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Türkiye
IDEF'19



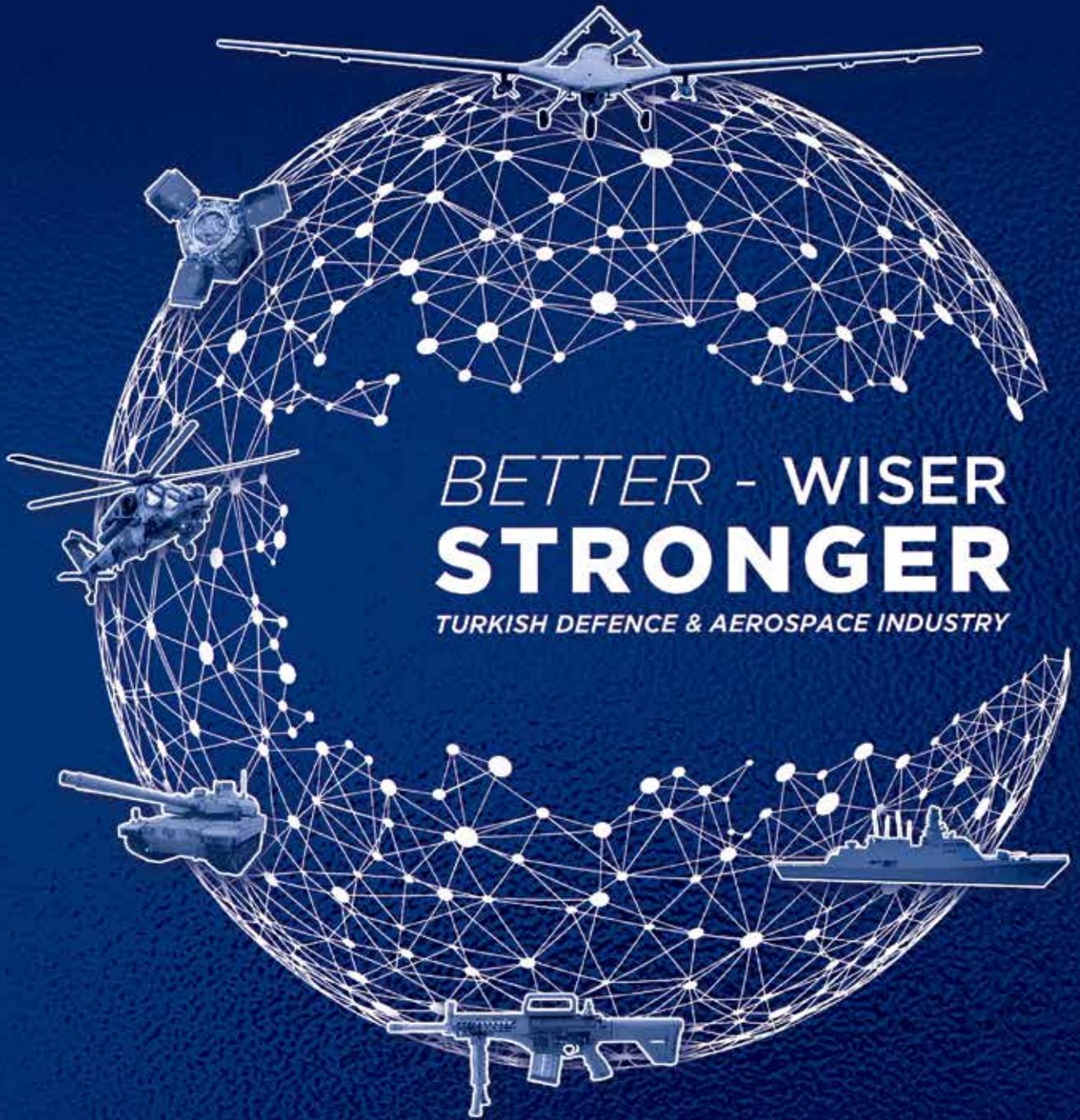
ATAK-II Contract Signed for the New Heavy Class Attack Helicopter

Turkish Naval Forces Sail on Territorial Waters with Blue Homeland Drill

30 Years of FNSS: A World Renowned & Respected Turkish Defence Company

Turkish Defence Industry Targets US\$ 3 Billion Exports in 2019

“Together for Peace” AMAN-19 Multinational Naval Exercise & Pakistan – Turkey Defence Cooperation



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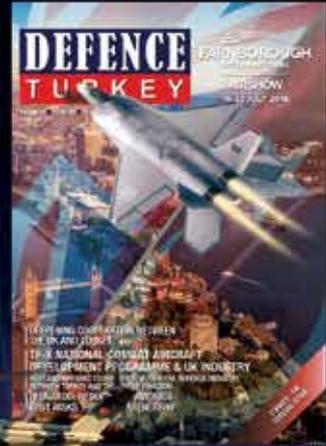
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IDEF '19 Gathers Top-ranking State Officials and Defence Professionals From All Over the World...

Ayşe EVERS
Publisher & Editor in Chief



Held biennially at Tüyap, Istanbul, IDEF, the landmark event in the region, offers a unique platform for the global and Turkish defence and aerospace industry to demonstrate its latest technologies, share knowledge, forge partnerships, connect global governments, armed forces, industry thought leaders, and the defence and aerospace supply chain. Leading industry players, government and military chiefs gather here biennially to contribute to dialogues, exchange ideas and seek solutions and strategies to advance the interests of the global aerospace and defence sector.

Under the auspices of the Presidency of the Republic of Turkey IDEF '19 organized by TÜYAP on April 30th – May 3rd, 2019 in collaboration with the Ministry of National Defence and the Turkish Armed Forces Foundation (TAFF), will showcase the latest defence developments featuring technology trends and the vital role of these technologies in advancing the defence sector and its relevant industries.

IDEF '17 welcomed 65,782 visitors from 116 countries and witnessed the participation of 820 local, regional and international companies and 133 delegations from 67 countries. The events also paved way for the signing of strategic deals. Throughout the event, where intergovernmental and G2G negotiations and negotiations between various levels of delegations and companies were conducted, a total of 2,240 appointment negotiations, stand visits and nearly 50 signing ceremonies were held.

IDEF '19 hosts the world's leading high-level procurement authorities in the field of the defence industry. It is expected that IDEF '19 will reach the highest number of official delegations at this year's event.

I wish that the IDEF '19 Exhibition will be very successful for all parties concerned.

Enjoy this issue... ■

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Yesterday, the sunlight trickled through the clouds
Today, as we ascend, it shines on our face with all of its brilliance
Tomorrow, we will soar together into the future

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Ismail DEMİR Ph. D.
Presidency of the Republic of Turkey
President of Defence Industries

IDEF - Among the Most Prestigious Defence Industry Fairs in the World

Together with its prime contractors, subcontractors, SMEs, research institutions and universities, the Turkish defence industry has become one of the most important sectors in our country. Today, land, air and naval vehicles, command and control, electronic warfare, fire control, communication and surveillance systems and specifically guided weapons are produced by Turkish defence industry companies and are designed through national means and offered to the service of our armed forces.

At present, Turkey is capable of cooperating with friendly and allied nations, as well as meeting the needs of our country. In this context, Turkey is exporting armoured vehicles, air defence systems, rocket systems, simulators, coast guard vessels, military communication systems, command and control systems and software to many countries around the world.

The defence industry is in a strategically important position in terms of policy and economy. Through its international cooperation and export-related efforts, the Presidency of Defence Industries (SSB) promotes the capabilities of the Turkish defence and aerospace sector, while also forging collaborations with allied countries. The defence industry collaborations built with allied nations benefit in reinforcing Turkey's existing political relations.

The development witnessed by the Turkish defence industry has created demand for the platforms, systems and capabilities of our Turkish companies in foreign markets. In order to ensure the continuity of this demand, international collaborations that are built at IDEF will be highly beneficial.

IDEF stands out as one of the world's most prestigious defence exhibitions. Top-ranking state officials and private sector officials from all over the world will participate in IDEF. To better understand IDEF's scope, figures from the previous exhibition provide a clear indication of the volume and variety of participants: IDEF'17 attracted 820 companies from 50 countries, and we saw participation by 133 delegations consisting of 637 members, arriving from 67 countries and two international organizations. Throughout the exhibition, several bilateral meetings were held, as well as signing ceremonies aimed at building new collaborations in the defence industry. With this event, our institution provides the opportunity to exchange views with representatives of visiting countries regarding current and potential projects.

Executed under the auspices of the Presidency of the Republic of Turkey, IDEF '19 is aimed to execute the same successful performance and provide extensive opportunities as with the previous exhibitions. IDEF '19 will host the manufacturers of platforms, systems and materials in the defence, security, naval, aerial and space industry sectors. To promote their potential and capabilities, all kinds of means will be provided to the participating companies, and notably our Turkish companies will have the opportunity to exhibit the platforms and systems they manufacture rather than models.

The Presidency of Defence Industries has invited over 90 delegations from more than 60 countries to IDEF'19 and meetings at the highest levels are planned with officials from the invited countries. In this context, the IDEF'19 exhibition is also considered to be important platform through which review and examination of collaborative activities occurs, it is an opportunity to build engagement with various countries on existing and future defence industry projects.

Benefitting from the logistical and cost-benefit advantages offered by the IDEF exhibition, our Turkish defence industry companies will find the opportunity to comprehensively showcase their potential and capabilities. Especially for small- and medium-sized enterprises (SMEs), IDEF represents a valuable platform from which they can introduce themselves to the international arena.

Every form of support that our sector might require during the exhibition shall be provided by the Presidency for Defence Industries and the relevant authorities. In this regard, we hold regular meetings with the sector's representatives and coordinate in order to enhance the effectiveness of the exhibition.

Last, but not least, I would like to express my wish for the successful execution of IDEF'19, and I hope that all participants will experience a beneficial and fruitful event.

ATAK-II Contract Signed for the New Heavy Class Attack Helicopter

The Presidency of Defence Industries (SSB) signed a contract with Turkish Aerospace (TUSAŞ) for the Heavy Class Attack Helicopter Project on February 22, 2019, to meet the needs of the Turkish Land Forces Command. President of Defence Industries Prof. İsmail DEMİR and representatives of the Turkish Armed Forces, TUSAŞ and defence industry sector representatives attended the signing ceremony at the Nuri DEMİRAĞ Meeting Hall of the Presidency of Defence Industries. The project contract was signed by the President of the SSB Prof. İsmail DEMİR, President & CEO of Turkish Aerospace Temel KOTİL and Turkish Aerospace Chairman of the Board Prof. Oğuz BORAT. The project aims to design and produce an effective and advanced attack helicopter equipped with state-of-the-art target tracking and imaging, electronic warfare, navigation, communications, and weapon systems. The ATAK-II is intended to operate in harsh geographical and environmental conditions and will have an increased payload while offering high maneuverability, performance and low maintenance costs. The project also aims to maximize the use of domestic systems to ensure



the security of supply and freedom of export.

The Heavy Class Attack Helicopter (Improved ATAK or ATAK-II) Project will play an important role in reducing the foreign dependency and increasing the effectiveness of the Turkish Armed Forces by implementing indigenous, national and innovative solutions that emerged from current domestic projects. Designed with the national and local capabilities as well as the technological know-how and operational experience gained through the T129 Mk-I Lightweight Attack Helicopter (ATAK-I), the ATAK-II will also use sub-systems

and components developed under the T625 GÖKBEY Multirole Helicopter Project. The T129 Mk-II Heavy Class Attack Helicopter (ATAK-II) to be developed will have a take-off weight of approximately two times the current T129 Mk-I ATAK helicopter and will be among the top-class attack helicopters with only two examples in the world. The first ATAK-II is expected to make its first flight within five years (approx. 60 months) of contract signature or in 2024. The project duration is estimated to be 8.5 years (approx. 102 months). Within the scope of the project, two types of Heavy Class Attack Helicopter configurations

Technical Specifications of T129 Mk-II (ATAK-II) Heavy Attack Helicopter

Empty Weight	Approx. 5,000kg / 11,023lb
Maximum Takeoff Weight	10,000kg/22,046lb
Maximum Payload	over 1,200kg/2,645lb
Crew	2, Tandem
Maximum Cruise Speed	318km/h / 171,70knts
Powerplant	2 x Turboshaft T700-TEI-701D
Takeoff Power	2 x 1,500kw/2 x 2,000shp
Service Ceiling	6,096m/20,000ft

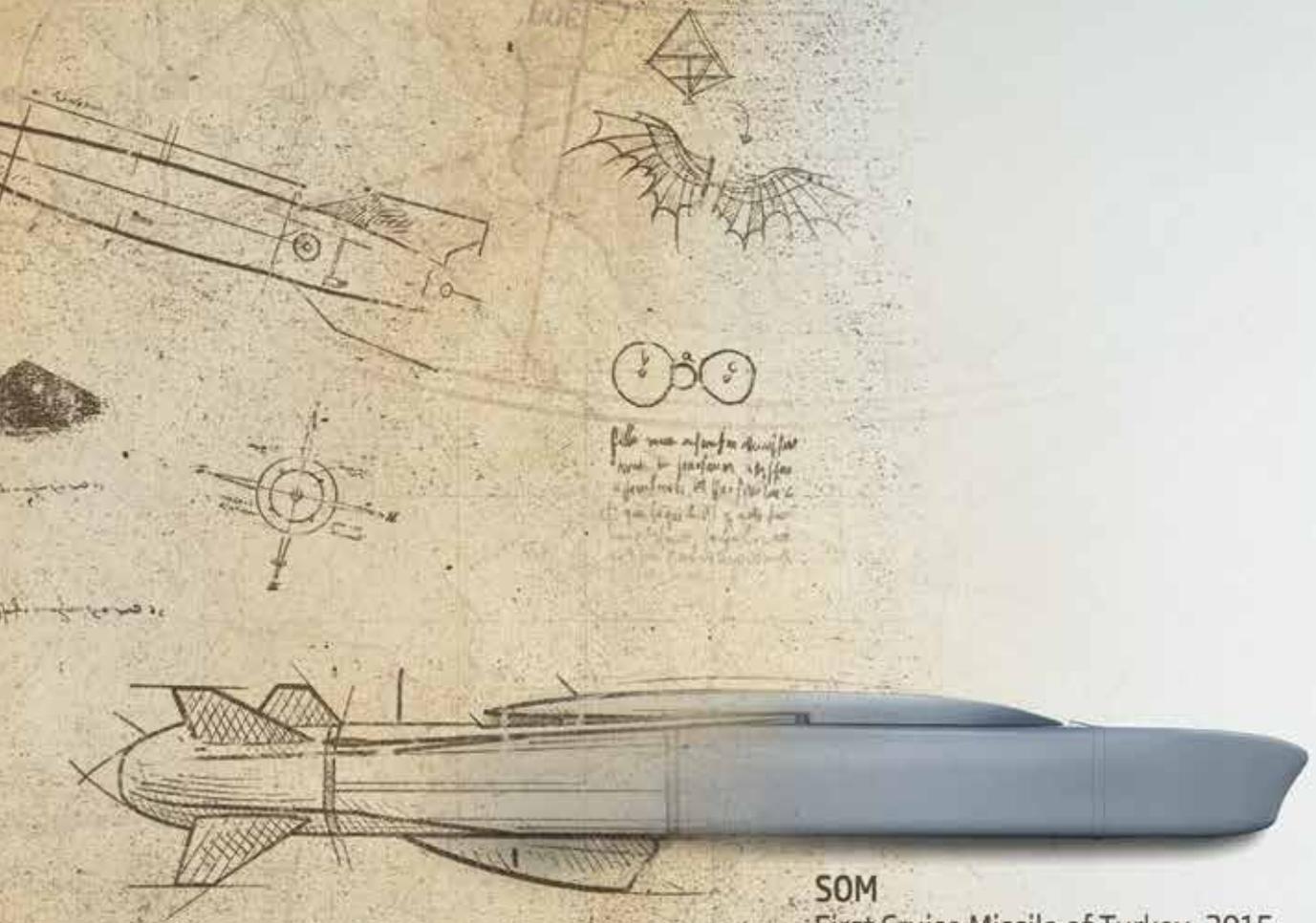


T129 Mk-II (ATAK-II) Heavy Attack Helicopter Armament

1 x 30mm single barrel chain gun,
New generation 2,75 inch/70mm unguided rockets, 70mm CİRİT Guided missiles, long range anti-tank missiles with different guidance systems,
Air-to-air Missile Systems



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(Naval and Land version) will be developed, and three prototype helicopters will be delivered to the Presidency of Defence Industries together with the Technical Data Package (TDP).

General characteristics of the T129 Mk-II Heavy Class Attack Helicopter:

- > 10-ton class
- > 2 Turboshaft engines
- > Weapon stations: 6 x underwing hardpoints
- > Maximum payload: 1,200kg
- > Tandem cockpit
- > 4 Axis Autopilot
- > Service ceiling: 20,000ft
- > Maximum speed: 318km/h
- > Operational envelope: -40° to +50°C
- > Armor: 12.7mm-resistant armored cockpit
- > Laser based Helicopter Obstacle Detection System (HETS) and Fire Control Radar (MilDAR)
- > Hot & High Performance
- > Resistant to environmental factors
- > High forward speed limit
- > Advanced electronic warfare and countermeasure systems
- > High-caliber cannon (30mm), new generation 2,75-inch rockets, long range and anti-tank missiles with different guidance systems and air-to-air missile systems

Speaking at the signing ceremony, President of Defence Industries Prof. İsmail DEMİR stated that they expect the Heavy Class Attack Helicopter to make its maiden flight within the prescribed time and added: "Different versions and advanced models of our helicopters should not lag behind in new technologies." Emphasizing that the helicopter will strengthen the operational capabilities of the Turkish Armed Forces, İsmail DEMİR said: "After 5 years, we expect our helicopters to use all-new, more advanced weapon systems and munitions than what we have today." On February 2019, President of the SSB İsmail DEMİR said in a statement to the channel NTV that they are open to friendly and allied countries who want to participate in the project. Additionally, in his statement to the press in January 2019, Prof. İsmail DEMİR also pointed out that the Performance Evaluation Phase of the Heavy Class Attack Helicopter Project will be completed in 2019.

Stating that the project aims



for 100% localization, Turkish Aerospace Chairman Prof. Oğuz BORAT emphasized that the new helicopter will be designed exclusively by Turkish engineers. Prof. Oğuz BORAT pointed out that the ATAK-II combat helicopter will have an increased operational performance with higher ammunition carrying capacity and said: "Along with new generation mission equipment, superior payload, and operational capabilities, the helicopter is expected to bring dynamism to the world market & Turkey." President & CEO of TUSAŞ Temel KOTİL also underlined that the helicopter will be 100% domestic and national because it is designed from scratch.

Earlier on October 3, 2017, Anadolu Agency reported that the aim of the ATAK-II Project was to develop a 6-ton class attack helicopter. Turkish Aerospace (TUSAŞ) announced on October 31, 2017 that it had begun domestic development of the 8-Ton Class (with 8.000kg MTOW and around 6.000 empty weight) ATAK-II combat helicopter. The Project would be realized

domestically without foreign help based on the technical knowledge and operational experience gained with the T129 Mk-I attack helicopter currently produced under license from Leonardo Helicopters.

Even though some of the sub-systems from the T625 GOKBEY TLUH (Turkish Lightweight Utility Helicopter Program) will be used in the T129 Mk-II, nevertheless the helicopter still needs more powerful turboshaft engines because the TS1400 engine will not meet the T129 Mk-II's thrust requirement. TEI plans to meet the engine requirement via 2.000shp class T700-TEI-701D engines, being manufactured under GE license (with a 61% local content share) for the T70 Utility Helicopters.

According to SSB figures, 6,300 of the 6,500 components/parts on T129 helicopters have been manufactured locally and the local content share on each T129 helicopter has reached around 50-55% as of May 2018. Each T129 ATAK Attack & Tactical Reconnaissance Helicopter costs around US\$40 Million.



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Sarsilmaz – Turkey’s Experts Producing the Highest Quality and Selection of Guns

In an Interview with the President of Sarsilmaz Silah Sanayi Latif Aral ALIŞ discusses the company’s scientific developments and innovations their focus on R&D. The company aims to manufacture the products that will best fulfill the demands and requirements foreseen in the global market. Sarsilmaz’s cumulative experience and know-how spans over 139 years, the only company in Turkey and in the world capable of manufacturing sports guns, pistols, shotguns and machine guns

Defence Turkey: Sarsilmaz Silah Sanayi A.Ş. has a deep-rooted history in manufacturing weapons and currently the company conducts the production of almost 100 types of guns in different sizes. Shall we start our interview with the Company’s 2018 performance figures?

Latif Aral ALIŞ: We initiated our journey five generations ago with the flintlock, and in time we turned into an R&D industry capable of designing

and manufacturing pistols, machine guns, shotguns and cannons. The number of our employees at Sarsilmaz and its affiliates is over 1,600. We have an outdoor area of 66,000 square meters and indoor area of 40,000 square meters at our factory established at the Düzce 1st Organized Industrial Zone (OIZ). Presently, we launched the construction of our additional facilities. Our investments in machinery and facilities are also

under construction. Sarsilmaz is the first and sole R&D Company in the light weapon industry in our country certified by the Ministry of Industry and Technology.

As Sarsilmaz, from past to present, our main effort has been to fully fulfill our commitments regarding the projects assigned to our company by the Presidency of Defense Industries (SSB). Within such a framework, our greatest aim is to direct the demands in light

weapon sector, into local production, to indigenous products. To this end, we conduct our deliveries in a very intense manner and continue executing our projects. Without doubt, our exports will continue as well.

Defence Turkey: What are your comments on the existing infrastructure, production capacity (semi – automatic weapons, automatic weapons, infantry rifles and sports guns) and technologies utilized in the manufacturing plants of Sarsilmaz at Düzce OIZ; also on the company's position within the light weapon industry in Turkey and in its users across the world?

Latif Aral ALİŞ: We are the only company in Turkey and in the world capable of manufacturing sports guns, pistols, shotguns and machine guns. There are no other industrial enterprises with such a wide product range. Of course, a 139-year old organizational memory is the key factor at this point followed by a conscious and dedicated team, a staff trained in time. With the help of attaching importance to the business and loving what we do, we readily are able to reproduce products at the multi-axial CNC benches. We have the same level of technology with the major companies of the world. Furthermore, we have many advantages.

Defence Turkey: Could you please share Sarsilmaz's vision, goals and predictions on the next 20 years with our readers?

Latif Aral ALİŞ: We aim to maintain our leadership in the light weapons industry and become a global design and production company with the most patents.

Defence Turkey: What are the features and superiorities of Sarsilmaz compared to its competitors in the market?

Latif Aral ALİŞ: The experience of five generations and keeping up with technological innovations, the importance we attach to R&D and quality and our powerful engineering infrastructure have carried us to higher levels in the weapon industry.

Defence Turkey: Previously Sarsilmaz bought the Italian Vincenzo Bernardelli Weapon Factory in 1998 and became a critical player in Europe. Does your company plan to make similar take overs in the future?

Latif Aral ALİŞ: We do not know what the future holds, but many companies are eager to team up with Sarsilmaz. Our negotiations are at full speed. Surely, we may make certain surprises in the upcoming period. We aim to become a multinational in our industry.

Defence Turkey: You have established a company named SAR USA in the USA and presently you conduct nearly 50% of your exports through this company to the USA. What can you share with us on the production made in USA and on the deliveries?

Latif Aral ALİŞ: We founded our US-based company in advance so that we can utilize the distributors in the US. We do not aim to sell too many products; we aim to build a good reputation instead. We included our company in the TURQUALITY support program developed by the Ministry of Economy for the branding of our country. We are the only weapon company manufacturing light weapons as part of this program.

Defence Turkey: Sarsilmaz exports a crucial part of its production to foreign countries and exports weapons nearly to 80 countries. At the same time, with the help of its products having high performance at tenders launched by the Ministry of National Defence, the company has been the single official weapon supplier of the Turkish Armed Forces (TAF) for years and accomplished the delivery of hundreds and thousands of weapons of different types to the use of the Turkish Police as part of contracts signed with the National Police. Could you inform us on the recent weapon deliveries made to the TAF and to the National Police and the models of the weapons delivered?

Latif Aral ALİŞ: We have secured the Indigenous Weapon Development Tender thanks to the SAR 9 METE



SAR9 METE

9x19 mm semi-automatic pistol which was selected for the best pistol and completed the project with the least number of errors. This pistol is the outcome of one-year-long intense R&D activities. It has always been an operation weapon admired by everyone due to its ergonomic structure, its practical demount ability, its robustness and high target acquisition capacity.

Defence Turkey: Sarsilmaz secured the Indigenous Weapon Development tender executed by the Presidency of Defense Industries (SSB). Within the scope of the contract you have signed, you will be accomplishing the delivery of a total of 110,242, 9mm SAR 9 METE semi – automatic pistols for the Land and Air Forces Commands, the Coast Guard Command and the National Police. What would you like to tell our readers on the latest status of the deliveries and the feedback received from the users?

Latif Aral ALİŞ: Let's add the Gendarmerie to the armed forces that you have mentioned. The overall number of weapons we will be delivering as part of this project is 157,242. For the time being 33,242 of these weapons have been delivered. The major part of this delivery will be accomplished in 2019 and 2020. We have been receiving quite positive feedback. We are delighted and proud to gain such a product for our country. In fact, the manufacturing of pistols is quite simple for us, yet we displayed our experience and technology once again in this recent product.

SAR 9 METE

	Caliber (mm)	9x19
	Capacity	17+1 / 19+1
	Barrel Length (mm)	113,5
	Overall Length (mm)	193
	Overall Height (mm)	140
	Overall Width (mm)	37
	Weight (gr)	750



Defence Turkey: Could you please enlighten our readers on the R&D approach of Sarsilmaz Company regarded as Turkey's greatest weapon and sports gun manufacturer and as one of Europe's three greatest weapon manufacturers and the activities conducted to this end? What would say on the cooperation with TÜBİTAK (the Scientific and Technological Research Council of Turkey) and the universities as part of R&D activities? What types of new technologies will be taking part in new pistol and shotgun models?



SAR 9X Platinum

Latif Aral ALİŞ: We are conducting R&D studies to further enhance our repertoire consisting of our cumulative experience and know-how spanning over 139 years, and for the utilization of this repertoire in designing new applications. With the aim of maturing these inventive activities we have been executing on a systematic basis, we have restructured our R&D unit in 2007. By implementing the R&D management processes at this unit, we have revealed many new products and achieved technological developments. We made an application for achieving the status

of an R&D center on 25 June 2015, this application was examined by the relevant authority and approved on 17 August 2015.

As of Sarsilmaz, we keep up with scientific developments and innovations and attach great importance to R&D with our desire to realize what has never been done before. We aim to manufacture the products that will best fulfill the demands and requirements foreseen in the global market. Our team with advanced know-how and global experience is the guarantee to maintaining Sarsilmaz Company's sustainable and full manufacturing capacity. Furthermore, we team up with the Turkey's greatest R&D institution TÜBİTAK, as well as Middle East Technical University, Kocaeli University, Eskişehir Osmangazi University as well as Düzce University on various projects at the Sarsilmaz R&D Center. As Sarsilmaz, we



SAR 223P

developed Turkey's first indigenous infantry rifle with light and modular weapon system characteristics the SAR 223 which is effective at all types of environment and harsh weather conditions and which has high firepower, accurate range and hit rate, by collaborating with TÜBİTAK, University of Kocaeli and the Middle East Technical University.

In parallel with the rapid development in technology, the

impetus of change and development of the weapon systems and equipment increased in the defence industry. In order to keep up with these swift changes and developments, the Sarsilmaz R&D Center established is the only R&D center in the light weapon sector that was certified by the Ministry of Industry and Technology.

Our experienced and dynamic R&D team is composed of engineers and technicians experienced in product development, 3-dimensional indigenous design, prototype production and weapon tests and gun masters and operators who are constantly surveying market demands.

At our R&D Center, we follow the systematic approach given below throughout the roll-out of new products:

- › Concept development,
- › Technological, technical and economic feasibility studies,
- › The laboratory studies and similar studies conducted as part of the transition process from the developed concept to design,
- › Design, design implementation and design verification activities,
- › Prototype production,
- › Establishment of the pilot facility,
- › Trial production and execution of the type tests,
- › Solving the issues faced during the field tests arising from the design.

Defence Turkey: Sarsilmaz launched the production of semi-automatic weapons upon the Production License granted by the MSB in 1998. In 2009, with its own resources, the company commenced development activities regarding the 5.56 mm caliber infantry rifle named SAR 223T and the 9mm caliber machine gun named SAR 109T. Could you please inform us on the latest status of the aforementioned weapon programs launched at IDEF'13 and the deliveries



SAR 109T



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accomplished so far? What type of feedback has been received at promotion and marketing activities held in our country and abroad?

Latif Aral ALİŞ: The semi-automatic weapons as part of the Sarsılmaz product range are being utilized by the institutions under the auspices of the Ministry of Internal Affairs composed of the National Police (EGM), General Command of Gendarmerie and the Coast Guard Command as well as the units under the auspices of the Turkish Armed Forces (TAF) that composed of Land, Naval and Air Forces Commands. Our machine guns are being utilized by the EGM, General Command of Gendarmerie and our Naval Forces Command as a task gun; our indigenous infantry rifles SAR 223P and SAR223T and the SAR 308 infantry rifle are being used by the institutions under the auspices of our Ministry of Internal Affairs. The MPT-76 Modern Infantry Rifle we have been manufacturing is included in the inventories of the EGM and Air Forces Command. Our tactical shotguns are being used in operations and admired by our General Command of Gendarmerie as well.

Defence Turkey: In February 2017, you signed a contract with the SSB for the production of 10,000 MPT-76 Modern Infantry Rifles and launched the mass production activities in 2018 upon the completion of the pre – production and prototype testing processes. In the meantime, the amount of the order reached 20,750 in 2018 according to the additional contracts signed with the SSB to this end. What are your comments on the amount orders received so far and on the accomplished deliveries within the scope of the MPT-76 project?

Latif Aral ALİŞ: We have received an order of overall 12,000 Modern Infantry Rifles from the Presidency of Defense Industries; the deadline of delivery was identified as the year 2020. We have successfully accomplished the factory acceptance tests of the first group of these rifles at this time. We initially completed the delivery of 500 products to the National Police (EGM). Currently, we are about to deliver 2,500 rifles to the Air Forces Command and to the EGM. Even though we were



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been involved in this project very late, we manufactured the products in a short span of time and launched the deliveries.

Defence Turkey: What would you like to tell about the TR Mechatronics Company you established with the Turkish Aerospace Industries, Inc. (TAI) in 2018 at the 1st Organized Industrial Zone in Düzce? This company has recently signed the Project on the Development of a 20 mm Cannon with the SSB in April. With this project, the indigenous design and production of the 20 mm rotary barreled turreted weapon system utilized in the T129 ATAK helicopters is aimed. Could you please inform our readers on the project schedule, the targeted rate of domestic participation and the number of cannons to be manufactured?

Latif Aral ALİŞ: Sarsılmaz and Turkish Aerospace are two notables enterprises achieved to make their marks in their own fields. We have established TR MEKATRONIK Company in order to minimize foreign dependency, with the vision of achieving a breakthrough. The structure of our partnership was

formulated as 50% Sarsılmaz and 50% Turkish Aerospace. During this procedure, Sarsılmaz will be proceeding by sharing its activities in aerospace with TR MEKATRONIK to a certain extent. We believe these two companies will be contributing to each other's achievements as aerospace industry contains quite valuable know-how in respect to design and quality requirements and since we perform our operations at the same premises. Moreover, TR MEKATRONIK will be in the structure that develops products of superior quality in line with the R&D philosophy. We believe that our new company, which will be conducting R&D studies in the first two years, will be contributing greatly to our country's exports in the next five years.

Defence Turkey: As Sarsılmaz Weapon Industry, in the middle of 2017 bought the Yavaşçılar (YAVEX) Hunting Equipment Industry and Trade, Inc. which was considered to be Turkey's leading explosives and light weapon ammunition manufacturer and established a brand new company titled as "Sarsılmaz Explosives Industry, Inc.". What are your



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Ayşe EVERS - Editor in Chief of Defence Turkey Magazine with Latif Aral ALİŞ - President of Sarsılmaz in Sarsılmaz Facility, Düzce

Denizlerde Tam Hakimiyet

comments on Sarsılmaz's light weapon ammunition (i.e. YAVEX 9 mm x 19 FMJ, YAVEX Primer, 5,56 mm x 45 and the 7,62 mm x 51) production capacity and its targets for the future?

Latif Aral ALİŞ: This facility was capable of only manufacturing 9x19 caliber guns when we bought it, now it has tripled its capacity. We completed our investments to enable the production of all components of ammunition in 5,56X45, 7,62x51 and 12,7x99 calibers. We will launch the production as soon as possible.

Defence Turkey: In addition to your Presidency of the Sarsılmaz Board, you are also the President of the Defense and Aerospace Industry Exporters' Association (SSI). Does having two positions bring you difficulties in the business world?

Latif Aral ALİŞ: The Defence Industry is our sector. What we have learned in Sarsılmaz actually facilitated my endeavors at the Presidency of the Defence and Aerospace Industry Exporters' Association. Furthermore, it enables me to make more pragmatic decisions. The Defence Industry exports achieved an average increase rate of 50% in the last three months. The Turkish Defense Industry Sector is becoming the highest growth sector among all the sectors as a result of export sales.

Defence Turkey: Sarsılmaz has been executing manufacturing for the aerospace industry since 2013. Could you please enlighten our readers on your activities in the aerospace industry and the deliveries you have recently accomplished?

Latif Aral ALİŞ: As of 2015, we have been manufacturing 500 various parts for the aerospace industry. We are manufacturing different parts for companies such as Boeing, Airbus, etc. and for all the products manufactured by Turkish Aerospace.

Defence Turkey: How did Sarsılmaz prepare for the International IDEF'19 fair, where Turkish Defense Industry will be raising its flag with its newest indigenous solutions? What are your assessments on Sarsılmaz Company's participation in IDEF'19 and the surprises prepared for the visitors?

Latif Aral ALİŞ: We will be displaying all our semi-automatic and revolvers within our product range including the ammunition calibers- from .22 to caliber to .45 caliber and the semi-automatic and fully automatic pistols with the caliber of 9x19 at IDEF'19. The shotguns with the calibers of 5,56x45 mm and 7,62x51 mm will be exhibited at our stand. Besides, we will be demonstrating the pistols with 7,62x51 mm and 12,7x99 mm calibers of which the projects were assigned by the SSB. Therefore, we will be showing our capability to manufacture the light weapon industry at all calibers as well as our capacity to produce all types of military products.

Defence Turkey: Would you like to convey any message to our readers?

Latif Aral ALİŞ: Our Company's principle is to manufacture the best product with the highest quality. We consistently lay claim to our products that are on the market. This perspective is the greatest proof why we are a reliable brand.

Defence Turkey: Dear Mr. ALİŞ, thank you for your time and we wish you continued success ■

Dünya çapındaki müşterilerine en kapsamlı ve entegre denizcilik ürünlerini sunmak konusunda 40 yılı aşkın deneyime sahip olan Leonardo, müşterilerinin denizlerde bilgi üstünlüğü edinmesine yönelik çözümler sağlar.

Aynı ismi taşıyan eski büyük usta ve mucidin vizyonu, merakı ve yaratıcılığından ilham alan Leonardo, yarının teknolojisini tasarlar.

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Turkish Naval Forces Sail on Territorial Waters with Blue Homeland Drill

The Turkish Naval Command conducted the Blue Homeland-2019 naval exercise with 103 military vessels in the Black Sea, Aegean Sea, and the Mediterranean simultaneously between February 27 and March 08, 2019.

Coordinated by a team of 165 personnel from the Naval Warfare Center Command, the "Blue Homeland-2019 Naval Exercise" was carried out by the Turkish Naval Forces Command in line with the Turkish General Staff Annual Training Program. The preparations for the exercise began on February 26 with the participation of 13 Frigates, 6 Corvettes, 16 Fast Attack Boats, 7 Submarines, 7 Minehunters, 17 Auxiliary Ships, 14 Patrol Boats, 22 Landing Craft, and 1 Training Ship. The operational



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phase of the exercise started on February 27, following the departure of vessels and units from the Black Sea, Ereğli, Umuryeri, Gölcük, Erdek, Çanakkale, Foça, Aksaz, and İskenderun. Between February 27 and March 02, Turkish Navy ships and units performed ASUW (Anti-surface Warfare), AAW (Anti-aircraft Warfare), ASW (Anti-submarine Warfare), Naval Mine Warfare, EW (Electronic Warfare), VBSS (Visit, board, search, and seizure) and live-fire training to evaluate the operational capabilities and readiness (ORE) of the Turkish Naval Forces. Turkish Air Force and Turkish Land Forces also participated in the exercise and carried out joint training with Turkish Naval units by providing tactical air support. In addition,



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Maritime Patrol Aircraft, Unmanned Aerial Vehicles, Navy special operations teams (SAS and SAT commandos), Amphibious Marine Battalions, Land Forces Command Multi-purpose & Attack Helicopters, Air Force Command Airborne Early Warning and Control Aircraft, and Coast Guard Ships and Boats also took part in the exercise. On March 5, Turkish Navy units conducted a submarine rescue mission and an amphibious landing operation at Aksaz and Foça Naval Bases as part of training scenarios.

During the exercise, Turkish Naval Forces used ANKA and Bayraktar Unmanned Aerial Vehicles for the first time in naval operations.

In the Eastern Mediterranean

part of the Exercise, Turkish Naval Forces vessels departed from Aksaz Naval Base in Marmaris and carried out various day and night training missions together with the Turkish Air Force during their voyage. The flotilla included 5 Frigates, 4 Fast Attack Boats, 2 Submarines, 2 Minehunters, one Amphibious Assault Ship, one Fleet Replenishment Tanker, 4 New Type Patrol Boats, one Coast Guard Search & Rescue Ship, 3 Auxiliary Ships as well as Navy special operations teams and amphibious assault units.

Arriving off the coast of Kaş, Antalya, the vessels commenced shore bombardment as part of Naval Gunfire Support (NGFS) training. The ships delivered



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Üstün Çözüm



AW101

AW101 Kuzey Kutbundan Güney Kutbuna 420,000 saat uçuşu olan, orta-ağır sınıfta sınıfının lideri bir helikopterdir. Kullanıcılarca en çok ihtiyaç duyulan menzil, kapasite, performans ve emniyet kriterlerini en zorlu koşullarda sağlamak üzere dizayn edilen ve en son teknoloji aviyonikleri ile pilot iş yükünü minimize ederken uçuş emniyetini maksimize eden AW101, 900 deniz mili üzerinde menzile, havada yakıt ikmal kabiliyeti, darbe korumalı koltuklara konuşlu 38 tam teçizatlı piyade taşıma kapasitesine sahip bir helikopterdir.

Süregelen operasyonel başarılarla edinilen geniş operasyonel tecrübeye dayalı uygun maliyetli ömür devri desteği ve kapsamlı eğitim seçenekleri mevcuttur.

Leonardo, büyük usta mucitin vizyonu, merakı ve yaratıcılığından esinlenerek yarının teknolojisini tasarlamaktadır.

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artillery fire to the predetermined targets at Beş Adalar area and hit all the targets on the islands with maximum accuracy.

Submarine Search and Rescue Training Executed with Absolute Success

In the Eastern Mediterranean part of the exercise, a submarine search & rescue training operation was also carried out. TCG Alemdar Submarine Rescue Mother Ship (MOSHIP) took part in the training off the coast Aksaz. As part of the scenario, TCG Çanakkale collided with a merchant ship while ascending to periscope depth from dive depth during an anti-submarine warfare operation. Rescue & towing Ship TCG Işın and minehunter TCG Anamur searched and located the position of the submarine approximately



80 meters below the surface. During the initial survey, the ships detected damage on the port side and the rudder blade of the vessel. The rescue operation started upon confirmation that 14 of the 47 personnel on board were injured. A submarine escape and rescue team airlifted to the scene as part of the scenario prepared the intensive care unit and the pressure chamber on TCG Alemdar for medical triage and emergency treatment. During the submarine rescue scenario, the rescued crew members were transferred to the related treatment areas following the medical examination.

TCG Burgazada Accomplished First Mission

Commissioned in November 2018, TCG Burgazada, the third of the Ada (Island) class corvettes produced under the National Ship (MİLGEM) Project, accomplished



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its first major mission during the Blue Homeland exercise. TCG Burgazada departed from Poyraz Harbor in Gölcük under an asymmetric threat from an approaching boat as part of a scenario. The ship fired warning shots then engaged and eliminated the target using Aselsan weapon systems.

In the continuation of the scenario, the national corvette destroyed a helicopter, which was reported to carry out an asymmetric attack on the base. The ship also performed "searched channel" training as part of naval mine countermeasure operation. SAT commandos landed on the ship's deck with the fast-roping method from a hovering helicopter. The Seahawk model helicopter then took off from the ship and deployed "chaff" and "flare"

countermeasure systems.

The North Aegean part of the exercise, commanded by Commander of Naval Forces Admiral Adnan Özbal, started with anti-aircraft warfare training. As part of the scenario, Turkish ships engaged target drones simulating enemy aircraft with anti-aircraft weapons.

More than ten warships, including TCG Burgazada, successfully destroyed the targets and completed the air defence training.

The Amphibious stage of the exercise began with marine infantry units, tanks, and armored vehicles boarding the indigenously built landing ship, TCG BAYRAKTAR, to land at the Hekimli Island located near the Izmir coast as part of the scenario.

Accompanied by landing



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TCG Burgazada F-513 Ada-Class Corvette

ships, TCG Bayraktar departed from the Leventler Port inside the Foca Naval Base to Hekim island. Following their approach to the island, the vessels performed ship-to-ship (Limbo) operation.

As the water depth at the beachhead is not suitable for TCG Bayraktar to use its bow ramp, amphibious assault teams were launched from the ship with small landing crafts to divide the enemy forces positioned on the main landing area as part of the training scenario.

Tactical divers onboard the TCG Edremit minehunter used the Lightweight Autonomous Underwater Vehicle (HOSA) to identify possible mines or dangerous objects in the sea which can cause a threat to the vessels and amphibious units approaching the island.

SAT and SAS commandos carried out underwater reconnaissance activities to detect mines and underwater obstacles in areas close to the coast. A Navy special operations team secured the landing area by infiltrating the enemy coast. Other SAT teams arriving with boats disarmed the mine at the beachhead for the approaching landing crafts.



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When the beach was secured and cleared from mines, amphibious infantry units landed on the island with boats.

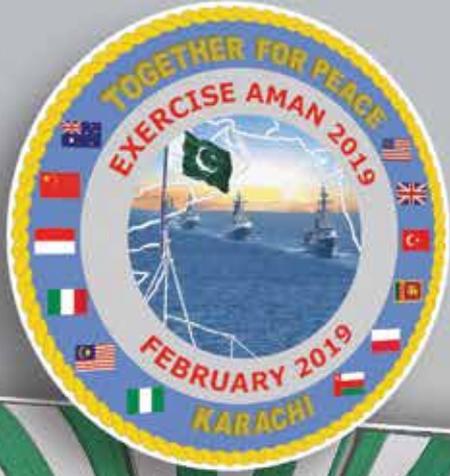
The Turkish Land Forces Command also participated in the exercise and coordinated a joint training operation to test the UMTAS and CİRİT missile systems. The participating units performed simultaneous real-time combat maneuvers resembling crisis and wartime scenarios in the Black Sea, the Aegean, the Mediterranean, and

the surrounding international waters.

Following the completion of the operational phase, the Turkish flotilla consisting of 67 ships conducted a total of 40 port visits in three seas between the dates of March 06-08, 2019. The port visits also included seven foreign ports in every littoral country in the Black Sea. Around 50 press members from national and international media organizations followed all stages of the exercise on the ground.



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“Together for Peace” AMAN-19 Multinational Naval Exercise & Pakistan – Turkey Defence Cooperation

by İbrahim SÜNNETÇİ

The Islamic Republic of Pakistan, a nation state of more than 200 million people, lies on the Arabian Sea (which is a part of the Indian Ocean that is located between the Arabian Peninsula and the Indian subcontinent) between latitudes 24 & 37 degrees North and longitude 61 & 75 degrees East. Pakistan enjoys a unique geo-strategic importance due to its strategic location whereby it connects three important regions: the Central Asian Republics and China on the North, the Middle East towards the West and Southeast Asia towards the East. It is located close to the Gulf of Oman and the Strait of Hormuz. On average, 3,000 ships visit Pakistani Ports and 45,000 ships pass close to the Pakistan coast every year.

As a riparian/littoral country, Pakistan is heavily reliant on sea routes, not only for its industrial supplies, imports and exports but also for its energy needs. Pakistan's Exclusive Economic Zone (EEZ, 350nm, technically the Pakistani water shelf constitutes 350,000 square kilometres) and the extended continental shelf constitutes over 35% of its land and it has a coastline of 1,046km. Around 95% of Pakistan's trade by volume and 70% by value are carried out through sea-lanes and 100% of its oil imports are routed through the North Arabian Sea. With the establishment of the Gwadar Deep Water Port, which is the gateway to the US\$62 Billion China-Pakistan Economic Corridor (CPEC), the strategic importance of the North Arabian Sea further multiplies. Pakistan's prosperity and progress are intrinsically linked to the safety and security of the maritime domain.



Maritime threats to international shipping, principally come from sea piracy and maritime terrorism. Other threats, those which are not directly related to shipping but are serious concerns to maritime states include: human trafficking, drug smuggling and gun running. The SLOC of the Arabian Sea needed to be protected for benefit of the world. Threats like terrorism, piracy, drug smuggling, human trafficking and disasters require international collaboration to secure the Arabian Sea and the Indian Ocean Region (IOR).

Starting from 2006, piracy incidents increased significantly all around the world, and peaked from 2009 to 2011 (410 incidents in 2009, 445 in 2010 and 439 in 2011) especially in the Red Sea, Gulf of Aden, Arabian Sea, Persian Gulf and the Somalia Basin. Thanks to international coalitions and alliances willing to work voluntarily against this threat, piracy was brought under control starting from 2012 (decreased to 297 incidents in 2012 and to 191 in 2016). However, according to the International Maritime Bureau Piracy Reporting Center (IMB PRC), an independent and non-governmental agency based in Kuala Lumpur, piracy in the world's seas has once again been on the rise. According to the IMB's latest annual piracy report, piracy increased in the world's seas in 2018. Worldwide, the IMB PRC recorded 201 incidents of maritime piracy and armed robbery in 2018, up from 180 in 2017. As of 1 April 2019, 41 incidents of maritime piracy and armed robbery have been reported.

Global maritime security is closely linked to the presence of Sea Power and Navies that provide presence all over the world for this purpose. However, in the 21st century, no single nation alone has the capacity to provide freedom of navigation, keep sea-lanes open, safe guard the vital links in the world and thus protect and defend global order. So, it is self-evident that nations that are completely dependent on the seas must work together. That is why the Pakistan Naval Forces (PNF), the guardian of country's maritime interests, became the

first regional Navy to become the member of the US led and Bahrain-based Combined Maritime Forces (CMF) in 2004. Comprised of three Combined Task Forces: CTF-150 (maritime security and counter-terrorism), CTF-151 (counter piracy) and CTF-152 (Arabian Gulf security and cooperation) the CMF is dedicated to promoting security and the free flow of commerce across 3.2 million square miles of international waters in the Red Sea, Gulf of Aden, Somali Basin, the Indian Ocean and the Gulf. The CMF's main focus areas are disrupting terrorism, preventing piracy, reducing illegal activities, and promoting a safe maritime environment for all. Since 2004, the Pakistan Navy (PN) contributed 1 to 2 Destroyers/Frigates with embarked helicopters to the CMF. The PN joined the CTF-150 in 2004 and the CTF-151 in 2009 and remained a fundamental contributor in the global efforts against piracy. As the largest contributor to CMF operations, second only to the US Navy, the PN has commanded multinational CTF-150 10 times and the CTF-151 8 times.

As a firm believer in collaborative maritime security, the PN has a number of initiatives in this regard including the RMSP and the TF-88. Established in 2018 by the PN in order to fulfil international obligations in addition to the protection of their own national interests in the IOR, the Regional Maritime Security

Patrols (RMSP) is focused on areas of interest particularly the Southern Red Sea, Gulf of Aden, Gulf of Oman and choke points off the Maldives. Established in December 2016 and fully activated during the first quarter of 2017 the Task Force-88 (TF-88) is focused on ensuring maritime security of the Gwadar and adjacent sea-lanes and maintains a robust security posture in critical sea areas and choke points in the Indian Ocean for the protection of national and international shipping.

In the spirit of promoting peace through this collaborative approach, the PN took the initiative and commenced the AMAN series of exercises in 2007. In Pakistan's national language Urdu AMAN means 'PEACE' and the slogan/motto of AMAN Exercise 'Together for Peace'. The concept of the Exercise was designed to provide a common forum for information sharing, mutual understanding and identifying areas of common interest.

The AMAN series of exercises play a pivotal role against regional threats, not for just the participating countries but for the extra-regional countries as well. The AMAN series of exercises are considered as the most significant initiative of the PN in the field of maritime diplomacy, aimed at reinforcing regional maritime security and the cooperation between partnering nations.



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Exercise AMAN

The Pakistan Navy (PN) has been hosting Multinational Naval exercise AMAN biennially since March 2007. The Exercise AMAN brings together Ships, Aircraft, SOF/EOD Teams and Observers from the Navies of East and West under one umbrella for collaborative peace and security in the maritime domain. The PN seeks to enhance interoperability between regional and extra regional navies, with this exercise as a means of promoting peace and stability in the region and beyond. Besides functioning as an opportunity to gather the international maritime community to one platform to promote peace and stability, the AMAN also provides a unique training opportunity to develop and practice tactics which help participants foster and sustain the mutual relationships that are conducive for ensuring safe and secured sea lanes across the world's oceans.

The AMAN exercises are structured to create Responses, Tactics, Techniques and Procedures (RTTPs) against non-traditional threats through tactical warfare planning followed by high-end warfare serials at sea such as Naval Gunfire, Visit, Board, Search & Seizure (VBSS), Anti-piracy, Operations, Combine Anti-Submarine Exercise, Communications, Boarding and Air Defence.

The AMAN exercises are planned with focused objectives follows:

- › Develop coalition building and multi-layered security cooperation to promote a safe & sustainable maritime environment.
- › Enhance tactical interoperability between regional and extra regional navies thereby acting as a bridge between the regions.
- › Validating RTTPs to counter non-traditional threats in the maritime domain.
- › Project a positive image of Pakistan as a country contributing towards regional peace and stability.
- › Consolidate the PN's position in the regional maritime arena.
- › Display of united resolve against terrorism and crimes in maritime domain.
- › Intermingling of multinationals with the depiction of their respective cultures.
- ›



Since 2007 a total of 7 AMAN exercises have been planned but, since in the year 2015 the AMAN-15 was not held due to some operational commitments of the PN, only six of them have been executed including exercise AMAN-19. The participation details of AMAN-07, 09, 11, 13, 15 and 17 are as follows:

1st Exercise AMAN-07: It was held in March 2007 with great success. During AMAN-07, total of 28 countries participated with ships/aircraft or observers. 14 ships from Bangladesh, China, France, Italy, Malaysia, UK and the US Navies joined the exercise. In addition, SOF/EOD Teams from Turkey and Bangladesh also participated in SOF Exercises. 21 countries attended the Exercise as Observer.

2nd Exercise AMAN-09: The second Exercise AMAN series was held in March 2009. A total of 24 countries participated in the Exercise with ships/aircraft or observers. During AMAN-09, 23 ships, 14 of them from Australia, Bangladesh, China, France, Malaysia, UK and the US along with 13 aircraft (including 2 P-3C Orion MPAs from Japan) and 9 SOF Teams from China, the US, Turkey, Nigeria and Bangladesh participated. Observers from 27 countries also attended the Exercise AMAN-09.

3rd Exercise AMAN-11: It was conducted from 08-12 March 2011. During this Exercise, 28 countries participated with ships/aircraft or observers. A total of 11 ships from Australia, China, France, Indonesia, Italy, Malaysia, Saudi Arabia and US participated. 3 aircraft from Australia & Japan and 3 x SOF/EOD/Marines Teams from China, Turkey and the US also participated during the Exercise AMAN-11. 43 observers from 26 countries attended the Exercise.

4th Exercise AMAN-13: It was conducted from 4-8 March 2013. Navies of 29 countries participated in the Exercise with ships/aircraft or observers. A total 12 ships from 10 different countries, 2 aircraft, 9 SOF/EOD Teams from 6 countries and 36 observers from 21 countries took part in AMAN-13.

5th Exercise AMAN-15: It was scheduled to be held in February 2015. 13 ships, 2 aircraft, 14 SOF/EOD/Marines Teams and more than 60 observers from 34 countries had confirmed their participation in the Exercise. However, due to some operational commitments of the PN, the AMAN-15 Exercise was not conducted. The International Maritime Conference was held.

6th Exercise AMAN-17: It was the 5th exercise of AMAN series and was conducted from 10 - 14 February 2017. The avies of 34 countries participated in the Exercise with 12 ships from Australia, China, Indonesia, Russia, Sri Lanka, Turkey and the UK. 2 P-3C Aircraft from Japan, 10 EOD/SOF Teams from China, Indonesia, Malaysia, Maldives, Russia, Sri Lanka, Turkey and the UK also participated during the Exercise AMAN-17. 67 Observers including 7 Senior Officers from participating countries attended the Exercise.

The AMAN is a clear manifestation of Pakistan's profound commitment toward promoting peace and stability in the region through harmony and collaborative efforts between the navies of the world. Participation of such a large number of Eastern and Western Navies in AMAN Exercises is a testament that the international community appreciates Pakistan's sincere efforts for peace and maritime security and is willing to join hands with Pakistan to create greater harmony and cooperation in the IOR.



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Exercise AMAN-19

The 6th edition of AMAN series of exercises, AMAN 2019 (AMAN-19) was conducted during 08-12 February in Karachi and the North Arabian Sea. Navies of 83 countries were invited to participate and 45 Navies (46 with Pakistan) participated through Ships (a total of 21 ships from 10 Navies including the PN and the Pakistan Maritime Security Agency/PMSA), Aircraft (11 fixed wing and 13 rotary wing aircraft took part in Fly-Past), Special Operation Forces (SOF, including 6 SOF Teams, 5 Explosives Ordnance Disposal [EOD] Teams and 4 Marines Teams from 11 countries), Observers and Speakers.

Like all previous AMAN Exercises the Exercise AMAN-19 also was conducted in two phases: The Harbour Phase (spanned from 08-10 February) and the Sea Phase (from February 11 to 12). The Harbour Phase consisted the Arrival of Participating Units, Opening Ceremony at PN Dockyard, Maritime Counter Terrorism Demo by SSG(N)/Pakistan Marines, Cross Ships Visits, Calls On, International Band Display and International Food Gala & Cultural Show. On the second day of AMAN-19, friendly sports matches between officers of participating countries and the PN were also held. Whereas, the Sea Phase included practical execution of operational plans and activities finalized during the Harbour Phase and the International Fleet Review (IFR).

The participating naval vessels carried out drills on 23 subjects including RAS, Anti-Piracy, Main-Gun Firing, Formation Movement and VBSS operations. AMAN-19, with compact schedules and rich activities, strengthened mutual understanding and trust between the Pakistan Navy and the participating navies. The Exercise also enhanced the capability of participating naval sailors to deal with various security threats and demonstrated the determination and confidence of Pakistan and other participating countries in jointly addressing risks and challenges and safeguarding peace, prosperity and stability in the IOR.

As one of the key events of



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AMAN-19, the 8th International Maritime Conference (IMC-2019) spanned over three days and was organized by the National Center for Maritime Policy Research (NCMPR) at Bahria University. The conference was held on the topic "Global Geopolitics in Transition; Rethinking Maritime Dynamics in the Indian Ocean Region" at the Movenpick Hotel, Karachi from 9-11 February 2019.

A group of 11 journalists from international media outlets and defence and aerospace sector magazines including Defence Turkey Magazine, courtesy of the Naval Directorate of Public Relations, were invited from China, Indonesia, Japan, Oman, Malaysia and Turkey and were hosted in Karachi to follow AMAN-19. The Exercise was also followed by 19 journalists located in Karachi and 45 Islamabad-based journalists.

Opening Ceremony at PN Dockyard

Multinational Maritime Exercise AMAN-19 formally commenced on 08 February 2019 at the Pakistan Navy Dockyard (PN Dockyard) in Karachi, with an impressive flag hoisting ceremony. Ships and observers from 46 participating navies, foreign diplomats and a large number of Pakistan Navy personnel attended the event.

Commander of the Pakistan Fleet, Vice Admiral Muhammad Amjad Khan NIAZI graced the occasion as Chief Guest whereas the Chief of Romanian Naval Forces, Vice Admiral

Alexandru MIRSU, Commander of the Zimbabwe National Army, Lieutenant General Edzai Absolon CHANYUKA and Chief of Defence Staff of Sri Lanka, Admiral Ravindra C. WIJEGUNARATNE attended the ceremony as Guests of Honour.

As the ceremony began, the flag squad of the PN presented a march-past on the tune for the national song 'Iss Parcham Ke Saye Talay Hum Aik Hain (Unity Song)' with every officer holding a neatly folded flag of each of the 46 participating countries in the AMAN-19 Exercise. The representatives of each of the countries - Australia, Azerbaijan, Bahrain, Bangladesh, Brazil, Brunei, Cambodia, Canada, China, Djibouti, Egypt, France, Germany, Greece, Indonesia, Iran, Italy, Japan, Jordan, Kuwait, Lebanon, Libya, Malaysia, Maldives, Myanmar, Nigeria, Oman, Palestine, Philippines, Poland, Qatar, Romania, Russia, Saudi Arabia, South Korea, Sri Lanka, Tajikistan, Tanzania, Thailand, Turkey (Rear Admiral [LH] Mehmet Cem OKYAY, Northern Task Group Commander of Turkish Navy), Turkmenistan, UAE, UK, US, Zimbabwe and Pakistan of course, then took their positions in front of their respective flagpoles. Following a three-volley gun salute, the flags of participating countries were hoisted with the playing of Pakistan's national anthem as all personnel in uniform saluted and the guests stood up in respect.

During the ceremony, the Message of Chief of the Naval Staff (CNS), Admiral Zafar Mahmood ABBASI was also read out. In his message Pakistan

CNS Adm. ABBASI highlighted that today, threats to maritime security increasingly emanate from contemporary asymmetric challenges that have deeply impacted the maritime environment. "There is a strong realization that given the vast expanse of oceans and array of maritime threats (both symmetric and asymmetric), preserving maritime order in the global commons, necessitates collaborative efforts as a matter of compulsion rather than choice. Pakistan is a firm believer in collaborative maritime security and has taken a number of initiatives in this regard. The RMSP is one such initiative of the PN to fulfil international obligations, besides the protection of its own national interests in the IOR," Adm. ABBASI stated in his message.

Speaking on the occasion, Commander Pakistan Fleet, Vice Admiral Muhammad Amjad Khan NIAZI emphasized that they can work together, keeping their differences aside, to defeat their common adversaries. "These adversaries pose threats like piracy, terrorism, drug-trafficking, gun-running and human smuggling; and greater adversary is climate change which calls for a growing need to respond to it collectively," Vice Admiral NIAZI said. He added that, maritime security is pivotal for national security and the protection of maritime routes is also necessary for the economy. Vice Admiral NIAZI also highlighted that Pakistan has been a proactive member of maritime security initiatives launched, as part of the war against terror and the PN has always been a consistent Security contributor in the IOR. He added that the presence of so many countries' navies in Pakistan for AMAN-19 was "indicative of their common resolve to promote collaboration, enhance regional cooperation and to ensure the maintenance of good order at sea for the protection of global commons."

Following the completion of the flag hoisting ceremony, Commander Pakistan Fleet, Vice Admiral NIAZI and some of the visiting foreign Navy officers also spoke to the media and replied their questions. Answering a journalist question



Commander Pakistan Fleet, Vice Admiral Muhammad Amjad Khan NIAZI

on the importance of the AMAN V. Adm. NIAZI underlined that, 45 nations from across the world from all continents have gathered for Exercise AMAN-19 to show resolve for one common thing, which is cooperation. Cooperation against the threats at sea such as terrorism, smuggling, piracy, gun-running, human smuggling, which are common to all nations. "We are here to learn from each other, practice together, learn each others' tactics and procedures and come up with common procedure and response against all those threats that are common to us. The PN is a firm believer in the collective effort so that is why we have invited Navies across the globe to take part in the AMAN-19 Exercise and gathered here today. We want to tell entire world that Pakistan is determined to fight terrorism and other threats at sea. And I as said in my speech earlier today that no nation alone could tackle this grave problem. So, we have to cooperate with each other and that is the only way forward," he said.

Colonel Mamoru NANJO,

Defence Attaché of Japan, said that he was glad to be a part of the AMAN-19 Exercise and remained impressed with the Pakistan Navy. "Japan Navy previously sent a ship to join a pre-AMAN exercise in January. We respect your Navy and your training skill; I am very interested in taking part in AMAN-19 as an Observer. Japan Pakistan Zindebat," said.

Rear Admiral J.J. RANASINGHE, the Chief of Staff of Sri Lanka Navy, said that it was good if seafarers could meet often and grow together. "I am extremely happy with this movement today, because when you look at the world you will see the differences of the countries but of these navies are united. So, AMAN-19 is a fine example, and it is also a wonderful example for everyone. It is a great opportunity I have today to participate AMAN-19," R. Adm. RANASINGHE said.

The Commanding Officer of the Italian Navy Ship Carlo MARGOTTINI, Commander Marco GUERRIERO, also said that he felt honoured and privileged to be in Pakistan and be participating in the Exercise, "We are looking forward to working together with all the other Navies and ships at sea as the motto of the Exercise says to work together for peace. Thank you very much for this opportunity," Commander GUERRIERO said.

A flag hoisting ceremony of participating Special Operations Forces was also held separately at Pakistan Navy Unit PNS IQBAL, the headquarter of Commander SSG(N), which was graced by Commander of the Coast, Vice Admiral Muhammad Fayyaz GILANI as Chief Guest.



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8th International Maritime Conference (IMC-2019)

The three-day International Maritime Conference (IMC) organized on the theme of 'Global Geopolitics in Transition: Rethinking Maritime Dynamics in the Indian Ocean Region' under the auspices of National Institute of Maritime Affairs commenced on 9 February. The President of the Islamic Republic of Pakistan, Dr. Arif ALVI graced the Opening Session as Chief Guest whereas Federal Minister for Defence, Mr. Pervez KHATTAK was the Chief Guest of the closing session held on 11 February. Pakistan Chief of the Naval Staff (CNS), Admiral Zafar Mahmood ABBASI also was present on the occasion. Held in tandem with AMAN-19, the IMC brought together eminent speakers and delegates from across the globe for in-depth discussions and deliberations on the changing dynamics of geo-politics and to analyse the impact of these changes on the IOR's economic exploitation and maritime security canvas.

The Conference was attended by a large number of dignitaries from across the globe, tri-services officers (including those from more than 35 navies), academia, foreign & local media representatives and researchers from local and international think tanks.

While addressing the audience at the inaugural session, President Dr. Arif ALVI underscored the importance of the Blue Economy and the effective use of Ocean resources as key to Pakistan's future. He stated that the Indian Ocean acts as a strategic gateway for food, maritime transportation and energy supplies to the world and the presence of major powers in the IOR, signifies its importance under a complex security environment. Appreciating the role of Pakistan Navy, President ALVI said that the collaborative maritime security engagements with regional and extra-regional navies in the form of "AMAN-19" signify Pakistan's resolve and commitment towards global peace and prosperity. Pakistan, as an important regional player, wishes to work in harmony and collaboration with all regional countries for the common objectives of peace, stability and economic prosperity for the people of the region.

While addressing the audience at the closing session, Pakistan Defence Minister, Mr. Pervez KHATTAK, stated that the current maritime threats and

emerging Geo-Strategic situation are posing new challenges and risks to the stakeholders in the Region. Minister KHATTAK expressed his confidence that the Conference deliberations and the valuable recommendations will provide insight to maritime stakeholders for Effective Policy Making. In the context of the CPEC, Minister KHATTAK added that amongst recent maritime development in their region, the China Pakistan Economic Corridor (CPEC) is rightfully considered a Game Changer, not only for Pakistan but also for the economic well-being and prosperity of the entire region. "With the progress of the CPEC and the Gwadar Port, maritime activities would increase manifold, especially in the Western Indian Ocean. The responsibilities of the Pakistan Navy would also increase for maintaining a secure maritime environment for the smooth flow of sea trade", he said.

At his address during the Opening Session, Pakistan CNS Admiral Zafar Mahmood ABBASI highlighted the significant role being played by the PN in the sustenance of peace and stability in the IOR. Adm. ABBASI added that Pakistan has always been an ardent supporter of maritime cooperation and being the pioneer partner of Combined Maritime Forces' (CMF) Task Forces CTF-150 (since 2004) and CTF-151 (since 2009). "Pakistan has been the largest regional contributor to these constructs in terms of men and material. On our national front, Pakistan has commenced 'RMSP' which aims to maintain security posture in critical sea areas and choke points in the Indian Ocean. Pakistan, located at a strategic position in the Indian Ocean, needs to prepare itself for the challenges and work out a viable strategy for the development of the maritime sector. The RMSP consists of ships and aircraft carrying out maritime security operations in the Northern, Eastern and Western

Indian Ocean," Adm. ABBASI said. Adm. ABBASI also added that the 6th AMAN Exercise is an embodiment of Pakistan's commitment toward global peace and harmony where the naval forces from across the continent are brought on a single platform to enhance combating capabilities in the wake of traditional and non-traditional security challenges. In his speech Adm. ABBASI also mentioned the CPEC and the PN's new naval base being constructed at the Port of Gwadar, which has been talked about widely during recent months with a claim that the CPEC also has a military dimension and in this context the People's Liberation Army Navy (PLAN) is going to have a naval base in Gwadar, "Let me say very very clearly that there is no reality to such assertions, the CPEC is purely an economic initiative and its objective is to undertake economic development of not only Pakistan but of the region. The Gwadar Port will have a naval base but that will be of the Pakistan Navy! And inshallah in next two years there could be a reality and whenever that is completed ships from all navies of the world, all friendly navies of the world, from the West, East such as China, US, UK or any friendly Navy will be welcomed to enter Gwadar as they are entering Karachi," Adm. ABBASI said.

During the second day of IMC-2019, presenting a paper at first session under a title of 'The Principles of Co-operation in Maritime Security' Rear Admiral (LH) Mehmet Cem OKYAY, the Northern Task Group Commander of Turkish Navy, underlined that the freedom of the high seas is the core principle for maritime commerce and shipping and added, "Commercial and military interests have led the international maritime community to accept the introduction of greater restriction on the freedoms of the high seas."



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International Bands Displayed & Maritime Counter Terrorism Demo by SSG(N)/Pakistan Marines

As a part of the AMAN-19 Naval Exercise, on 9 February in the afternoon at PNS QASIM Manora (Marines Base located on Manora Island in Karachi Coast), an international bands display was presented by the bands of participating countries of AMAN-19, aiming to connect the countries through cultural heritage as well. Chief of Romanian Naval Forces, Vice Admiral Alexandru MIRSU graced the display as Chief Guest. Pakistan CNS Admiral ABBASI and Commander of the Pakistan Fleet, Vice Admiral NIAZI were also present on the occasion. The military bands from Sri Lanka, Pakistan Army, Pakistan Navy, Pakistan Air Force and Pakistan Rangers played a mix of their traditional and military tunes. The enchanting melodies mesmerized the audience and were really appreciated.

Following the display of bands, in the evening the Special Operations Forces (SOF) of the Pakistan Navy (Special Services Group Navy/SSG[N] & Marines), presented an impressive Maritime Counter Terrorism Demonstration at the coast of Manora Island, located south of the Port of Karachi.

The SSG(N) is a multi-dimensional force with the capability to undertake assignments on land, air, sea and subsea. The Maritime Counter Terrorism Demonstration was carried out in six phases; Dolphin Manoeuvres at a speed of 45 knots by 4 Maritime Tactical Patrol Boats and 2 MRTP15 VBSS boats, Fast Boat Recovery covering the fast extraction of a five-men SSG(N) Team, initially dropped by a PN Sea King helicopter about 200m from the beach from hostile water with a Special Forces Boat, Demonstration of Advance Fire Arms Techniques, Static Line Para Jumps by SSG(N)s/Commandos from PN Fokker F-27 aircraft (a total of 8 SSG(N) paratroopers were dropped from 800 to 1,000 feet into the sea, these jumpers then formed part of Beach Reconnaissance Team for the Counter Terrorism Demonstration),



After completing his speech at IMC-2019, Pakistan CNS Admiral ABBASI presented model of PNS Rah Naward sail training ship to President Dr. Arif ALVI

a Counter Terrorist Demonstration Maritime Counter Terrorism Team commonly known as the CTT demonstrated a coordinated beach assault operation to neutralize terrorists' stronghold and safe house by making air and sea approaches and using different techniques of infiltration [insertion of Air Assault Teams by a Sea King helicopter from the air and insertion of SOF Teams & Marines Platoon by three hovercrafts from the sea, fire arm techniques and quick recovery and extraction of hostages] Demonstration of Bomb Burst Aerial executed by 2 Sea King helicopters from Pakistan Naval Aviation to present special salute to honour Chief Guest. Then paratroopers from Pakistan Navy Sea Eagle Team (established in 1991) demonstrated High Altitude HALO (High-Altitude-Low Opening) Jumps from a Fokker F-27 aircraft. 12 HALO Jumpers carrying the flags of different countries (including

China, Italy, Indonesia, Malaysia, Nigeria, Poland, UK, Turkey, Sri Lanka, US and Pakistan), that participated in AMAN-19, jumped from 7,000 feet and landed with precision accuracy on the target located on the coast. According to shared information their parachutes had 8:1 glide ratio and 77km/h glide speed in '0' wind conditions. Following the successful landing of 12 HALO Jumpers, the leader of the PN Sea Eagle Team, Commander Cavat HUSSAIN, presented the flag of Pakistan to the Chief Guest.

The counter terrorism demonstration was a fine display of strength and specialized skills by Special Operations Forces (SOF) of the Pakistan Navy to counter act maritime terrorism, refine special operating procedures, exchange of professional expertise and to enhance interoperability with participating SOF Teams. SOFs all over the world act as force multipliers in support of conventional forces, engage major or minor missions at a broader context thus increasing the effectiveness and efficiency of the regular forces.

A large number of personnel of the participating navies, observers, foreign diplomats and senior officials of Armed Forces of Pakistan witnessed the Bands Display and the Maritime Counter Terrorism Demonstration. The event was coordinated by Commander of Coastal Areas (COMCOAST) Vice Admiral Fayyaz GILANI and Commander of SSG(N) Captain Muhammad Imran RANA. Mr. Imran ISMAIL, Governor Sindh graced the occasion as the Chief Guest. Pakistan CNS Admiral ABBASI and Commander of the Pakistan Fleet, Vice Admiral NIAZI, were also present on the occasion.





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A shot from Dolphin Maneuvers that performed at a speed of 45 knots by 4 Maritime Tactical Patrol Boats and 2 MRTPT15 VBSS boats

CNS Visits Foreign Navy Ships and International Food Gala & Cultural Show

As a part of the AMAN-19 Naval Exercise, on the morning of 10 February Pakistan CNS Admiral ABBASI visited the ships of foreign navies participating in the multinational Exercise AMAN-19. Upon his arrival on board the foreign visiting ships, Adm. ABBASI was warmly welcomed by Senior Officers/Commanding officers of the respective ships and was presented the guard of honour by smartly dressed contingents.

During this session Adm. ABBASI visited participating ships of Australia (HMAS Ballarat [FFH-155]), China (Type 071 Yuzhao Class LPD PLA[N] Kunlun Shan [998]), Italy (FREMM Class Frigate ITS Carlo Margottini [F-592]), Malaysia (multi-role support ship RMK KD Mahawangsa [1504]), Oman (Khareef Class Corvette RNOV Al-Rahmani [Q41]), Sri Lanka (off-shore patrol vessel SLNS Sayurala [P623]), Turkey (Gabya Class Frigate TCG Gokceada [F-494]) and the UK (Type 45 Class Destroyer HMS Dragon [D35]), where he interacted

with Senior Officers/Commanding officers. The Naval Chief was given briefings on board the ships.

On the same day, at night an International Food Gala & Cultural Show was also organized for officers and sailors at the PN Dockyard to provide an opportunity to witness the diverse cultures of participating countries. The International Food Gala & Cultural Show was a unique occasion where the Pakistan Navy presented the diverse and vibrant art, culture and cuisine from across Pakistan. A variety of traditional regional dances, folk music & multilingual songs were choreographed especially for this event and Syed Murad Ali SHAH, Chief Minister Sindh, graced the occasion as the Chief Guest. A large number of personnel from participating navies, observers, foreign diplomats and senior officials of the Pakistan Armed Forces attended the event.

Sea Phase of AMAN-19: IFR

On 12 February 2019 the 6th Multinational Naval Exercise AMAN-19, the largest multinational exercise ever hosted by the Pakistan Navy (PN), reached its conclusion with the execution of the International Fleet Review (IFR) at 40nm off the Port of Karachi in the North Arabian Sea in the Pakistan EEZ.

A total of 21 naval vessels from 10 countries in various displacement and types participated in the Sea Phase of AMAN-19 including; Australia (HMAS Ballarat [FFH-155]), China (Type 071 Yuzhao Class LPD PLA[N] Kunlun Shan [998] and Type 903A Fuchi Class Auxiliary Vessel PLA[N] Luoma Hu [AOR-964]), Italy (FREMM Class Frigate ITS Carlo Margottini [F-592]), Malaysia (multi-role support ship RMK KD Mahawangsa [1504]

and Kasturi Class Corvette RMK KD Kasturi [F-25]), Oman (Khareef Class Corvette RNOV Al-Rahmani [Q41]), Sri Lanka (off-shore patrol vessel SLNS Sayurala [P623]), Turkey (Gabya Class Frigate TCG Gokceada [F-494]), UK (Type 45 Class Destroyer HMS Dragon [D35]) and USA (Arleigh Burke Class Destroyer USS Decatur [DDG-73]), along with Pakistan Navy Ships PNS Aslat (F-254), PNS Saif (F-253) PNS Shamsheer (F-252), PNS Khaibar (F-183), PNS Azmat (1013) and PNS Alamgir (F-260) and Pakistan Maritime Security Agency (PMSA) ships PMSS Kashmir (143), PMSS Zhob (1073) and PMSS Basol (1071).

The IFR also featured an impressive Fly Past by participating aircraft and helicopters including 3 WS-61 Sea King Mk 45, 3 Z-9EC (known as Stingray and designed to hunt enemy submarines) and 3 Alouette III Naval Helicopters and 3 P-3C Orion Long Range Maritime



A total of 8 SSG(N) paratroopers jumped from PN Fokker F-27 aircraft at 800 to 1,000ft altitude into the sea. The IFR also featured an impressive Fly Past by participating aircraft and helicopters including 3 WS-61 Sea King Mk 45, 2 ATR72/500 LRMPA (one in MPA configuration and the other in utility/transport role) and 2 Fokker F-27 Aircraft (one in MPA configuration and the other in utility/transport role) from Pakistan Navy, 4 JF-17 Thunder Aircraft from Pakistan Air Force (PAF) as well as, one each Z-8 (China), Z-9EC (China), NH90 (Italy) and S-70B (Turkey) Naval Helicopters took part in Fly Past.

During the IFR Pakistan Navy's newly commissioned Fleet Replenishment Tanker PNS Moawin (AOE-39) took center stage as it hosted dignitaries, including the President of Pakistan Dr. Arif ALVI, Governor Sindh Imran ISMAIL, Chief Minister Sindh Murad Ali SHAH, Minister of Defence Pervez KHATTAK, Minister of Defence Production Miss Zubaida JALAL, Minister of Maritime Affairs Ali Haider ZAIDI, Chairman Joint Chief of Staff Committee General Zubair



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HAYAT, Chief of Army Staff General Qamar Javed BAJWA, Chief of Naval Staff Admiral Zafar Mahmood ABBASI, Chief of Air Staff Air Chief Marshall Mujahid ANWAR, Secretary Defence Lt. Gen. Ikram UI HAQ, Chief of Romanian Naval Forces Vice Admiral Alexandru MIRSU, Chief of Defence Staff Sri Lanka Admiral Ravindra C. WIJEGUNARATNE, Chief of Coast Guard Azerbaijan Lt. Gen. Nagiyev Afgan VELI and Commander Zimbabwe National Army Lt. Gen. Edzai Absolon CHANYUKA as well as Ambassadors, Defence and Naval Attaches and a number of other guests.

Upon arrival on board the Pakistan Navy Ship (PNS) Moawin (AOE-39) Fleet Replenishment Tanker by a Sea King Naval Helicopter, President of Pakistan Dr. ALVI was welcomed by CNS Admiral ABBASI and Senior Naval officers.

During IFR, the Chief Guest and other high ranking officials on board PNS Moawin witnessed various operational activities including: Replenishment at Sea (RAS), Rocket Depth Charge (RDC) Firings, Surface Firing on Killer Tomato, Fly Past by Air Units (PN, PAF and foreign participating Aircraft) and Man and Cheer Ship in Honour of the Chief Guest. Within the context of IFR, Counter Piracy Demo by PN Maritime Seaward (MSW) Team was also planned but due to high sea conditions this activity was cancelled at the last moment.

At the beginning of the drill PNS Moawin refuelled ships while underway. In this context, PNS Aslat and PNS Saif took a position on either side of the PNS Moawin. The two receiving ships had hoses sent their way from PNS Moawin through which fuel was supposed to be transferred to them. Underway refuelling and replenishment, considered to be one of the most dangerous activities carried out at sea, was performed with extreme care by PN personnel during the drill. It was also pointed out that PNS Moawin, built with the cooperation of Turkey, is Pakistan Navy's largest indigenously built ship that was commissioned in October 2018. PNS Aslat was also built at the Karachi Shipyard and Engineering Works (KS&EW) Limited



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Onboard PNS Moawin we had an opportunity to have a quick word with Pakistan CNS Admiral ABBASI and President of Pakistan ALLAVI

with cooperation from China.

The RAS demonstration was followed by Rocket Depth Charge (RDC) Firings from both the PNS Aslat and the PNS Saif at a simulated submarine targets. Both frigates then manoeuvred themselves to align behind each other to look like they were just one ship from behind. Gunnery demonstrations were also carried out by PN frigates PNS Aslat and PNS Saif, Turkish Navy frigate TCG Gokceada (F-494) and Peoples Liberation Army Navy (PLAN)'s Type 071 Yuzhao Class LPD PLA(N) Kunlun Shan (998) at given pre-deployed target buoys in the form of a giant red killer tomato (equipped with radar reflectors) and located 4,500 yards away from the ships.

Then the PN, the PAF and foreign participating aircraft performed an impressive Fly Past, which was followed by Men and Cheership by participating ships



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President of Pakistan ALVI disembarking from a Sea King HC. 4 Helicopter in VIP configuration on PNS Moawin's helicopter deck

in honour of the Chief Guest. Thereafter, the participating ships formed up in traditional "AMAN Formation" to signify unity and harmony to ensure PEACE in the maritime domain.

President ALVI congratulated the PN for hosting the mega event and reaffirmed Pakistan's resolve for peace and security in the region. He also appreciated the participation of large number of like-minded Nations and emphasized that AMAN-19 will pave the way to make the region more peaceful and secure with combined efforts by all stakeholders. He reiterated the need for strategic cooperation to counter transnational maritime threats and to encourage safety, security and stability in the region.

PNS Moawin (AOE-39) Fleet Replenishment Tanker

Designed by Delta Marine under the project carried out by STM as the Main Contractor, the Fleet Replenishment Tanker PNS Moawin with an overall length of 158m and a displacement of 16,400 tons was constructed at KSEW (Karachi Shipyard and Engineering Works) Shipyard adjacent to the PN Dockyard in the Karachi Port and was commissioned by the Pakistan Navy on 16 October 2018. The vessel served as the flagship during the IFR phase of the Exercise AMAN-19. According to the information shared by the Commanding Officer (CO) of the ship Captain Zeshan Nabi SHAIKH during our conversation, outfitted with an indigenous radio communication system and data

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link system (Link Green), the vessel can carry ship and aircraft fuel of over 8,000 tons, fresh water and ammunition. According to the PNS Moawin's ship designer Delta Marine, the 15,600-ton vessel (16,400 full-load) can carry up to 8,650 tons of F-76 fuel, 210 tons of JP-5 fuel, 1,050 tons of fresh water and dry cargo of up to 650 tons. It has a ferry range of 10,000 nautical miles at a speed of 15 knots.

Equipped with MilSoft's Pakistan Navy Information Exchange System (NIXS), the PNS Moawin, if required, can also serve as a Command Ship thanks to its advanced Combat Management System (CMS) capability. The PNS Moawin can support two maritime helicopters (one WS-61 SeaKing Mk45 and one Z-9EC) and can equip them with guided anti-ship missiles (2 x AM39 Exocet) and light torpedoes (4 x Mk46) for both Anti-Submarine Warfare (ASW) and Anti-Surface Warfare (ASUW) missions. The vessel can reach a maximum speed of 20 knots with two controllable-pitch propellers (CPP) powered by two diesel engines. The cruising speed of the ship is 15 knots. During the RAS demo for the AMAN-19 Sea Phase, the ship speed was announced as 9-12 knots. The speed was reduced to 5 knots during the shipboard helicopter operation to increase the stability of the vessel for a smoother landing and take-off of the Sea King, Z-9EC and Alouette helicopters, which were used to transport VVIP guests from Islamabad and Karachi to the ship.

The PNS Moawin has 8 decks and can accommodate 250 to 300 personnel depending on the type of mission to be performed. Serving under the Pakistan Navy Fleet's 9th Auxiliary & Mine Warfare Squadron, the ship will support the Pakistan Navy's combat/auxiliary elements by transferring critical equipment such as fuel/water and ammunition at sea during operations with its Replenishment/Fuelling-at-sea Systems (RAS/FAS), thus increasing their operational capability. Equipped with a 20mm Mk15 Blok 1B Phalanx CIWS and two Aselsan 12.7mm STAMP System for self-defence needs, the PNS Moawin is also outfitted with a DR-3000 ESM (Electronic Support



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P-3C Orion LRMPAs seen here during fly past

Measure) System. According to our information, the PNS Moawin is able to refuel and replenish 3 individual ships at distances of 52m and 36m with its Replenishment/Fuelling at Sea (RAS/FAS) systems at the same time. Satisfied with the abilities and capabilities of the PNS Moawin, the commanding officer of the ship Captain Zeshan Nabi SHAIKH emphasized that the ship can perform refuelling operations in a much more efficient and easier way compared to the old supply ships and noted that the replenishment time is reduced by one-third thanks to the PNS Moawin.

This is the 3rd PN ship that has been named Moawin. In 1989 a Vulcan Class repair ship was inducted in the PN with the name PNS Moawin. This ship was launched in 192 as USS Hector and later was handed over to Pakistan. This ship was returned to the US in 1994 and then scrapped. The second vessel with this name was inducted in the PN fleet in 1994. The ship HNLMS Poolster (A835), a replenishment ship, was launched in 1963 and inducted in Royal Netherlands Navy fleet in September 1964. HNLMS Poolster was decommissioned on 28 July

1994 and transferred to the PN, which renamed her Moawin (A20). On 10 March 2005, a fire broke out on board PNS Moawin (A20) during a maintenance work while she was anchored at the PN Dockyard and the ship was badly damaged in the fire, which claimed the lives of 43 crewmembers. PNS Moawin (A20) was decommissioned in October 2018.

Port of Karachi & PN's Plan for Three Fully Functional Naval Bases

Having a length of 5.2nm and depths of 12.2m to 13m Port of Karachi is the gateway to fertile regions of the hinterland and houses the primary base of the PN. As one of South Asia's largest and busiest deep-water seaports, the port handles about 650,000 TEUs (Twenty-foot Equivalent Units) and 26 million tons of cargo per annum. The Port of Karachi has 35 cargo berths. The recently constructed Karachi Deep Water Container Port & Terminal is able to accommodate fifth and sixth generation super container ships, carrying 8,000 up to 18,000 containers at 20-foot each and having a draught up



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PNS Saif (F-253) performs Rocket Depth Charge (RDC) firings at a simulated submarine target

to 18 meters. Existing container terminals in the country house vessels of the capacity of around 8,000 TEUs due to deep water and other handling constraints. In Phase-II of the project, that coast over US\$1,4 Billion, the depth of the outer approach channel has been enhanced to 18 meters. Inaugurated in May 2018 the high-tech Karachi Deep Water Container Port & Terminal, which was named as the Hutchison Ports Pakistan, has a capacity of handling 3.1 million TEUs per annum, and has a higher capacity than that of all container terminals in the country at 2.5 million TEUs.

The Pakistani Naval Shipbuilding effort centers on the Pakistan Navy (PN) Dockyard, located on the West Wharf of the Port of Karachi and is supported by the Karachi Shipyard & Engineering Works (KS&EW in operation since 1957). The Karachi International Container Terminal in located adjacent to both.

The PN Dockyard covers 73 acres. It has a total of 90 work centers graving dock, four floating docks and one marine railway. It provides homeport facilities for PN ships, submarines and other support crafts. The keel of the present PN Dockyard was formally laid on 27 September 1952. Since its inception in 1952, the PN Dockyard has been undertaking repair and overhaul work, the modernization/retrofit and rebuild of PN Ships, Submarines and Support Vessels. It is a comprehensive naval construction and refurbishment facility. Utilizing Transfer of Technology (ToT) agreements with foreign governments, the PN Dockyard, in collaboration with KS&EW, has developed the capability to undertake ambitious, indigenous naval vessel construction projects ranging from Utility Craft, Fast Attack Craft (Missile), F-22P Class Frigates, Mines Counter Measure (MCM) Vessels, Agosta 90B Class Submarines and Fleet Replenishment Tanker. The PN has shown its confidence in KS&EW by awarding a mega order for construction of 4 of 8 Hangor Class Submarines at the shipyard in collaboration with China.

While the KS&EW is fully capable of constructing both commercial as well as military



craft of all sizes, in the early 1980s the PN Dockyard also undertook limited construction of small to medium size ships. The retrofitting of modern ships and submarines at the PN Dockyard is providing cost effective maintenance to the fleet units.

Since the coast of Karachi has become a hub of commercial activity, it makes it difficult for the PN to perform its tasks. Moreover, the industrial waste in Karachi's waters was damaging the Navy's assets and was reducing the life of the ships.

Faced with the challenging task of guarding Pakistan's extended EEZ through out the 1,046km long coastal line, the PN has prepared a plan to have three fully functional naval bases in Karachi, Ormara and Gawadar in the near future. In addition to Karachi, the PN has already set up a naval base at Ormara – situated about 240km west of Karachi by sea, some 350 kilometers away from Karachi and 285km from Gwadar by road – while efforts to establish another fully equipped base at Gwadar on the Makran Coastal Line are currently on-going. The PN has already

shifted some of its operations and naval assets from Karachi to the newly built Jinnah Naval Base (also includes a Naval Air Station) in the strategic town of Ormara located mid-way between Karachi and Gwadar. Since 2014 Jinnah Naval Base (JNB) in Ormara, has been serving the PN as a major secondary base after Karachi. Unlike Gwadar or Karachi, which harbour commercial activities, the JNB is reserved solely for military purposes. At the Ormara Naval base, the Turkish firm STM carries out studies for preventing the restriction of the use and manoeuvre area at sea due to siltation, streams and waves and improving the use of the base.

The KS&EW is to be complimented with another shipyard in the Port of Gwadar that has been approved by the Government of Pakistan and is expected to have two dry docks with a 600,000dwt capacity. The Port of Gwadar has a potential of 88 berths and a capacity to anchor ships weighing 100,000 to 200,000dwt and will have a total of 26-28 jetties once it is fully developed. Construction of the new naval base, to be the



country's biggest ever, and a shipyard in the Port of Gwadar is currently on-going and scheduled to be completed in next two years. Since it is located very far from the reach of the Indian Navy compared to the PN Dockyard in Karachi, Gwadar will provide a safer location for the PN to accommodate its surface, under surface and air assets. According to our sources, the feasibility study of a new naval base at the Port of Gwadar was prepared by the Turkish firm STM. Given its proximity with vital international sea routes, Gwadar is likely to become a major port in the country.

Meanwhile, following the tensions with India in late February 2019, the PN has been put on a high state of alert. According to "Indian Defence Updates" satellite imagery showed that except those under construction and those undergoing sea trials, all of the PN's ships & submarines stationed at Karachi, Ormara and Gwadar ports have been out at sea following tensions with India. They have remained out at sea as of March 8, 2019. This reaction is believed to have been taken as a precaution to the IAF's possible air strikes to the port and to put considerable pressure on India. On February 26, the Indian Air Force (IAF) carried out air strikes on a Jaish-e-Mohammed training camp in Balakot in Khyber Pakhtunkhwa, and a day after, the Pakistan Air Force (PAF) shot down an IAF MiG-21 and captured its pilot Wing Commander Abhinandan VARTHAMAN. On 1 March, Pakistan returned Wing Commander VARTHAMAN in a gesture aimed at demonstrating its willingness to de-escalate the conflict and to lower tensions between the two countries.

Participation of the Turkish Navy in the AMAN-19 Exercise

Organized by the host nation Pakistan, the multinational maritime exercise AMAN-19 kicked off with the participation of naval vessels from Australia, China, Italy, Oman, Malaysia, Sri Lanka, Turkey, UK and the US. Having already participated in AMAN Exercises in 2007, 2009, 2011, 2013 and 2017, the Turkish Naval Forces Command took part in



With the establishment of Port of Gwadar, which is the gateway to the US\$62 Billion China-Pakistan Economic Corridor (CPEC), the strategic importance of the North Arabian Sea further multiplies

the AMAN-19 Exercise with the TCG Gokceada frigate, with an embarked S-70B SeaHawk Naval Helicopter, as well as a SAS Operation Team (deployed on the TCG Gokceada Frigate), Multinational Maritime Security Mobile Training Team (MARSEC-MTT, 4 SAT Personnel, and 6 Amphibious Assault Team personnel arrived at Karachi by a commercial plane), and a staff officer. Having departed in January 2019 for a 2-month deployment to the Red Sea, Aden Bay, Gulf of Oman, North Arabian Sea, Persian Gulf, and the Indian Ocean to provide support for the Combined Task Force 151 (CTF-151) as part of the Counter Piracy (CP) Focused Operation (FO), the TCG Gokceada frigate reached the Karachi Port in southern Pakistan on February 7 to participate in the AMAN-19.

Within the scope of its deployment to Karachi Port, in order to contribute to the bilateral relations and the projection of Turkish Naval Forces, the TCG Gokceada frigate carried out port visits to Port Sudan (Sudan), Djibouti (Doha), Doha (Qatar), Manama (Bahrain), Kuwait (Kuwait), Salalah (Oman) and Aqaba (Jordan) and performed joint maritime training with Navy elements from these countries.

On the evening of February 8, 2019, the first day of the exercise, a reception was held at the TCG Gokceada (F-494) frigate, which was docked in the PN Dockyard. While almost all of the ships participating in the Exercise were docked in the commercial section of the Karachi Port (US Navy Arleigh

Burke Class USS Decatur [DDG-73] AEGIS destroyer anchored off the Port of Karachi and did not berth), as a sign of the importance given to the Turkish Naval Forces by the Pakistan Navy, the TCG Gokceada was honoured to dock in the PN Dockyard, the military section of the Karachi Port, and the ship anchored side by side with the Pakistan Navy PNS Alamgir (F-260) frigate.

Participation in the reception included; Consul General of Turkey in Karachi, Mr. Tolga UÇAK (Head of Mission for 1.5 years), Naval Defence Attaché Navy Commander Burak TUGAN, Guest of Honour Commander Pakistan Fleet, Vice Admiral Muhammad Amjad Khan NIAZI, senior admirals and officers of the Pakistan Navy including Director General of the Pakistan Maritime Security Agency (DG PMSA) Rear Admiral (UH) Zaka Ur RAHMAN, Commander of the 25th Destroyer Squadron Commodore Muhammad Faisal ABBASI and Commander Submarines Commodore Khalid SAMAR, numerous military personnel from Azerbaijan, Malaysia, Oman, Sri Lanka and Turkmenistan Navies, Consul Generals of Germany, Afghanistan, Bangladesh, Qatar, Thailand, military attaches as distinguished guests, as well as STM staff, who are currently providing support for the PNS Moawin (AOE-39) Fleet Replenishment Tanker built for the Pakistan Navy under the warranty period or those working on projects such as the Agosta 90B Class Submarine Mid-Life Upgrade (MLU) Project. While addressing



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guests at the reception on board the TCG Gokceada frigate, Turkish Consul General of Karachi Tolga UÇAK underlined that Turkey and Pakistan have established good cooperation in defence production. "A Turkish company recently completed a Fleet replenishment tanker for the PN in the KS&EW shipyard. Turkey is expected to deliver 4 MilGem Class corvettes to the PN and there are more projects going on for submarines." Consul General UÇAK said. During the reception we approached Commander of the PN Commander Submarines Commodore Khalid SAMAR to hear his opinions on the Agosta 90B Submarine MLU with Turkish companies. He replied "We have very good cooperation with Turkish companies and the Turkish Navy. Presently we are modernizing Khalid Class Submarines with STM, Havelsan and Aselsan and we are very happy. The first submarine will be re-delivered in next year," Commodore SAMAR said.

On 10 February 2019, the third day of the Exercise AMAN-19, Chief of Naval Staff (CNS) of Pakistan Admiral Zafar Mahmood ABBASI visited the TCG Gokceada frigate and had a short conversation with the Commanding Officer of the ship, Commander Engin AĞMIŞ. Commander Pakistan Fleet Vice Admiral Muhammad Amjad Khan NIAZI also accompanied the CNS Pakistan Admiral ABBASI during his visit. Admiral ABBASI made his first visit to the TCG Gokceada within the scope of his visiting schedule and showed the importance of the Turkish Naval Forces for the Pakistan Navy. Commander AĞMIŞ previously served as the CO of the TCG Buyukada corvette and is an experienced officer who was involved in the design and construction processes of the ADA Class/MilGem corvettes. During the conversation with the CNS Pakistan, the four ADA/MilGem (dubbed Jinnah Class by the PN) Class corvettes for Pakistan were also mentioned. Two of the ships will be constructed in Turkey while the remaining two will be built at the KS&EW Shipyard in Karachi. The CNS Pakistan Admiral ABBASI noted that as their ships will be equipped with Medium-Range Air



Consul General of Turkey in Karachi, Mr. Tolga UÇAK addressing guests at the reception onboard TCG Gokceada frigate

Defence Missile System (LY-80/HHQ-16) launched from a Vertical Launching System (VLS, with 16 cells) installed behind the main deck gun, a modified version of the Combat Management System (based on GENESIS) will be integrated to the vessels. The next visitor of the TCG Gokceada frigate docked at the PN Dockyard was the CO of the PNS Alamgir (F-260, former FFG-8 USS McInerney) Captain Tasawar IQBAL. Similar to the TCG Gokceada, PNS Alamgir is also an FFG-7 OHP Class frigate, however, it is not equipped with a tactical towed array sonar (TACTAS) like the TCG Gokceada. The AN/SQR-19 sonar system was stripped by the US prior to delivery. Other disassembled equipment includes the Mk92 Fire Control Radar and the Mk-13 Mod 4 launcher, which is used to fire both SM-1MR and Harpoon guided anti-ship missiles. The Pakistan Navy made a number of improvements on the ship in

order to use the PNS Alamgir more effectively. In this context, two quadruple launchers for 8 RGM-84 Harpoon Guided Anti-Ship Missiles were installed in front of the bridge (directly behind the Mk-13 launcher), the Phalanx CIWS was upgraded to Mk15 Block 1B with EO/IR capability, and one of the helicopter hangars of the vessel was modified to support the Sea King Naval Helicopter by enlarging the hangar door.

Arriving at the Port of Karachi on 7 February 2019, the Gabya Class TCG Gokceada frigate stayed in Karachi until 15 February after the completion of Exercise AMAN-19, which ended with an International Fleet Review (IFR) held on 12 February, and then participated in the Joint Naval Exercise between the Pakistan Navy and Turkish Naval Forces "Turgutreis-III", which were conducted in Pakistani and Turkish waters respectively. Pakistan Navy ships, the PNS Alamgir and PNS Aslat frigates and an ATR 72/500 Long Range Maritime Patrol Aircraft (LRMPA) participated in the "Turgutreis-III" Exercise, which was conducted between 13-15 February in order to improve bilateral relations with the Pakistan Navy. After the Multinational Maritime Exercise AMAN-19, the Pakistan Navy carried out similar joint exercises "Lion Star" with Sri Lankan Navy and "MALPAK-II" with Royal Malaysian Navy. Following the completion of the Turgutreis-



III Exercise, the TCG Gokceada frigate, which departed from Karachi on 15 February and commenced its return to the Golcuk Naval Base on 17 March 2019, which marked the ending of a 2-month deployment as part of CTF-151.

The participation of the Turkish Navy in Exercise AMAN not only improves the bilateral relations but also helps in improvement of sharing of information, interoperability in Maritime Security and the learning of new techniques of modern warfare against terrorism. In 2013, the Turkish Navy ship TCG Gokova and a Special Forces Team participated in Exercise AMAN-13. In 2017, the TCG Gelibolu (F-493) frigate with an embarked S-70B SeaHawk Naval Helicopter participated in the Exercise AMAN-17 from 10-14 February 2017 along with SAT and SAS Teams.

Military and Defence Industrial Relations Between Pakistan & Turkey

Turkey enjoys deep-rooted brotherly and strategic relations with Pakistan. Since its independence, Pakistan has been enjoying very friendly and warm bilateral relations with Turkey in all fields, especially defence. Military cooperation between these two brotherly countries, which started soon after Pakistan's independence, has been flourishing ever since, resulting in closer cooperation and understanding between the Armed Forces of the two countries. Today, Turkey and Pakistan are important actors in their respective regions and share similar views on many international issues.



Upon their arrival onboard TCG Gokceada frigate Pakistan CNS Admiral ABBASI and Commander Pakistan Fleet Vice Admiral NIAZI were warmly welcomed by Consul General UÇAK and TCG Gokceada Commanding Officer Commander AĞMIŞ

Pakistan and the Turkish Armed Forces have a long-standing, close and cordial relationship and the two countries are expanding ties through joint military exercises and defence production, building on a long tradition of military co-operation.

The roots of bilateral cooperation between Turkish and Pakistan Naval Forces dates back to the second half of the 1960s. The Turkish Navy provided assistance to the Pakistan Navy (PN) to establish submarine service in its early days. In this context, part of the crew serving on-board the Tench Class PNS/M Ghazi submarine were trained at Golcuk Naval Base in Turkey. Nazir AHMED, the father of our tour director at Exercise AMAN-19, Commander Rashid Nazir CHAUDARY, PN Director Public Relations (Navy), was among the officers trained in Turkey when he was a Major. Like his father, Commander CHAUDARY was also trained in Turkey as a submarine

officer and, in this context, while serving on-board the PNS/M Khalid submarine as a Major, he attended the 1st DM2A4 Torpedo Course at the Submarine Training Center Command at Golcuk Naval Base in 2012. According to open sources the PN acquired 59 DM2A4 heavy weight torpedoes (HWTs) to be used in Agosta 90B Class submarines from Germany for US\$80 Million and since France has requested more than expected for integration work, the DM2A4 HWTs have been successfully integrated into Agosta 90B submarines with the support of Germany.

The PN Submarine Force was raised in 1964 as a lead sub-surface arm of the PN and was the first in the region. The first fast attack submarine of the Pakistan Navy was the Tench Class PNS/M Ghazi which arrived at Karachi Port on 4 September 1964. The overhaul (refit and MLU) of the submarine was carried out between



March 1968 and 2 April 1970, at Golcuk Naval Shipyard in Turkey. According to open source claims, the submarine also gained mine-laying capability within the scope of this US\$1,5 Million MLU process. The PNS/M Ghazi submarine and its crew, comprising 11 Officers and 82 sailors, embraced martyrdom during the 1971 Indo-Pakistan War due to the accidental detonation of its own mines in a minefield.

Besides frequent exchange of visits at all levels, both the navies are actively collaborating through professional seminars, bilateral ship visits to each other ports, joint naval/SOF team exercises and mutual training assistance. The PN sends its cadets and officers to Turkey for training in various courses while the Turkish Navy also provides staff course and TACCO's training with the PN besides exchange of ship riders.

The PN presently operates two high-speed ONUK MRTP15 boats for VBSS operations and two ONUK MRTP33 Fast Attack Crafts (FACs) designed and constructed by Yonca-Onuk JV of Turkey. MRTP15 fast interceptors were ordered under a €3 Million contract awarded in 2003 and delivered in the second half of 2004. The PN ordered two units of ONUK MRTP33 FACs to Yonca-Onuk JV as a result of a tender that was open to international competition in 2006. The first boat was delivered in 2007 and the second in 2008. The PN also acquired 2 x 25mm STOP and 2 x 12.7mm STAMP Stabilized Naval Gun Systems from Aselsan, Turkey for installation on these boats. These platforms have been successfully integrated into PN Fleet operations. Armed with a 25mm STOP Remote Controlled Stabilized Naval Gun System MRTP33 FACs can be also integrated with 4 Harpoon SSMs. However due to resource constraints procurement of additional boats and modifications to integrate SSM capability to MRTP33 FACs are pending and will be initiated upon the availability of funds.

Carried on board a commercial vessel from Karachi to Istanbul, the 14-year old MRTP15 VBSS boats of the SSG(N) underwent their extensive Mid-Life Upgrade (MLU) at Yonca-Onuk Shipyard in



Recently modernized MRTP15 VBSS boats took part at Maritime Counter Terrorism Demonstration during AMAN-19

Istanbul, Turkey last year. Within the scope of the MLU, which was carried out over an 8 month period from January – October 2018, while no change was carried out on the structure of the boats, equipment related to propulsion were modernized and overhauled. Once modernized, the boats were re-painted in green with a high-quality special paint. The existing two MTU 12V183 TE93 ECU diesels on board the boats were replaced with brand new engine sets (2 x MTU 12V 2000 M84 series diesel engines) and their propulsion systems were overhauled. Yonca-Onuk JV also provided user training to PN personnel in Istanbul as part of the MRTP15 VBSS Boats MLU Project. Before the modernization effort, the boats had remained idle for a long time due to technical problems experienced with their diesel engines (which were no longer produced by MTU) and a lack of spare parts. As a result of the MLU and the overhaul efforts, the service life of the MRTP15 VBSS boats have been extended out to 2033. Meanwhile, according to our sources, as of February 2019 the PN has been carrying out negotiations with Yonca-Onuk JV for the procurement of an undisclosed number of ONUK MRTP-34 Class Fast Patrol/Attack Crafts. The ONUK MRTP34 Fast Patrol/Attack Craft is the 1m longer version of the

proven ONUK MRTP33 already in PN service since 2007. The ONUK MRTP34 has improved sea keeping, has highly stealthy characteristics and is able to carry larger mission equipment/payload such as a 40mm stabilized gun, surface-to-surface medium range missiles, EO sensors, fire control systems and decoys.

On 16 October 2018, the Pakistan Navy's new Fleet Replenishment Tanker PNS Moawin (AOE-39) was launched at Karachi Shipyard & Engineering Works (KS&EW). With a full displacement of 16,400 tons, the double-hull PNS Moawin was constructed under a US\$80 Million contract signed between the Pakistan Ministry of Defence Production and the Turkish firm STM as the Main Contractor, on 22 January 2013. This project is the first in naval vessel construction between the two friendly and brotherly countries. Within the scope of this project, in which more than 20 Turkish companies took part, the respective design activities have been performed in Turkey and shipbuilding and outfitting activities have been carried out by KS&EW in Pakistan from material kits transferred from Turkey. The 158m Fleet Replenishment Tanker, with RAS/FAS capability and with helicopter landing/take-off capability, is able to operate independently at sea for up to 3



Pakistan Navy's Fleet Replenishment Tanker PNS Moawin (AOE-39)



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months. The ship is also equipped with modern medical facilities to support PN Fleet units, both during war and disaster relief operations. Aselsan has been selected to provide the 25mm STOP Remote Controlled Stabilized Naval Gun System and the Communication Switching System for the PNS Moawin under a €4,7 Million contract awarded by STM in July 2015.

According to STM officials, the PN is quite satisfied with PNS Moawin's performance and capabilities. The company continues to provide maintenance support for the ship under the warranty period, and they haven't encountered any critical technical failures until now. According to our information, the negotiations between the PN and STM for the procurement of a new ship are still on-going. In the event that budget/financing is available, a MoShip/Rescue Vessel for the PN will be on the agenda.

The construction of the PNS Moawin Fleet Replenishment Tanker has opened the door for future collaboration between Turkey and Pakistan in the field of combat vessel construction, and the improvement of the other defence projects. Following the PN Fleet Tanker Project, STM won a contract for the comprehensive MLU of PN's Khalid Class Agosta 90B diesel-electric/AIP attack submarines.

The original contract was inked on 22 June 2016 in the Pakistani city of Rawalpindi between Pakistan's Ministry of Defence Production and STM. According to our sources, the contract became effective (and T_0 started) in December 2016. As part of the project regarding the modernization of Agosta 90B submarines; STM entered a long, compelling competitive evaluation process with the French Naval Group (formerly known as DCNS Shipyard), which undertook the designing and production operations for the aforementioned submarines. After a tendering process beginning on 16 April 2016, STM was found to be technically and commercially superior during the evaluation process and was selected as the Main Contractor for the Agosta 90B Class Submarine MLU Project. The initial contract



PN's Khalid Class Agosta 90B Diesel-electric/AIP Attack Submarine

covered the modernization work on one submarine and included options for two more vessels. In February 2018 the contract signing ceremony for the second submarine (PNS/M Saad [S-138]) under the Agosta 90B Class Submarine MLU Project was held at the premises of Pakistan's Ministry of Defence Production. With this first contract amendment, a third submarine (PNS/M Hamza [S 139]) and various additional systems have been also introduced into the Project as options. The modernization work is being performed at a local shipyard (KS&EW) in Pakistan. Within the scope of the Agosta 90B MLU Project, modernization work on the first submarine PNS/M Khalid (S-137) already started (PNS/M Khalid has been docked and dismantled, all of its major systems and subsystems have been removed either for overhaul/upgrade work or to be replaced with new ones) and are scheduled to be completed in September 2020 following contract effectivity ($T_0 + 45$ Months) or during the first quarter of 2021. Modernization work on the second submarine, the PNS/M Saad (S-138), is expected to start in 2019 and is to be completed with a one-year interval between them. The Agosta 90B submarines are 76-meters long and weigh around 2,050 tons. They have range of 10,000 nautical miles and can remain at sea continuously

for 60 days. They are equipped with SUBTICS (Submarine Tactical Integrated Combat System) CMS and are capable of firing SM-39 Exocet missiles and DM2A4 heavy weight torpedoes.

Meanwhile, within the scope of the Agosta 90B Class Submarine MLU Project, STM will further enhance the capabilities of PN's Agosta 90B submarines. To that end, the second amendment to the initial contract was signed on 8 March 2019 between STM and Pakistan's Ministry of Defence Production. With the second amendment, STM will incorporate Aselsan's ARES-2SC/P Electronic Support Measure (ESM) System, ZARGANA Torpedo Countermeasure System (TCMS, along with ZOKA Anti-Torpedo Acoustic Decoy Family comprising both stationary and self-propelled jammers and target emulator decoys) and Acoustic Measurement Sensors on the Khalid Class Agosta 90B submarines. According to the 'Aselsan 2018 Activity Report', issued in March 2019, Factory Acceptance Tests (FAs) of the first ARES-2SC/P ESM System have been completed in 2018 with the participation of a PN delegation. In 2019 the Harbour Acceptance (HATs) and Sea Acceptance (SATs) Test of the first ESM system on board PNS/M Khalid are scheduled to take place along with the FATs of the remaining two ESM Systems for the PNS/M Saad and PNS/M Hamza. According to the 'Aselsan 2018 Activity Report', the FATs of the RWR/GPS Antenna and Signal Distribution Unit (SDU) have been carried out and they were shipped to Germany, where they are going to be mounted on HENSOLDT's OMS-200 Optronics Mast. Aselsan was contracted to supply the Radar Warning Receiver (RWR) and ESM



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system for the PN's Agosta 90B submarines. The antennas for the ESM and RWR/GPS are mounted on separate periscopes. Meanwhile, according to the same annual report, a delegation from the PN participated in the ZARGANA TCMS Effectiveness Tests executed in 2018 in Turkey.

The Ay (launched via inboard signal ejector tubes), Preveze and Gur Class (via 6-tube Submarine Decoy Launchers, 2 at port and 2 at starboard side) Submarines of the Turkish Navy have been equipped with Aselsan's ZARGANA TCMS along with the ZOKA Anti-Torpedo Acoustic Decoy Family. Under the DAKA Project, valued at TL45 Million, from 15 April 2008 – 1 October 2014 Aselsan manufactured a total of 4 ZARGANA TCMSs along with 280 ZOKA torpedo decoys for the Ay Class submarines, and 8 ZARGANA TCMSs along with 360 ZOKA torpedo decoys for the Preveze and Gur Class Submarines. The first export customer for the ZOKA Anti-Torpedo Acoustic Decoy Family was Indonesia which placed an order in 2018 for its Type 209/1400 Mod Nagapasa Class submarines. Deliveries to Indonesia will take place in 2019.

Within the scope of the project, Havelsan is responsible for the design, development, manufacturing, test, integration and installation of the following systems and already contracted to provide Integrated Logistics Support (ILS) and training services to the end user; Modernization of Sonar System (both wet-end and dry-end sections), Command Control and Information System (C2IS), Weapon Control System (covering Torpedo Integration & Missile Integration) and Submarine Data Distribution System (covering both acoustical and non-acoustical sensor integration efforts).

Under the Agosta 90B Class Submarine MLU Project, valued at US\$350 Million in 2016 by the then Turkish MoND Fikri ISIK, the entire sonar suite, periscope systems, integrated command control and weapon systems, periscope system (both assault and navigation), radar and electronic support systems as well as converters, helm console and rescue buoy of the Agosta



Aselsan has already completed manufacture and Factory Acceptance Tests (FATs) of ZARGANA Launchers to be integrated on TCG Anafartalar and TCG Burakreis submarines of the Turkish Navy

90B submarines will be replaced. The existing weapon configuration will be integrated with the updated systems as a part of the project and the systems developed and built by other Turkish companies such as Havelsan and Aselsan will be exported. The Agosta 90B Class Submarine MLU Project involves sub-systems from numerous OEMs, including: Aselsan for the ARES-2SC/P Electronic Support Measure (ESM) System, RWR/GPS Antennas, Signal Distribution Units (SDU), ZARGANA TCMS and ZOKA Anti-Torpedo Acoustic Decoy Family; Havelsan for its Integrated Underwater Command and Control System and Submarine Data Distribution System; Kelvin Hughes SharpEye LPI Doppler radar; and HENSOLDT's OMS-200 Optronic Mast (for surveillance role) and SERO 250A Attack Periscope.

STM will also take part in the PN's new Miniature Submarine Program. As per the PN's request, STM had studied the feasibility of upgrading the Cosmos MG110 (SX756/W) mini-submarines, which were bought in the 1980s to replace the SX404 mini-submarines, but both sides then concluded that this was not an affordable route. The PN Submarine Force took pride in operating 3 X-Craft (Cosmos MG110s), which were transferred to the Squadron in March 2005 from the Special Service Group Navy (SSG[N]). This has enhanced the number of sub-surface units to 8 instead of 5 having been in operation prior March 2005.

STM, later on put a proposal on the table covering the joint

development and marketing of a new generation mini-submarine intended for special forces operations (such as insertions and extractions of SEAL Teams) in littoral waters not only to meet the PN's (to replace aging Cosmos MG110 in the inventory) but also the Turkish Navy's (considered TKMS Type 200 and Type 300 mini-sub designs in the past) and other potential customers (Azerbaijan is said to have already declared its interest according to our sources) requirements. So, STM has designed a new type of mini-submarine platform for the PN from scratch and STM General Manager Murat IKINCI presented a scaled model of this mini-submarine to Pakistan's Ministry of Defence Production during the signing ceremony for the second contract amendment held in Rawalpindi, Pakistan. On 8 February 2019, the contract (the value of Aselsan's share is disclosed as TL512.4 Million) for the Mid-Life Upgrade (MLU) of the Turkish Navy's four Preveze Class Submarines, which were commissioned during 1994-1999, was signed between STM-Aselsan-Havelsan-ASFAT Business Partnership and the Turkish Presidency of Defence Industries (SSB). Once modernized, the four submarines will re-enter service in 2023, 2024, 2026 and 2027 respectively.

The NIXS (Naval Information Exchange System), which was developed by MilSoft of Turkey with national resources, provides the end user high situational awareness capability and for the past three

years, it has been successfully used by the PN on more than 50 surface platforms and Maritime Patrol Aircraft. MilSoft managed to deliver NIXS to the PN within a remarkably short period of 8.5 months following the effective date of the contract. To enable communication between NIXS-equipped platforms, the Pakistan Navy has established a country-wide communication infrastructure called the RedLine. The first phase of the Pakistan Navy Information Exchange System (NIXS) Project, which was launched in 2013 with the aim of providing command control capabilities to the platforms, comprised a total of 56 Surface and Air Platforms including 8 Ships and 2 Command Centers. The number of NIXS-equipped platforms is expected to reach 80 with the options.

Tracking data is relayed to two independent Command Centers. A Common Operational Picture (COP) is created in these centres through the data gathered from the various platforms, then it is relayed back to the units in the Operational Area (OA) together with specific task orders. Thus, NIXS-equipped vessels and headquarters achieve situational awareness due to the picture of the operational area. The contract for the second phase of the PN Information Exchange System (NIXS) Project signed in October 2018 includes a WEB based New Architecture update for NIXS software, On Scene Tactical Commander (OTC) capability for the units in the Tactical Field (Sea), additional capabilities and a 3rd Command Center. The 4 Jinnah Class corvettes to be built for the PN will be also fitted with NIXS capability.

Under a US\$1,5 Billion G2G contract awarded on 5 July 2018 and became effective on 11 March 2019 Pakistan will procure four ADA/MilGem (dubbed Jinnah Class by PN) Class corvettes, of which two of them will be constructed at Turkey's Istanbul Naval Shipyard while the remaining two will be constructed in Pakistan's state-owned shipbuilder Karachi Shipyard & Engineering Works Limited (KS&EW). The contract includes a Transfer of Technology (ToT) as well as a Transfer of Intellectual Proprietary (ToIP) rights for the



TCG Kinaliada (F-514) has executed its first sail in March 2019. GENESIS ADVENT CMS will be first integrated on TCG Kinaliada corvette and then the existing CMS on board TCG Burgazada will be upgraded to the GENESIS ADVENT level

design of the Pakistani ships. According to an already publicized schedule, the first corvette will be constructed in Turkey, the second one in Pakistan, the third in Turkey and the fourth in Pakistan. The first pair (one to be constructed in Turkey and one constructed in Pakistan) is expected to join PN service in 2023 and the remaining two corvettes in 2024. The first vessel will be constructed in 54 months and the remaining vessels will be constructed in 60, 66 and 72 months, respectively.

The Prime Contractor of the PN Jinnah Class Corvette Program is the Military Factory and Shipyard Management Incorporated Company (ASFAT AŞ), which is tied to the Turkish MoND. According to presentation that was made before the signing ceremony on the PN's Jinnah Class Corvettes and the tender process, negotiations began in 2015 and the first purchase demand was made in 2017.

According to the Turkish Presidency of Defence Industries (SSB) figures, each ADA Class corvette costs Turkey around Euro250 Million. Since the Jinnah Class corvettes are to be customized to meet the PN's special requirements they will have some differences in terms of internal layout (such as Jinnah Class corvettes will have a prayer room and ablution area), propulsion system and weaponry and the PN will also procure some systems and subsystems under a Government Furnished Equipment (GFE)

approach. For example, while the Turkish Navy's ADA Class corvettes can reach up to 31 knots with their 32MW propulsion power, generated by one gas turbine (LM2500) and two diesel engines (CODAG system configuration), according to information disclosed during the contract signing ceremony the PN's Jinnah Class corvettes will have maximum speed of 26 knots. On the other hand, while the Turkish Navy's ADA Class corvettes have 10 days of sea endurance with 170 tons of fuel capacity (in 2015 fuel capacity has been increased to 180 tons to gain a few days in endurance) the PN's Jinnah Class corvettes will have an endurance capacity of 15 days. Additionally, instead of 21-cell Mk49 Mod 3 Guided Missile Launching System (GMLS) for short-range RIM-116 Block IA/HAS Surface-to-Air Missiles (SAMs) and RMG-84 Harpoon anti-ship missiles the Jinnah Class corvettes will be fitted with a 16-Cell VLS (to be located behind the main gun) for the LY-80/HHQ-16 Medium Range Air Defence Missile System and C-802 anti-ship missiles. It is believed that the PN also has a plan to arm them with its indigenously developed and produced Harbah Anti-Chip Cruise Missile (ASCM) system, which currently deployed on Azmat Block-II Class FACs. For the integration/installation of LY-80/HHQ-16 SAM in a 16-cell VLS and C-802 SSM or Harbah ASCM on the vessel, a number of modifications should be done in ADA Class' overall design and in their GENESIS

based CMS software. Meanwhile according to the 'Aselsan 2018 Activity Report', issued in March 2019, under a contract awarded in 2018 Jinnah Class corvettes will be equipped with the ARES-2N Radar ESM System (also and AREAS-2 ECM Naval Electronic Attack (EA) System (with RF solid state amplifier and mechanically directed stabilized dish antenna structure).

Constructed under the MilGem (National Vessel) Program and representing Turkey's first locally designed, developed and constructed corvette-type combat vessel, the ADA Class corvette is a modern littoral combat warship with indigenous capabilities, using extensive stealth technology in its design. As the Turkish Navy's newest and most advanced vessel, the ADA Class corvette has a mono-hull, displacement-type hull form with an overall length is 99,5 meters, maximum beam of 14.4m, displacement of 2,300 tons (2,450 tons with full load) and range at an economic speed is over 3,500 nautical miles. Having an endurance of 10 days without replenishment and 21 days with replenishment the ADA Class corvettes accommodate a 10-ton helicopter (S-70B SeaHawk, with 11 personnel including flight crew and technicians) with platform, hangar and extensive service and handling equipment. With their 32MW propulsion power, generated by one gas turbine (LM2500) and two diesel engines (CODAG system configuration), the ADA Class corvette can achieve 15 knots cruising speed with a single diesel engine (MTU 16V595TE90, driving two shafts), 27 knots with LM2500 gas turbine and 31 knots fully laden with two diesel engines and a gas turbine. The ADA Class corvette is able to execute operations in Sea State 5 (without limit) and in Sea State 6 (with some limits). The vessel is equipped with a GENESIS based indigenous Combat Management System (CMS, runs on around 3,9 million lines of code of software and can track over 2,500 tactical surface and air targets simultaneously), Thales Nederland's SMART-S Mk2 E/F-band 3D air and surface surveillance radar, STING EO Mk2 multi-sensor weapon director, Meteksan Defence's Yakamos hull-



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Following the completion of 10-month scheduled Design Phase, construction of the first Jinnah Class corvette is expected to start during the second half of 2019. She will be integrated with a 16-cell VLS for LY-80/HHQ-16 SAMs

mounted medium frequency active/passive sonar system, Aselsan's ARES-2N Radar ESM System, AseIFLIR-300D electro-optical director and Alper LPI radar, and is armed with an Leonardo (Oto Melara) 76/62 Compact gun (with a locally produced stealth shield), a RAM System GmbH (RAMSYS) Mk49 Mod 3 Guided Missile Launching System (GMLS) for the RIM-116 Block 1A/HAS missiles, Aselsan 12.7mm STAMP (2x) turrets, eight RGM-84L Harpoon Block II SSMs, four x 324mm (2-twin) torpedo tubes (for Mk46 Mod 5 and Mk54 LW torpedoes) and an Ultra Electronics Sea Sentor Surface Ship Torpedo Defence (SSTD) System. Turkish Navy currently operates three ADA Class corvettes, TCG Heybeliada (F-511) and TCG Buyukada (F-512) and TCG Burgazada (F-513). Provisional

acceptance of TCG Kinaliada (F-514), executed its first sail in March 2019, is scheduled to take place during September/October 2019. Compared to first two ships, which are equipped with nationally developed CMS, namely 'GENESIS', the third and fourth corvettes will be integrated with network enabled CMS 'GENESIS ADVENT' and Aselsan's HIZIR Torpedo Defence System (replacing the existing Ultra Electronics Sea Sentor Surface Ship Torpedo Defence System), SeaEye-AHTAPOT EO Reconnaissance and Surveillance System (replacing AseIFLIR-300D) and AKR-D Block B2 Fire Control Radar System (replacing STING EO). GENESIS ADVENT CMS will be first integrated on the TCG Kinaliada corvette and then the existing CMS on board TCG Burgazada will be upgraded to the GENESIS ADVENT level ■



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30 Years of FNSS: A World Renowned & Respected Turkish Defence Company

Completing its 30th year in the defence industry, FNSS, as one of the biggest Land Vehicle producers of Turkey, will showcase its latest platforms at IDEF'19

Displaying its wide range of solutions, FNSS will exhibit the KAPLAN 10 Anti-Tank Vehicle (ATV), KAPLAN MT PULAT, Marine Assault Vehicle (MAV), PARS III 8x8 Combat Engineering Vehicle, AV-8 CBRN vehicle, Anti-Tank Remotely Controlled Turret (ARCT) and the Armored Remote Weapon System (ARWS) solutions for the first time at this event. Additionally, the Award Ceremony for the 3rd MILDESIGN International Military Land Vehicles Design Competition will take place during IDEF'19.

The globally recognized land systems company FNSS specializes in designing and producing wheeled and tracked Armored combat vehicles as well as combat engineering vehicles, turrets and sustainability solutions. As the solution provider of choice for users in various countries, the Company has delivered more than 4000 Armored combat vehicles so far, worldwide. Thanks to its competent and dynamic workforce, the Company has continuously improved its vehicle design and production capabilities in line with the requirements of its users.

FNSS designs and develops customized solutions to meet the requirements of each user. The key to FNSS' success in delivering tailored products within requested time frames lies in its flexible approach to project management. This is complemented by its ability to orchestrate an extensive supply chain and a wide range of global partnerships.

FNSS products have been tested in stringent conditions and have proven themselves in combat missions. FNSS views user satisfaction as a permanent concept, addressing new needs that may emerge throughout the product's lifecycle and offers sustainability solutions that extends throughout the overall lifecycle. Building upon its 30-year heritage in the defence industry, FNSS continues to add value to its



K.Nail KURT - General Manager & President of FNSS

users by creating innovative solutions.

Celebrating the company's 30th anniversary, K. Nail KURT, General Manager & CEO of FNSS made a statement about FNSS's achievements so far. "This year, we celebrate our 30th Anniversary as 'A World Renowned and Respected Turkish Defence Company'. Since 1989, from the moment that the contract for our initial program became effective for the production of Armored Combat Vehicles (ACV), we have come a very long way. Successfully completing major local and export programs, in addition to attaining the status of being a "globally trusted and respected Turkish partner in defence", looking back at what we have accomplished in those 30 years, and starting with the production of ACV's, we see FNSS evolving into a global company designing, developing and delivering solutions like the innovative KAPLAN Family of vehicles which transformed the Infantry Fighting Vehicle (IFV) Class into the 21st Century; the PARS Family of vehicles which has become a standard of reference for tactical wheeled armored vehicles, and highly specialized platforms like the Marine Assault Vehicle (MAV). Overall, we have delivered over 4,000 combat platforms from our extensive

family of products, ranging from the 15t class of tracked armored vehicles to the medium weight class tank and 4x4 and 8x8 tactical wheeled armored vehicles. We continue to support each and every one with the same care. Today our products are making a name for themselves as solutions whose performance surpass the requirements of extensive user acceptance tests and are actively proving themselves in combat."

Emphasizing the solution-oriented activities of FNSS as a supplier, Mr. KURT shared the following: "A further pre-condition of a trustworthy land systems supplier for our users is meeting their requirements with creative and innovative solutions. Looking back at 30 Years of FNSS, we have deservedly accomplished this aspect as well. In all areas of our activity; be it our tracked or wheeled armored combat and engineering vehicles or modernization programs and turret systems, we provide leading edge, competitive, trustworthy and flexible solutions. In the international arena, with major competitions, which include comparative testing, winning up against world-renowned manufacturers is a strong indicator of the quality of the solutions we present. Today, in all the areas we participate in, we aim to be able to present

potential users with the best solution range; and to see us succeeding brings great pride to all of our FNSS employees.”

Addressing FNSS’ commitment to design innovative and future-proof products, Mr. KURT shared information about the new platforms of the company. “IDEF holds a very special place among those organizations. As FNSS, we will realize our largest participation and showcase our widest range of products at IDEF. Starting in 1993, we have been a part of every IDEF show to date. IDEF ‘19 will now be a reflection of 30 Years of Success and will show the world at large that we are ready for the next 30 years.”

At IDEF ‘19 FNSS will exhibit a series of vehicles and systems for the first time:

Marine Assault Vehicle (MAV) Makes First Appearance at IDEF’19

IDEF’19 will witness the unveiling of the MAV Marine Assault Vehicle, which has been greatly anticipated by the sector due to limited number of comparable vehicles in the

same class, principally because of the challenging requirements and highly specialized mission definition associated with these vehicles. Visitors to the FNSS stand will have opportunity to see the first prototype MAV, whose main role is to support the combat capabilities of marine forces in line with the requirements of the 21st century combat environments.

The MAV is being developed as part of the Armored Amphibious Assault Vehicles (ZAHA) Project being conducted by the Presidency of Defence Industries (SSB) to cater for the requirements of the Turkish Naval Forces Command. Within the project, FNSS will deliver a total of 27 vehicles, including 23 personnel carriers, two command and control vehicles and two recovery vehicles.

In addition to enabling the safe landing of units during amphibious operations, the Armored amphibious assault vehicles also serve as Armored personnel carriers after reaching the shore. During the amphibious assault phase of an operation, these vehicles are launched from the Landing Helicopter Dock (LHD) and rapidly cover the distance between the vessel and shore, allowing forces to land

under protection and with minimum delay. Once on land, these vehicles can continue taking part in operations side-by-side with other Armored vehicles. As vehicles with a dual role due to their mission requirements, Armored Amphibious Assault Vehicles need to exhibit superior performance both at sea and on land, and only a few countries around the world have such vehicles in their inventories. Among the NATO countries and allies, there is only one company other than FNSS producing vehicles of this class.

Compared to similar examples, the MAV is expected to have superior features such as, number of personnel transported by the vehicle, level of ballistic and mine protection, and performance criteria on land and in water. With ZAHA, FNSS takes Armored amphibious assault vehicles into the 21st century, and the project has now reached the Critical Design Review phase. Venturing outside classical approaches within defence projects, FNSS has completed its evaluation of the vehicle’s design not only on paper, but also in the prototype, for this review. The review will be on executed on the prototype vehicle in the integration hall.



KAPLAN MT Adapts to Emerging Threats with PULAT Integration

Currently, under development by FNSS and the Indonesian company PT Pindad within the scope of a joint project, the KAPLAN MT Modern Medium Weight Tank will be equipped with Aselsan's PULAT Active Protection System against increasing threats to tanks in the battlefield. The PULAT-integrated KAPLAN MT will be exhibited at IDEF'19 for the first time.

In today's battlefields, the threats faced by the tanks are increasing every day. Especially in urban operations, the diversification of the new weapons and the implementation of new tactics make active protection systems a necessity. The KAPLAN MT, which has the highest level of ballistic and mine protection in its class, is ready to face these emerging threats with PULAT integration.

Developed by Aselsan and TÜBİTAK SAGE, PULAT stands out as the preferred solution of the Turkish Armed Forces for M60T tanks. PULAT detects the anti-tank missiles or rockets approaching to the platform with its high technology radar, and then disables them at optimum range from the platform by using the Hard-Kill method. PULAT provides 360 degrees full protection, depending on the placement of the modules on the platform, against anti-tank guided missiles (ATGM) and rockets. When the system is activated, it works autonomously without any user input. During data collection and system performance tests, PULAT has been fired hundreds of times and completed the tests successfully.

Tank Hunter of the Future: KAPLAN ATV

The prototype of the KAPLAN Anti-Tank Vehicle (ATV), developed by FNSS to meet the demanding requirements of the Turkish Armed Forces, will be exhibited at IDEF'19. The vehicle has successfully completed KORNET and OMTAS missiles tests with the FNSS designed Anti-Tank Remotely Controlled Turret (ARCT).

KAPLAN STA, which was developed within the Anti-Tank Vehicle (AV) project carried out by the Presidency of Defence Industries, is the smallest member of the new generation FNSS KAPLAN armored



KAPLAN Anti-Tank Vehicle (ATV)

combat vehicle family. The vehicle performs all kinds of missions by integrating different subsystems and can move together with main battle tanks considering its automatic transmission. The vehicle has a low silhouette, and with its twin 5-road wheeled tracks, can operate in hot/cold weather conditions at high speed not only on asphalt and stabilized highways, but also soft soil, and rough terrain. The advanced suspension track system is designed to reduce vibrations and improve road holding.

The KAPLAN ATV is one of the very few vehicles to have amphibious characteristics. Thanks to the two water propulsion systems located at the rear of the vehicle, KAPLAN-10 can perform in deep and fast flowing waters. In addition to this, the driver is able to enter the water without prior preparation. The hull of the KAPLAN ATV is manufactured and integrated using a ballistic welding technique. The hull is water resistant, together with the hatches, and the lids are water-proofed via seals. While the power pack cabin and the expanded driver area is located at the front of the vehicle, the gunner and the commander areas are located in

the middle of the vehicle. The rear part includes the gunner's aid and additional crew sections.

In addition, the KAPLAN ATV has fitted with Anti-Tank Remotely Controlled Turret (ARCT) which is developed to have modern firing and command control capabilities. The turret is armed with ready-to-fire anti-tank missiles, as well as a coaxial 7.62-mm machine gun. With the completion of the qualification tests of the KAPLAN ATV, all deliveries within the ATV project are planned to be completed in 2021.

AV-8 AENBCRV (CBRN Reconnaissance) Prepares to Enter Inventory in Malaysia

The AENBCRV (Armored Engineer Nuclear, Biological and Chemical Reconnaissance Vehicle) version of the AV-8 Tactical Wheeled Armored Vehicle family developed by FNSS and its partner, DRB Hicom Defence Technologies Sdn Bhd. (DEFTECH) for the Malaysian Army, prepares to enter inventory in the first half of this year. The AV-8 AENBCRV, which has passed all tests successfully, has reached the end of the "Endurance



AV-8 IFV 25 GEMPITA

Tests” phase, which is the second and final stage of the qualification tests.

The AV-8 AENBCRV is equipped with advanced systems and equipment to detect and identify any outside chemical, biological, radioactive, and nuclear threats. By analyzing the hazard area, the vehicle will alert its user and other friendly military and civilian elements in the field to the relevant threats, ensuring the necessary protection measures are taken.

The “First Vehicle Development Process” consisting of concept design, detail design, manufacturing, and assembly activities of the AV-8 AENBCRV configuration, which has a complex and modern system architecture with special equipment, was carried out by FNSS. The first phase of the qualification tests, the Land Performance Tests and CBRN System Tests, which demonstrate that the vehicle meets the user-defined requirements fully and completely, was carried out at FNSS’ facilities in Ankara. The endurance tests, which are the second stage of the qualification process, started in Malaysia as of February 2019. Following the successful completion of all tests, acceptance of the first vehicle and delivery to the end user will be realized in Malaysia in the coming days.

Within the project, 4 AENBCRV vehicles will be delivered. The first of these will be the vehicle that completes the qualification tests. The remaining 3 vehicles will be produced by FNSS and delivered to the user by 2020.

The AV-8 AENBCRV is the first 8x8 CBRN vehicle developed by FNSS. The CBRN system, which is the primary mission equipment of the vehicle, was supplied from various

domestic and foreign companies according to user preferences and joint integration solutions were provided by the Environics company in Finland. By carrying out localization activities for some subsystems of the CBRN system, FNSS also contributed to the capabilities of local subcontractors.

FNSS Expands PARS III 8x8 Configurations with Combat Engineering Vehicle

FNSS demonstrates the modularity of the PARS III 8x8 in adapting to different missions with the armored combat engineering vehicle configuration developed for the Royal Army of Oman. The ongoing qualification tests of the PARS III 8x8 Combat Engineering Vehicle are expected to be completed in the first half of this year and the vehicle is planned to enter the inventory.

The PARS III 8x8 CEV is the first 8x8 combat engineering vehicle developed by FNSS to conduct mine clearing and obstacle construction/breaching missions. The vehicle can perform various tasks effectively thanks to its multiple types of quickly attachable and detachable equipment. For the primary mission equipment of the vehicle, FNSS works with the well-renowned Pearson company, which provides field-proven solutions preferred by many countries.

The contract signed by FNSS to meet the needs of the Royal Army of Oman includes the design, development, production, and delivery of 172 vehicles in 13 different configurations as well as the integrated logistic support (ILS) services to be offered during

the warranty period. FNSS will deliver 145 PARS III 8x8 vehicles in 8 different configurations and 27 PARS III 6x6 vehicles in 5 different configurations. The number of PARS III 8x8 combat engineering vehicles to be delivered is 6.

FNSS Presents Shadow Cavalry Solution to Turkish Armed Forces

In parallel with the importance of unmanned land vehicles applications in our country and internationally, FNSS exhibits the Shadow Cavalry concept at IDEF 2019. The Shadow Cavalry, which can be applied to all types of land platforms, will be introduced to the visitors with the M113 vehicle in IDEF’19.

The Shadow Cavalry concept that FNSS provides: Flexible solutions with integrated modular units, Manned and unmanned usability, Alternative communication and remote-control over varying distances, Internal and external day/night low-latency video transmission, Multi-layered secure data transmission and Applicability to all vehicles in the inventory.

With the Shadow Cavalry concept, FNSS aims to bring remote-control capability to all kinds of land platforms without sacrificing the manned driving option. The Shadow Cavalry concept is expected to perform critical missions such as logistical support, obstacle clearing, minefield breaching, and close fire support in the operation zones. As a highly successful production of the main industry and SME partnership, the Shadow Cavalry is intended to be an integrated part of all land platforms built by FNSS in the years to come.

ARWS Brings Ballistic Protection to Remote Controlled Weapon Systems

FNSS will exhibit the Remote-Controlled Weapon System ARWS (Armored Remote Weapon System), one of the best in its class with its technical features and ballistic protection, for the first time in IDEF ‘19. The qualification process was successfully completed in December 2018 and mass production of the ARWS system has started.



© FNSS

PARS III 8X8



PARS 4x4 ATV

Remote-controlled weapon systems are fielded extensively by the armed forces around the world because they provide personnel safety thanks to their unmanned nature and significantly increase the hit rate with the firing control system. Especially the operations in urban areas show that having ballistic protection is a critical necessity for these systems. Because these systems can be targeted by enemy fire or damaged by the debris and fragments in conflict zones and become unable to perform their functions. On the other hand, ARWS can continue their missions with high-reliability thanks to NATO STANAG 4569 Level 2 ballistic protection.

The ARWS system can be equipped with a M2 12,7 mm/.50 caliber machine gun, Mk19 40 mm automatic grenade launcher, M240 7,62 mm machine gun or FN MAG58 7,62 mm machine gun. ARWS can carry 300 12,7 mm bullets, 750 7,62 mm bullets, or 64 40 mm grenades. The system can be integrated into different types of vehicles, from 4x4 vehicles to main battle tanks.

PARS 4x4 Anti-Tank Vehicle Sets the New Standards of its Class

Developed by FNSS to meet the needs of the Turkish Land Forces Command, the PARS 4x4 Anti-Tank Vehicle (ATV) sets the new standards of its class with its unique features. The prototype of the vehicle, which is in the final phase of the qualification process, will be displayed at IDEF'19.

The PARS 4x4 ATV has been devised as a vehicle that offers both speed and high maneuverability

under all terrain conditions, with enough firepower to destroy enemy tanks and other armored units from a distance, and with the ability to engage second targets following a rapid change of position. Drawing upon its vast experience and innovative approach, FNSS has come up with a very special amphibious vehicle that is capable of meeting these challenging requirements simultaneously.

Most noteworthy among the PARS 4x4 ATV's features is the positioning of its power pack at the rear of the vehicle. With the placement of cooling grate and exhaust on the upper body, this positioning allows the vehicle to go amphibious without prior preparation, thus granting it the best amphibious capabilities in its class and further allows the PARS 4x4 to maneuver at higher speeds. All these features, which can only be expected from a vehicle with a rear-positioned power pack, grants the PARS 4x4 with critical capabilities in moving away rapidly after launching an attack.

The first prototype of the PARS ATV, which is the wheeled anti-tank system in the ATV project, began verification tests in May, and will soon commence qualification tests in line with the project schedule.

FNSS Continues to Support Users of 30 Years with Integrated Logistic Support Solutions

FNSS responds to the needs of numerous land platform users worldwide, making a difference not only with the superior survivability, mobility and firepower of its

vehicles, but also the integrated logistic support (ILS) solutions it offers to its users. For 30 years, the company has been providing uninterrupted support for all of its vehicles, including the very first ones delivered years ago.

FNSS' customers include armed and security forces of nations with the highest standards and greatest expectations, and the company follows the world's leading standards and practices in its ILS works. The company reflects its 30 years of experience on its ILS activities, which include a very wide range of solutions such as working together with local partners, supporting the vehicles directly during operations, establishing local offices, and Government Owned Company Operated (GOCO) model.

FNSS' ILS-related works address the entire product life cycle of vehicles, starting from the very beginning of the product development phase, and providing continuous support until the decommissioning stage of the vehicles. ILS activities also cover the provision of spare parts, technical support and technical documentation updates performed both during and after the warranty period, as well as optional user training and maintenance training programs.

Mr. KURT concluded his remarks by stating their confidence in the future. "When our first ever vehicle left the production line in 1991, we had visionary employees who predicted that at its 30th Anniversary, FNSS would become a global player. With everything we do, we move forward by continuously taking the human element into account. Today, with a workforce of close to 1,000 competent and dynamic employees, we deliver innovative solutions throughout the entire product lifecycle, from design to support. Already at the Alpha Leadership Academy, which recently became operational, we have started training the leaders of tomorrow, who will be carrying the legacy of the past 30 Years into the next 30.

FNSS has always been in the service of those protecting the homeland and will keep on doing so into the next 30 Years." ■

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A New Era of Connectedness - Honeywell Turkey Central Asia is a Key Partner for Profitable Digitalized Operations in Turkey and Central Asian Markets

In this exclusive interview, Frans Van DEURSEN - Honeywell President, Turkey and Central Asia discusses the company's Partnerships with Turkish aviation companies and many other industrial sectors helping Turkey meet its indigenous industrial growth objectives

Defence Turkey: Dear Mr. DEURSEN, first of all thank you very much for the interview. Last September you were appointed president of Honeywell, Turkey and Central Asia (Azerbaijan, Georgia, Tajikistan, Turkmenistan and Uzbekistan). Can you please inform us about Honeywell Turkey's new vision, structural plans, long and short term strategies?

Frans Van DEURSEN: Honeywell is one of the world's largest and most advanced technology companies, with a focus on connected solutions that make industries more productive, efficient, safe and secure. We do this by combining hardware systems for a range of industries – from aviation and defence, to buildings and smart city developments, to industrial plants and refineries, to warehouses, logistics and safety critical operations – with innovative software and data analytics tools. Because we have been developing industrial hardware applications for more than 130 years, we understand how technology can be applied to improve operations in virtually any industry.

By combining this domain expertise and hardware capability with advanced software engineering, Honeywell can produce modern solutions to some of the biggest challenges facing our industries today – including cyber security, worker safety, productivity improvements, and fuel efficiency. Our objective in Turkey is to take this expertise and apply it to Turkey's large industrial programs – from airports to high-rise buildings to rail infrastructure. We're a proven local partner for Turkey, helping it meet its indigenous industrial growth objectives, and that is also a strategy that is only going to grow for us.

Defence Turkey: We know that Honeywell considers Turkey to be one of the emerging and growing industrial markets. In this context, what would you like to say regarding Honeywell's current position in Turkey's industrial development from building technologies to energy, aviation and defence industries,

as well as the new opportunities and technologies to strengthen this cooperation in the upcoming period?

Frans Van DEURSEN: In 1992, Honeywell opened its first Turkish office in Istanbul, with a staff of 10 people. It was the start of what was to become an outstanding growth story for a company that today has 300 people across three offices in Istanbul, Ankara and Izmir.

Turkey is a strategic market for Honeywell – a bridge between Europe and Central Asia and the company's headquarters for the Central Asia region. The Central Asia region includes countries such as Azerbaijan, Uzbekistan, Georgia, Turkmenistan and Tajikistan. - These countries are all experiencing rapid urbanization, a significant rise of a middle-class population, growing demand for energy and resources, and huge investments in infrastructure construction.

Turkey's leading airlines, including MNG, Pegasus and Turkish Airlines, invest in the latest software and hardware technologies from Honeywell to make their operations safer, more efficient and comfortable. Our CTS800 engine, produced under a 50/50 partnership with Rolls-Royce, is a core component of Turkish Aerospace Industries' T129 ATAK helicopter and Turkish Light Utility Helicopter. Honeywell systems are also at work in some of Turkey's best-known buildings, including the Isbank Towers, the Ford Otosan factory, the Kanyon AVM shopping mall, the Polat Tower and the Hilton hotel in Istanbul.

We also have energy-efficient refining and petrochemical manufacturing systems and processes in many of Turkey's most important industrial facilities. For example, the Tüpras and Socar oil refineries, and Petkim's petrochemical manufacturing plants, all employ Honeywell industrial automation systems to reduce energy consumption, improve production efficiency, and raise output quality. There's very few, if any, industrial sectors in Turkey where we are not present.

Defence Turkey: Honeywell's technologies are at the forefront

of the Industrial Internet of Things revolution (IIoT), blending leading physical products with advanced software and data analytics to support a smarter, more connected, safer and more sustainable world. What is your assessment of the adoption of IIoT and digital transformation across the Turkish and Central Asian markets? How does Honeywell provide solutions to companies and institutions in this field?

Frans Van DEURSEN: One of the main tenets of Industry 4.0, and the lynchpin of Honeywell's modern portfolio, is the Industrial Internet of Things (IIoT). IIoT refers to the ability to get greater visibility of, and value from, operations by connecting the large number of hardware systems, or 'endpoints', that exist within typical industrial operations. The vast quantity of data these endpoints generate every minute is aggregated, and stored and analyzed either locally or remotely from anywhere in the world. By harnessing data in this way, IIoT enables industrial companies to unlock intelligence, from their data, helping them lower costs, improve productivity, efficiency, security, and safety, and best position their operations for growth.

That's why it's an exciting time for Honeywell. We provide the endpoints that manage, improve and collect data across an industrial operation. We provide the security systems that protect this data from ever-evolving cyber threats. And we also provide the hardware and software-based aggregation tools that interface with these endpoints and harness the data they generate, turning it into business value for customers.

Turkey benefits from ambitious industrial sectors that understand the value technology investment can yield, and with our end-to-end capabilities we can expect significant growth in IIoT-related technologies across Turkey in the near-term.

Defence Turkey: What are Honeywell's core capabilities, technologies, products that are focused on aerospace and defence?

Frans Van DEURSEN:

Honeywell's aerospace products and services are found on virtually every commercial, defence and space aircraft. We build aircraft engines, cockpit and cabin electronics, wireless connectivity systems, mechanical components and more for both commercial and defence customers. Our hardware and software solutions create more fuel-efficient aircraft, more direct and on-time flights and safer skies and airports.

For defence, we have a combination of mechanicals – such as engines and auxiliary power units – and software-based avionics and connectivity systems that help ensure mission success and maximize in-theater performance. We focus on helping military customers reduce unplanned downtime across defence platforms, improve aircraft operational performance, including in hot and dusty environments, and extend fleet lifecycles through a series of mechanical and avionics retrofit, modification and upgrade solutions.

Defence Turkey: Honeywell is an important solution partner of Turkey in terms of software and hardware support in civil and military aviation. Could you please clarify for us the existing commercial airline clients as well as the scope of these collaborations? How do you assess your position in civil aviation in Turkey?

Frans Van DEURSEN: Honeywell works with both Turkish Airways and Pegasus Airlines, supporting their initiatives to increase operational efficiency and safety within their fleets. Three years ago, Turkish Airways selected Honeywell's GoDirect Fuel Efficiency software to reduce fuel costs and associated costs, saving up to 5% yearly on aircraft operating the software. Pegasus Airlines is a major operator of, and indeed was the European launch customer for, our cutting-edge IntuVue™ RDR-4000 weather radar, which can produce a 3D, 180 degree display of weather from the ground up to 60,000 feet and up to 320 nautical miles ahead of the aircraft.



We have close partnerships with almost all airlines, and maintenance providers such as Turkish Technic, in our country. With the growth of civil aviation in Turkey, we are seeing our partnerships and customer base continue to expand in this area too.

Defence Turkey: Honeywell is also allocating significant resources in SATCOM technology. What would you like to say about these services that can provide flexibility to both commercial airlines and military fleets in life cycle management and cost? What type of requests are you seeing for the procurement of such technologies and services in Turkey, as a market booming each passing day in the aviation industry? Could you please discuss the current status and share your future expectations with us?

Frans Van DEURSEN: I talked about the rising prominence of IloT earlier in this interview, and it is no different for the aviation industry. Here, connected technologies have an increasingly large role to play in improving the performance and economic sustainability of operations.

Today, pilots use tablets to improve navigation, update flight plans on the go, or view real-time weather information, increasing passenger safety and securing more on-time arrivals. Airline operators can download real-time data to monitor fuel usage or share aircraft health and usage information with maintenance personnel for better predictive maintenance. And in the

cabin, passengers now expect to be able to live stream TV, stay in touch with colleagues, family and friends, and browse the internet in the same way as they do at home or in the office.

Because we have the hardware systems on the aircraft, as well as the connectivity equipage and the software solutions to turn data into operational intelligence, we're seeing huge upside right across our connected aircraft portfolio.

Defence Turkey: In the Turkish market, we see that you have adopted a growth oriented approach with strategic partnerships rather than a direct sales-oriented approach. Within this frame, how do you cooperate with companies in the aerospace and defence industry? In addition to that what is your assessment on SME collaboration?

Frans Van DEURSEN: Instead of just fulfilling the offset requirements in any project, our strategy is to include the existing local capabilities in Turkey into our integrated supply chain. building closer cooperation with both military and civil aviation companies of all sizes across Turkey. For example, there are the capabilities in Turkey to produce, and maintain, some parts of the engines, mechanical systems, APU, air thermal and landing systems locally. We are capitalizing on this engineering skillset and expertise because it supports the growth of Turkey's industry and helps our customers get service where they need it most – locally.

Remote Sensing Systems
Electronic Warfare & Communication Systems
Electronic Mission Systems
Simulation & Training Systems
Production Programs



IDEF'19

14th International Defence Industry Fair
30 April - 03 May 2019

Hall. 3

Stand No. 323A

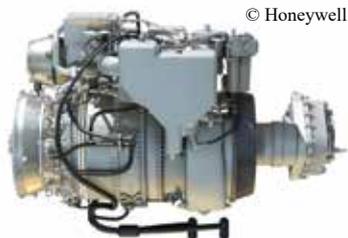
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Defence Turkey: Could you please inform us on the latest status of the T129 Atak and T625 Multi-Role Helicopter program? What is your approach regarding new programs like T-FX, ATAK- 2 and General Utility Helicopter?

Frans Van DEURSEN: T129 ATAK is a very successful platform offering very high performance and delivering outstanding mission success. Our LHTEC CTS800 engines play an important role in this success. The next step will be the export of the T129 ATAK to other countries and we are actively supporting this initiative. The CTS800 provides superior performance to the T129 ATAK, especially in high altitude and hot weather conditions, meaning the platform can deliver mission success in a wide variety of operating environments and therefore extending its attractiveness to a wider export market.



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LHTEC CTS800

The new multirole helicopter T625 GÖKBEY made its maiden flight on 6th of September 2018 and will undoubtedly be another success story. For the T625, we have delivered the engines that are essentially the same engines used in the T129.

Honeywell has extensive solutions both in mechanic and avionics systems and we therefore have a lot to offer new platforms coming into the market.

Our solutions span everything from radar altimeters, auxiliary power units, wheels and brakes, satellite communications, cockpit systems and displays, air and thermal systems, cabin management and entertainment, navigation and radios, terrain and traffic awareness, actuation, sensors and engines. There are many very capable local OEMs in the Turkish defence industry, and it is our expertise and portfolio breadth that helps them be even more competitive.



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T129 ATAK Helicopter

Defence Turkey: What are your growth predictions for the Turkish market in the next five-year period?

Frans Van DEURSEN: Turkey is recognized as an emerging market and one of the world's newly industrialized countries. Turkey's economic significance is partially attributed to the country's growth, which has been achieved despite global economic headwinds. While many countries around the world have experienced increasingly sluggish growth, Turkey experienced a comparably high average percentage of gross domestic product growth over the last few years.

Despite macro-economic fluctuations that have the potential to impact local economies around the world, we continue to maintain a good level of confidence in Turkey's long-term growth opportunity.

Defence Turkey: Lastly, would

you like to convey a message to the readers of Defence Turkey?

Frans Van DEURSEN: Whether our customers are running petrochemical plants, aircraft fleets, or skyscrapers, their operations are generating vast quantities of data – data that has untapped customer value locked within it. Our technologies help customers extract that value and, in doing so, enable them to make better informed decisions that improve the safety, security, efficiency and productivity of their operations. We are committed to supporting our customers with our cutting-edge technology and connected solutions in the future as we did in the past and are very proud to be partnering with Turkish aviation companies, and those in many other industrial sectors, to ensure this new era of connected, digitalized operations continues to be profitable for Turkey and the Central Asian markets ■



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Turkish Defence Industry's Vanguard Aselsan at IDEF '19

At the forefront of the Defence Industry, Aselsan is positioned once again to impress local, regional and international audiences at IDEF 19 with leading-edge technology at their booth. Turkey's pioneering and leading defence industry company Aselsan to showcase an array of crucial and innovative products



Aselsan Rapidly Rising in the field of Active Protection Systems

In last decade, the importance of main battle tanks (MBTs) has increased in the modern operational environment, and as such, rocket (RPG) and anti-tank guided missile (ATGM) usage against MBTs has increased in parallel. Traditional passive armors have become inadequate in protecting MBTs; hence, taking new kind of measures becomes an ultimate necessity.

In order to meet this emerging demand, Aselsan has started working on active protection technologies and developed the PULAT System as a first outcome. PULAT was developed in a very short time span with great effort and was qualified by testing against hundreds of RPGs and ATGMs. It started to be used by the Turkish Armed Forces (TAF) in M60T MBTs. PULAT, one of the few Active Protection Systems (APS) used operationally in the world, has increased the survivability of Turkish MBTs.

Aselsan, ever-growing in active protection technologies, has also been developing the active protection system AKKOR, specially designed for ALTAY MBTs. AKKOR is currently at the stage of field tests and will be delivered to the TAF along with ALTAY MBTs mass production.



M60T MBT's were fitted by AKKOR PULAT APS

Aselsan, creating products used operationally with the AKKOR & PULAT active protection product family, will be a pioneer in the world in active protection systems.

Another First From Aselsan in the Field of EW

The effective use of Electronic Warfare (EW) Systems, which has been rapidly developing in recent years, has an important role in operations and enables strategic superiority between parties by strengthening defence and coordination among allied troops.

During the operation, the parties can be faced with either the jamming or deception of their radar and communication systems or attempts to collect the intelligence data of the threat zone. When these circumstances occur, it is important to experience the impacts of it and how to counterattack or apply realistic countermeasure techniques.

For this purpose, Aselsan continues to develop the most comprehensive Project as a first in Turkey; RAKAS and MUKAS in order to train experts who will have advanced technical capabilities while experiencing the realistic EW environment. Under this context, the MUKAS System as a first training system of the project contains both Electronic Communications Support and Electronic Attack capabilities. It has completed its user acceptance tests in the field successfully and now it is ready for operational use. Meanwhile the RAKAS System that combines Radar and Communication Electronic Support and Electronic Attack capabilities is being developed by Aselsan and is planned to be launched in the upcoming period.

MUKAS is a tactical field training system, which was developed for Turkish Armed Force (TAF) Communication EW Operators to learn how to use the system efficiently

under electromagnetic environments that contain threat factors.

The MUKAS System was designed on a single vehicle where Communication Electronic Support and Electronic Attack capabilities in HF, UHF and VHF frequency bands can work in unison. The system capabilities include high accuracy direction findings, efficient jamming, deception, signal detection and signal analysis. By means of these design features, it is Turkey's first Communication Electronic Warfare Simulator and a comprehensive system that is not common in the World.

On the other hand, the RAKAS tactical field training simulator is designed as a single system where both Radar and Communication Electronic Support and Attack capabilities can work together. The System is applicable of using both for Naval and Land platforms and its outstanding features are detection and classification of the radar signal, automatic multi target tracking via RF and optical sensors, radar and electronic attack simulations, jamming and deception of the target communication system in HF, UHF and VHF



MUKAS

frequency band. Overall, it aims to train radar and communication operators on collecting intelligence data, understanding the effects of Electronic Attacks, analyzing and developing counter ECCM techniques.

Aselsan to Meet Future Needs with NG-MDS

The self-protection capabilities of airborne platforms of the Turkish Armed Forces (TAF) will be improved further with Aselsan's new generation systems.

As threats for airborne platforms evolve, the countermeasure decoys, applied techniques and the self-protection systems evolve and improve as well. Aselsan closely follows this progress and carries on its efforts to stay up to date by foreseeing the needs of the Armed Forces. Aselsan's New Generation Countermeasure Dispensing System (NG-CMDS) that is currently in the development phase, is being presented at IDEF'19 with the first conceptual design outputs.

As the indigenous product development effort is continuing with the contributions of the domestic industry, Aselsan also actively participates within the NATO sub group studies working on these technologies. With more than 10 companies worldwide, that are important CMDS System and decoy suppliers, the NG-CMDS System of Aselsan has demonstrated superior performance during these sub group studies.

The NG-CMDS is designed to satisfy the countermeasure dispensing needs of the airborne platforms ranging from rotary wing platforms to fighter jets, taking into account the future requirements of such needs. The system will provide the infrastructure to use new generation decoys and provide flexible solutions for the varying needs of different platform types. The capabilities of the Aselsan ÖZİŞİK CMDS System, that has been in use for a long time by the TAF and other users around the world, is improved for future combat fields. The qualification tests of the NG-CMDS are planned to start within 2019 with the pilot production units.



© RAKAS

High Frequency is Our Expertise

Besides using wired communication in the tactical and strategic field, radio communication systems are also used according to different requirement and scenarios. For that reason, the HF (High Frequency) frequency band is important for radio communication systems. The V/UHF Frequency band is used for short distance and short duration communication however the HF frequency band is used for long distance and long-term communication, for this purpose ground wave, sky wave and NVIS (Near Vertical Incidence Skywave) is used in the tactical/strategic field.

Scanning, detection, Direction Finding (DF), location fixing, parameter extraction, recording and analysis capabilities becomes a necessity for intelligence in the HF frequency band like the V/UHF frequency band, and also attacking has critical importance in harming or completely blocking the target HF communications and/or causing incorrect data transmission ensuring an advantage for friendly troops in the tactical field.

Aselsan has been developing HF Electronic Support (ES) and Electronic Attack (EA) Systems for a long time. HF ES/EA Systems are in the validation phase and after completion of the field tests, the Systems will be delivered to the Turkish Armed Forces (TAF).



Acoustic Sensors of PREVEZE Class Submarines will be Provided by Aselsan

Within the scope of the PREVEZE Class Submarine Mid-Life Upgrade (MLU) Program, acoustic sensors, which are the basic and most important sensor group of a submarine, will be replaced with more modern, more effective and indigenous sensors. In this context, by changing wet-end units of the Cylindrical Array, Passive Ranging Sonar, Flank Array Sonar (FAS), Intercept Sonar, Active Sonar and Own Noise Measurement Systems, the acoustic capabilities of our PREVEZE Class submarines will be improved.

General Features

- › Digital output
- › Minimum ambient noise effect
- › High signal gain
- › High front to back signal ratio
- › Low cabling
- › Modularity
- › Sensor BIT feature

FERSAH Displayed for the First Time at IDEF '19

Within the scope of the BARBAROS Class Frigate Mid-Life Upgrade (MLU) Project Contract, signed with the Presidency of Defence Industries (SSB), the FERSAH Hull Mounted Anti-Submarine Warfare (ASW) Sonar will be showcased for the first time at IDEF '19.

FERSAH is a Hull Mounted Sonar System, developed for frigate and corvette platforms that will be built or modernized, which operates in the medium frequency band as active and passive mode and its primary task is to meet the

needs of ASW. In addition to ASW, Aselsan's FERSAH also has an object avoidance sonar mode. The system consists of 5 units including the Sonar Wet-End, Connection Box, Power Cabinet, Processor Cabinet and the Operator Console.

General Features

- › Modern signal processing algorithms
- › Compliance with military environmental standards
- › Ability to work independently
- › Integration into Combat Management System
- › Extensive Built-In Test (BIT) feature
- › Water-cooled cabinet structure
- › Acoustic data recording
- › Training simulator
- › Open architecture and modular design
- › User friendly interface

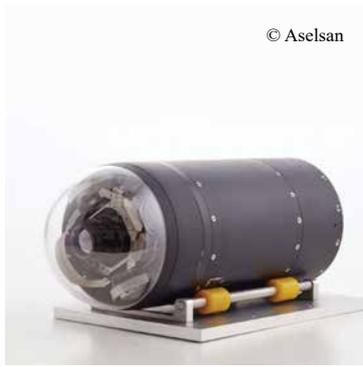
ACAR to Target UAVs

Aselsan widened its ACAR Surveillance Radar Family, which is one of the most important members of the homeland security and border surveillance product portfolio, with the ACAR-UAV Surveillance Radar to counter the rising threat of mini/micro UAV's. The ACAR-UAV Surveillance Radar is designed and developed for detecting and tracking fixed and rotating wing mini/micro UAV targets. The ACAR-UAV is a man-portable, all weather, day-and-night operable radar system which complies with applicable military standards.

The ACAR-UAV can classify mini/micro UAV targets with its automatic classification capability and provides track-while-scan capabilities for 100 simultaneous targets. The ACAR-UAV is designed as a fully solid-state Ku-Band radar system. With its 400 of simultaneous elevation coverage and 15 rpm antenna rotational speed, the ACAR-UAV provides superior performance in detecting, tracking and classifying fast and maneuvering mini/micro UAV targets.



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HİSAR Air Defence Missile Imaging Infrared Seeker Continues to Prove its Performance in Ballistic Test Activities

The Imaging Infrared Seeker (IIR) being developed for the HİSAR projects by the Aselsan Micro- Electronics Guidance and Electro-Optics Sector Directorate successfully accomplished its target acquisition/ tracking tasks against high speed target aircraft during ballistic tests as part of the HİSAR Low/ Medium Altitude Air Defence Missile System Projects that are being executed in order to fulfil Turkey's air defence requirements. The missile displayed an effective performance under terminal guidance and with the indigenously developed high resolution HİSAR Infrared Seeker with cooling detector, critical advantages were gained within the scope of the air defence missile seeker technologies.

KARAOK Anti – Tank Missile's Infrared Seeker Prototype in Test Phase

The test activities are underway for the infrared seeker prototype developed for the shoulder launched KARAOK guided anti-tank missile.

The single-use new generation short range anti-tank missile, developed indigenously, features fire-and-forget mode, and it is capable of destroying heavy armored vehicles by directly shooting them or shooting them from above. This missile could be manufactured and utilized by a limited number of countries in the world. KARAOK's infrared seeker is being developed by Aselsan.

Infrared Seeker of the Indigenous Anti- Tank Missile UMTAS in Serial Production

Activities continue regarding the mass production of the Infrared Seeker for one of the powerful weapons of the Indigenous Attack Helicopter T129 ATAK, the UMTAS (Long Range Anti-Tank Missile).

The UMTAS infrared seeker could be used efficiently up to 8km with the help of the image transferred to the marksman in cases where the target is either in or out of the line of sight against fixed and mobile targets with its "fire-and-forget" and "fire-and-update" modes. The seeker is capable of;

- › Performing lock-on and automatic target tracking functions over the image transferred by the seeker to the marksman's monitor marked by the user prior to firing in the fire-and-forget mode.
- › And in the fire-and-update mode, the seeker can be locked onto the actual target tracked over the seeker image transmitted from the missile sent to the coordinates of the target by the marksman and moreover when a new target is identified it is capable of updating by locking onto this new target.



UMTAS Infrared Seeker

The New and High Resolution Version of the CATS System DASS will be on Call Soon

Aselsan launched new generation vision system development activities at the end of 2018. This new system will feature sensors with higher resolution compared with the CATS System. This newly developed system is planned to be dubbed the DASS Electro – Optical Reconnaissance, Surveillance and Targeting System.

In addition to the Unmanned Air Vehicles (UAV) and aircrafts, DASS System could be utilized by rotary wing platforms or high resonance platforms capable of operating in medium and low altitude and capable of artillery shooting.

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DASS Electro – Optical Reconnaissance, Surveillance and Targeting System

The CATS System infrastructure will be utilized in the DASS System and the higher resolution versions of the sensors existing in the CATS System will be used.

The DASS System features the SWIR Camera, Laser Point Tracker and Acute-Angled Day Television options. Additional sensors may be integrated to the system on account of its distributed sensor structure and critical amenities may be provided during the production and test procedures of the system.

The DASS System is planned to be launched into mass production in 2020.

Turkish Navy's Sea Eyes Provide Vision

Aselsan's naval electro-optical systems in different sizes and characteristics have started to be included in the Turkish Naval Forces inventory in respect to naval



platform requirements in a wide variety ranging from small search and rescue boats to airplane carriers.

Following the integration of the Seaeye -AHTAPOT Electro-Optical Director System to the ADA Class TCG Burgazada corvette, the Seaeye Systems to be respectively integrated to the TCG Kinaliada and the Multi-Purpose Amphibious Assault Ship the TCG Anadolu, feature the characteristic of being the first genuine naval surveillance systems that are fully designed and manufactured with local resources.

The Seaeye Group, which will be the main vision system of the Turkish Navy and Turkish Coast Guard as of 2019, is composed of the PİRİ, AHTAPOT, KIRLANGIÇ, LİS, ORFOZ and the MARTI systems, designed for all naval platforms of all sizes.

Aselsan will be introducing the PİRİ - Infrared Search and Tracking System into utilization in 2019. It is the most competent and effective infrared band radar system in the world, developed in line with the demands of the Turkish Armed Forces and named after the great Turkish Sailor PİRİ REİS. The security of the Multi-Purpose Amphibious Assault Ship (LHD) the TCG Anadolu will be maintained in maximum with the Laser Warning System (LWS) capable of perceiving laser threats from the enemy used with the PİRİ System which is capable of detecting and tracking all threats around the vessel, again with Aselsan's advanced technological infrastructure.

Very few countries in the world are capable of fulfilling their all of their own requirements regarding electro-optical reconnaissance and surveillance of their own Naval Forces in the full sense. Aselsan's Seaeye group eliminated the foreign dependency in naval electro-optical systems.

Aselsan Solutions Against Newly Emerged Threats

Aselsan introduced new generation ship defence systems against Swarm Drone Strikes that emerged as a new generation threat in order to neutralize the high combat capability of the battleships. The Seaeye Group, designed and manufactured fully with indigenous

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resources, is the backbone of the aforementioned defence systems revealed in order to automatically detect and track numerous Mini/Macro UAVs and eventually destroy the threats with laser guns in an active and coordinated manner without resorting to the use of ammunition.

The aforementioned new generation ship defence concept is structured in a way to be embedded over the PİRİ - Infrared Search and Tracking System named after the great Turkish seaman PİRİ REİS. PİRİ will automatically detect and track hundreds of threats simultaneously, then transfer these targets over the Laser Defence System (LDS) in the most optimal order, the high-power laser guns within the LDS will destroy these targets in turn and therefore the swarm drone attacks threatening the ship will be neutralized. In this way, Aselsan is forming a hybrid solution with high technology which it has developed with the company's own resources.

With the Swarm drone defence systems making great progress in Anti - Drone Systems in recent years, Aselsan is ready to fulfil its responsibilities in the protection of the Turkish Naval Forces.

STAMP - The Star of Exports has been Renewed

The STAMP Remote Controlled Stabilized Machine Gun Platform, which has been sold to 19 different countries so far, is being displayed with a more capable, smaller and lighter design as the STAMP-2 at IDEF19.

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The STAMP-2 Remote Controlled Weapon System has been developed in line with the changing user requirements and it will be introduced at IDEF19. The demand is growing rapidly for the STAMP-2 System that is sold to the Turkish Naval Forces and different countries abroad. This system provides near area defence against potential asymmetric threats related to naval platforms even under challenging environmental circumstances. 7.62mm, 12.7mm machine guns and 40mm grenade launchers could be integrated to the STAMP-2 system that could be remotely commanded by an operator. With the assistance of its laser distant meter, day and night vision cameras, automatic target acquisition and tracking, precise stabilization and automatic ballistic application capabilities, the system continues to increase its high shooting performance in respect to surface and air targets.

The training simulator, improved user interface and precise stabilized electro-optical system stand out among the updates to the STAMP-2 System. The system stands apart from its international competitors with the help of the new features added by Aselsan. On account of the under-deck ammunition feed capacity, the ship crew is able to feed ammunition to the system without being exposed to counter



fire when the ammunition in the system decreases. The action limits of the STAMP-2 are increased as well and with the help of the precise stabilized router, the STAMP-2 could also be utilized without directing it towards the target under surveillance mode.

One of the renewed features of the STAMP-2 system is the user interface. In the updated system, the size of the screen has been increased to 19 inches. The simultaneous display of the day vision and thermal camera images over the screen provide a great advantage to the user during implementation. The improved user graphic interfaces and embedded training simulator are on par with popular computer games on the market. In this way, it is possible to specialize in the utilization of the system in a more pleasant and practical way.

Aselsan's Touch Operated Smart Cockpit Debuts with GÖKBAY

The new generation smart cockpit of the T625 GÖKBAY Lightweight-Class Utility Helicopter and all its avionic systems were developed by Aselsan. One more solution was added to its competitive and innovative solutions in the global aerospace market with this new generation smart cockpit.

As the leading association of the Turkish defence industry, in order to fulfil domestic and foreign demands, Aselsan successfully conducts the development and manufacturing of the most critical avionic products used in helicopters, aircraft and unmanned air vehicles, and the integration of these systems to air platforms as well as the after sales services.

The first hover flight of the T625 GÖKBAY Utility Helicopter project was executed under the main contractor ship of Turkish Aerospace and equipped with Aselsan's new generation smart cockpit indicators. This indigenous avionic system was successfully accomplished on September 6th, 2018.

The new generation smart cockpit MATE (Modular Avionics Touchscreen Environment) is



Aselsan's New Generation Touchscreen Smart Cockpit

admired by users and is composed of two touchscreen displays with a size of 8 inches x 20 inches x 10 inches. While decreasing the workload of pilots, these cockpits elevate flight safety to the maximum level.

MATE was developed to be compatible with the civil aviation standards of the European Aviation Safety Agency (EASA) and the General Directorate of Civil Aviation (SHGM) enabling pilots to manage all systems over the helicopter via the touchscreen cockpit displays. The navigation, communication, identification for friend or foe, electronic battle and electro-optical systems of the helicopter were designed by Aselsan as well.

The T625 GÖKBAY Utility Helicopter's flight and task management software was also developed by Aselsan. This software allows the helicopter to conduct Performance Based Navigation up to the level of RNP 0.3 (Required Navigation Performance 0.3) in all civil air spaces across the world. With the help of Aselsan's indigenous digital map and obstacle detection system software, the aim is for pilots to be able to conduct secure flights even under the harshest conditions.

Turkish and Global Marines are Under the Guard of Aselsan Deniz Electronic Warfare Systems

The Naval Electronic Warfare (EW) systems identify friend and foe platforms around the surface or underwater platform through perceiving and categorizing the electromagnetic signals sent by the radar devices over them. These are the most crucial systems to assist the commander of the vessel in making the proper decisions according to the friend or foe categorization of



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the platforms. Since the systems operate completely in a passive manner, they cannot be detected by hostile platforms as they perform their tasks. Moreover, through the actively operating EW systems, by interfering with the radars of the hostile platforms directing the missile or the guided missile threats towards the platform with the help of the electromagnetic signals sent, they stand out as an indispensable component as part of the self - protection task of the platform. These systems operate as a sub-component of the National Electronic Warfare Suite (NEWS) and could be utilized at a high reaction speed and high efficiency level in order to minimize operator interaction.

Aselsan Naval EW Systems contain the product groups named the ARES (Aselsan Radar ESM System) and the AREAS (Aselsan Radar Electronic Attack System) with different versions in accordance with various platform requirements and fully indigenous equipment, software and algorithms. A cooperation was built with the Naval Forces Command Research Center Command (ARMERKOM) in the design of the systems and in this way a high level of effectiveness and field success could be achieved.

The aforementioned systems could be integrated to many different platforms such as Submarines, Frigates, Assault Boats, Corvettes and Support Ships so far and soon they will be integrated to the Multi-Purpose Amphibious Assault Ship, the TCG Anadolu platform which will be our

country's first Landing Helicopter Dock (LHD).

Compared with their competitors, the ARES and AREAS series Aselsan Naval EW systems have many technological effectiveness superiorities and they could be integrated to the underwater and surface platforms of friendly and allied countries. Negotiations with numerous countries are being conducted for the integration of these systems to the naval ships of the world, increasing the export of such systems with high added value.

AESA SAR POD to Take Part in Aselsan's SAR Product Group

One of the leading companies of the Turkish Defence Industry, Aselsan continues to generate indigenous solutions towards the radar system requirements of our country. With the justified pride of introducing numerous radar systems to the utilization of our Armed Forces since the 90s, Aselsan bears the responsibility arising from being the pioneer company of the sector and continues its intense activities. The AESA SAR Pod developed with the high technology, that is owned by only a small number of countries, emerged as a result of perseverance and a steadfast schedule and it will contribute to the security of our country.

The Synthetic Aperture Radars (SAR) are used by being integrated to satellites or manned/ unmanned air vehicles enabling the imaging of the earth in night and day and under all types of weather conditions including rainy and cloudy weather, and the identification of naval targets and mobile ground targets. SAR radars are being used in reconnaissance and surveillance implementations in the military area and for activities such as the imaging of agricultural areas, crisis management and urban and regional planning in civilian areas.

The final acceptance tests of the first imaging and mobile target acquisition radar SARPETM Synthetic Aperture Radar (SAR) System developed by Aselsan with the ANKA Unmanned Air Vehicle (UAV) was completed in 2016. The



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mass production of the SARPETM System that became operational over the ANKA was accomplished and the system was delivered.

The AESA SAR Pod system is a lighter and more compact new generation SAR system that fulfils the tactical reconnaissance and surveillance requirements of the Turkish Armed Forces (TSK) and that could be used as a disposable load in air platforms. The AESA SAR Pod features advanced capabilities such as walk detection mode and could be used for various purposes over manned/ unmanned and civilian/ military air platforms in different sizes. This is a product capable of competing in international markets.

The AESA SAR Pod's diameter is 16 cm, its length is 94cm and it is lighter than 23kg. With the help of its POD structure, it was designed to enable an installation under the wings as well as the air frame. In this way, simultaneous utilization with different sensors such as electro - optical sensors under the air frame was rendered available in the platform. Following the image capture from distant ranges via the radars and the acquisition of mobile targets, these targets could be identified with the electro - optical sensors. With the help of SAR capability, by comparing the images captured in different intervals over a given region, the minor changes over the field as well as the structural changes such as buildings, roads or airports may be identified ■



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Otokar Exhibits Two New Armored Vehicles During Press Meeting at Its Arifiye Plant

by Ibrahim SÜNNETÇİ

Operating in the defence sector since 1987 and providing services to the Armed and Security Forces of 32 allied and friendly nations in five continents besides Turkey with over 30,000 military vehicles (including LandRover Defender tactical vehicles), Otokar revealed the prototypes of Turkey's first electric drive armored vehicle AKREP-II Armored Combat Reconnaissance Vehicle and URAL Special Operations Vehicle, which is the new version of ENGEREK Special Operations Vehicle to the local media during an exclusive press meeting held on April 24, 2019. The press meeting held at Otokar's plant in Arifiye, Sakarya was hosted by Otokar's General Manager Serdar GÖRGÜÇ

In the meeting, stating that Turkey was drawing the world's attention with its competitive products in defence industry, Otokar General Manager Serdar GÖRGÜÇ said, "The products and vehicles manufactured by our defence industry are being appreciated in global scale. As Otokar - Turkey's only indigenous land systems manufacturer - we have been increasing our added value to our country with the vehicles and technology we produce in this field. Otokar is the supplier of the NATO and the United Nations and more than 30,000 military vehicles manufactured by Otokar with the company's own technology, design and implementations are being actively used in Turkey as well as in the world. The reputation of our vehicles exceeded beyond our borders; we reached a competitive level in the world with the help of the vehicles we manufacture. Otokar is no longer a company in defence industry manufacturing and selling products, it reached the level of a company that exports its know-how and conducts technology transfer from Turkey".

GÖRGÜÇ: "We Steer the Innovations in Land Systems"

Stating that as a result of the changing threats during the last 20 years, the need for the vehicles that could be used in armed patrol, reconnaissance and in military operations on urbanized terrain has increased and that they developed the new generation armored vehicle AKREP-II to this end, Otokar General



Manager GÖRGÜÇ said, "According to our observations, a requirement for a low silhouette armored vehicle with high ballistic protection that enables the integration of many weapon systems in addition to the primary tasks of reconnaissance and surveillance has developed in our users. Our AKREP vehicle, which we added to our product range in 1995, secured contracts both in our country and in foreign countries and it was a low silhouette platform operated by a crew of 3. By making use of the know-how and high technology we own, we developed the new generation AKREP-II

considering the contemporary expectations and against the future threats and added it to our product range. We expect AKREP-II to be successful particularly in the export markets with its high firepower, superior protection and survivability, its high maneuver capability, low silhouette and agility."

GÖRGÜÇ: "It was designed in line with the Technologies of the Future"

Noting that AKREP-II was designed as a modular platform adaptable to different tasks, and that they developed the vehicle in a way to enable benefiting from the technological facilities in maximum extent, GÖRGÜÇ said, "The circumstances of the battlefield and the expectations of the end users are changing constantly. The armies wish to benefit from the operational advantages and the logistical efficiency of technology



in the highest level. Therefore, the expectations for new generation vehicles and solutions are increasing in the modern armies. They wish to utilize the technological solutions that would increase the efficiency and performance. By taking all the aforementioned expectations into consideration, we designed AKREP-II in a way to enable integration with all contemporary and future technological infrastructures. For instance, the AKREP-II that fitted with appropriate equipment for the long-lasting reconnaissance and surveillance missions will be able to transmit the data, obtained by onboard advance identification and recognition systems, simultaneously to the digital information systems. With this feature, AKREP-II will be a pioneer in transferring the advanced technologies to the military field as well.”

Underlining that AKREP-II will be displayed at the 14th IDEF '19 International Defence Industry Fair this year for the first time, and that they have been working for months to present the vehicle in a special configuration at the event for months, GÖRGÜÇ continued, “When we spoke of technological developments of course alternative fuels remained in our agenda. We designed AKREP-II in line with the alternative powertrains. AKREP-II is equipped with electric motor and improved battery packs will be displayed at IDEF '19 as Turkey's first full electric drive armored vehicle. Offering agility, low thermal signature, high speed and silence advantages all at once compared with the traditional armored vehicles, AKREP-II features the electric motor that is sufficient for fulfilling the challenging specifications set by the armies across the world. Fulfilling the tactical performance expectations in the best way, AKREP-II also provides advantages especially in fuel efficiency, mobility, survivability and in respect of integrated logistical support.”

Noting that AKREP-II would become a milestone for Otokar and Turkey, GÖRGÜÇ added, “With AKREP-II, Otokar gained a unique know-how on the implementation of electric drive vehicle technology to armored vehicles. This development has the characteristic of a first step



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for the hybrid and autonomous armored vehicles of the future. Our target is to render AKREP-II a leading product in the technology exports of Turkey.”

AKREP-II Armored Combat Reconnaissance Vehicle

Developed by Otokar as a private venture the AKREP-II Armored Combat Reconnaissance Vehicle is intended to meet both export and local customers' requirement. It is worth mentioning that a number of countries, including the ones in Africa, operate thousands of

aging scout cars, produced the 1960s. So the AKREP-II seems as a good replacement. The AKREP-II is intended for surveillance and force recon/combat reconnaissance missions. But when equipped with 90 mm gun it can also provide close fire support to combatants. Otokar has a plan to make AKREP-II be ready for the sale to the export customers in next one year.

Various weapon options are proposed for the low-silhouette AKREP-II Armored Combat Reconnaissance Vehicle. The Technology Demonstrator version of the AKREP-II that revealed to the media at the Anechoic Chamber in EMI/EMC Test Centre (as part of its currently ongoing test program AKREP-II will undergo EMI/EMC tests during next days) is fitted with Otokar's new BOZOK remotely operated turret system armed with a 25 mm automatic cannon and a coaxial 7,62 mm machine gun. The second prototype to be displayed during IDEF '19 Fair is fitted with a low-weight two-person turret armed with a 90mm low-pressure gun (such as either CMI Cockerill® CSE 90LP). Otokar General Manager Serdar GÖRGÜÇ disclosed that they are currently in negotiations with an undisclosed potential customer who has requested the 90mm gun armed version. Live firing tests of AKREP-II with 90 mm gun is planned to take place in 2019.

The AKREP-II in surveillance and force recon/combat reconnaissance configuration has a crew of three; Driver, Gunner and Commander. However, all the main functions of this vehicle can be implemented by



the crew of two. The Driver sits in the center of the vehicle upfront and has access to a modern re-programmable sports car like three large flat-panel multi-function displays. Commander (left) and Gunner (right) sits behind the Driver and can control sensors, radios and 25mm gun the AKREP-II is carrying. Both Commander and Gunner have a large multi-function display and Gunner can control the 25mm remotely operated gun via control stick with multi-function buttons. Vehicle is also fitted with a mast-mounted long-range day/night observation system with 360-degree surveillance capability.

Two propulsion options are proposed for the AKREP-II Armored Combat Reconnaissance Vehicle. The version revealed to the media at the Anechoic Chamber at Otokar plant in Arifiye is fitted with novel full electric drive/propulsion technology including a pair of alternators/DC motor (procured from an undisclosed foreign company and each generating 180kW, around 250hp) and ALTINAY's battery packs (can be mounted both in the front and in the rear of the vehicle) that generates around 500hp. With existing ALTINAY's battery packs AKREP-II has a range of 250km on a single charge and the battery packs can be recharged within 3 hours. The second version, which is currently under development, will be fitted with a 450hp diesel engine. An ongoing development effort for this version is scheduled to be completed in a year. Thanks to its full electric drive technology AKREP-II has an extra punch in performance (compared to diesel propulsion version) when needed and could also execute its mission silently in high-threat environments without radiating any thermal and acoustic signature. The AKREP-II can be airlifted by the C-130 Hercules and A400M military cargo aircraft. This means the AKREP-II can be flown directly into the area of operations and can roll off their transports ready to go to work.

Having a weight of around 11 tones the AKREP-II offers similar ballistic protection capability with COBRA-II (according to open sources the baseline vehicle is STANAG 4569 Level 3 compliant). Its armored monocoque hull is fabricated from high-hardness armor steel. The AKREP-II also uses several



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common subsystems with COBRA-II and being considered as a first step of Otokar to unmanned combat vehicle field.

URAL Special Operations Vehicle (ENGEREK-II)

The prototype of URAL Special Operations Vehicle, which is the new version of ENGEREK Special Operations Vehicle that based on LandRover Defender 110 tactical vehicle was also displayed during the media tour that took place after the press meeting at the Otokar Arifiye plant along with company's other vehicles; TULPAR Light Tank, URAL Internal Security Vehicle with BAŞOK 7,62 mm turret system, COBRA-I Armored Personnel Carrier (APC), COBRA-II APC UN version with open cupola, COBRA-II APC with ÜÇOK 12,7 mm turret system, ARMA 6x6

Serdar GÖRGÜÇ – Otokar General Manager with BAŞOK 7,62 mm turret system, ARMA 8x8 with 30mm remote controlled MIZRAK-30 RCWS and RABDAN 8x8 (without any turret, it is going to be fitted with a BMP-3 turret in the UAE).

The URAL Special Operations Vehicle is an open-topped light armored vehicle operated by a crew of five and can be used for long-range reconnaissance and special operations. The vehicle offers cross-country mobility with high off-road performance and well-balanced power-to-weight ratio. It features a 4x4 wheel drive layout and an open architectural design configuration.

While the ENGEREK was featuring only armored under-protection for the fuel tank and underbody composite armor that provides protection for the crew (5+1) against only anti-personnel mines exploded underneath



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URAL Special Operations Vehicle (ENGEREK-II)

the vehicle, the URAL Special Operations Vehicle features both side armor (up to waist-high and provides protection from small arms fire) and improved underbody protection for heavier mines explosion as well as a ballistic protection for the engine compartment.

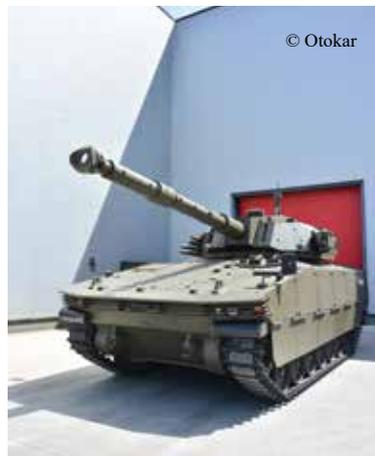
The URAL Special Operations Vehicle has three weapon mounts; Front (rotating gun mount and weapon adaptor for a 5,56 mm or 7,62 mm caliber weapon), Back (rotating and height adjustable gun mount and weapon adaptor for a 5,56 mm or 7,62 mm caliber weapon and a Main Gun Ring at the roof (gun pintle and weapon adaptor for a 5,56 mm, 7,62 mm or 12.7 mm caliber weapon and a 40 mm grenade launchers). For rapid deployment by air, URAL Special Operations Vehicle can be transported by the C-130 Hercules and A400M military cargo aircraft and by CH-47F Chinook heavy lift helicopters (as an under slung load). The vehicle can, in theory, be transported internally by Chinook, although the weapons mounts have to be removed to allow this.

GÖRGÜÇ: *“TULPAR Light Tank to be Displayed in Turkey for the First Time”*

Expressing that the TULPAR Light Tank has been included into their product range during last year will be displayed for the first time at the IDEF '19 Fair, GÖRGÜÇ extended the following information: “The light weight class tanks assuming active roles as a reconnaissance and fire support vehicle in modern armies have been standing out as an increasing demand in the sector, especially when the changing battlefield conditions and the differentiating threats are taken into consideration. In accordance with this tendency, and by starting with the expectations of the end users from around the various geographies of the world, we designed the TULPAR Light Tank by combining our experiences, engineering capabilities and R&D facilities. Our light weight tank successfully completed the firing tests it went through in Europe last year and was tested by two different users in 2018.”

Otokar Accomplished an Export of US\$ 211 Million in 2018

Sharing information on the developments in the defence industry and Otokar's export activities in the meeting, Otokar General Manager GÖRGÜÇ told that the world's defence industry expenses reached the level of US\$ 1.7 Trillion in 2017 and 22 percent of this amount was composed of equipment procurement and said, “Our sector's export performance in the first three months of 2019 increased by 60% compared with the same period of the previous year and the exports per kilogram exceeded US\$ 46 in defence industry. Our President of Defence Industries Prof. İsmail DEMİR announced the export target for 2019 as US\$ 3 Billion. As Otokar we will be doing our best to reach these critical targets. The light tank TULPAR we introduced in France last year was admired in global scale. On account of the delivery of the tactical wheeled armored vehicles, the orders of which we received last year, we doubled our exports in 2018, and achieved export revenue of US\$ 211 Million. 82% percent of our defence industry turnover is composed of the exports”. Noting that URAL, COBRA-II and ARMA vehicles drew intense interest in 2018, GÖRGÜÇ added, “We successfully delivered the armored vehicle orders we received last year from our country and from foreign countries, United Nations being in the first place. Our delivery continues in 2019 as well. Our TULPAR vehicle displayed a successful performance in the firing tests held at two different countries”.



GÖRGÜÇ: *“We Invested TL 1 Billion in R&D in 10 Years”*

Stressing that their aim was to become a global brand in defense industry and they have proceeded towards this target with courageous steps GÖRGÜÇ said, “Regarding the land systems, we have been manufacturing vehicles in world standards that are capable of competing with the global players. We invested TL 1 billion in R&D in the last 10 years. We offer our R&D center equipped with the latest technologies to the utilization of both the defence industry and other sectors. In addition to the product export and R&D facilities, last year we included the technology transfer into the services we provided. The years 2019 and 2020 will be the years where Otokar shifts up the gear in the exports. We will endeavor to renew the record we broke last year in exports. We have been attending the events organized across the world in order to strengthen our international cooperation and make use of the opportunities regarding our targets identified for opening to brand new markets. This year, our target markets in exports are South America, Africa, Middle East, Eastern Europe and the Far East. We will achieve the targets we identified, with our wide variety of vehicles in defense industry and our technology transfer capability”.

At the 14th IDEF '19 International Defence Industry Fair to be held on 30 April - 3 May, Otokar will exhibit its newest platforms and products to the participants and visitors at its stand located Hall 7, in TÜYAP Fair & Exhibition Center. Ambulance version of COBRA-II 4x4 wheeled armored vehicle (already entered Turkish Navy service and delivered to an undisclosed export customer for UN missions) and TULPAR-S (the new member of TULPAR family, a multi-purposed vehicle platform which retains basic features of standard TULPAR whilst maintaining the amphibious capability) will be among 12 vehicles to be displayed at Otokar stand. Serdar GÖRGÜÇ disclosed that an unnamed Far East country has declared its interest to TULPAR-S and officials from that country will pay a visit to Turkey during IDEF to inspect the vehicle.

Collins Aerospace; “We are Committed to Our Customers and Partners in Turkey”

Defence Turkey caught up with Collins Aerospace Vice President - Middle East & Africa, Mr. Talel KAMEL, during IDEX 2019 to get first-hand information on the recently established company and ongoing transition process. We also took the opportunity to ask him about their goals and expectations for the Turkish market

Defence Turkey: How would you best describe Collins Aerospace, a unit of United Technologies Corp. Could you please provide some key facts about the company for our readers?

Talel KAMEL: Collins Aerospace, a unit of United Technologies Corporation (UTC), is a leader in technologically advanced and intelligent solutions for the global aerospace and defence industry. Created in 2018 by bringing together UTC Aerospace Systems and Rockwell Collins, Collins Aerospace has the capabilities, comprehensive portfolio and expertise to solve our customers' toughest challenges and to meet the demands of a rapidly evolving global market.

By building on the strengths and talents of UTC Aerospace Systems and Rockwell Collins, we have the ambition at Collins Aerospace to redefine aerospace and particularly what is possible in the areas of intelligent aircraft, integrated and optimized aircraft products and services, and advanced defence systems.

Defence Turkey: Can you elaborate on the core capabilities of Collins Aerospace, locally and around the world?

Talel KAMEL: With a team of 70,000 highly skilled and talented employees, including an engineering workforce of more than 16,000, Collins Aerospace has a strong global presence, with operations at 300 sites worldwide. Turkey is a key market for Collins Aerospace, and we are well positioned to deliver the solutions that our civil and military customers need. Our military solutions have been used

by coalition forces in the region for years. Our offerings include secure communications, avionics, ejection seats, sensors to name a few. With ARINC, we are a leading provider of airport systems and critical infrastructure protection in the region. And on the commercial side, we were very successful in developing strong partnerships with airlines and operators.

Our organizational structure reflects our desire to ensure our customers have the broadest portfolio of solutions and systems at their disposal. Our six newly-defined strategic business units are centered on product capabilities to better serve our customers. They include: Avionics, Aerostructures, Power & Controls, Interiors, Mechanical Systems and Mission Systems.

Defence Turkey: Could you give us an overview of 2018 from Collins Aerospace's point of view and could you elaborate on your targets for 2019?

Talel KAMEL: Collins Aerospace's ambition is to redefine aerospace and it's more than a bold statement. As global competition in the aerospace industry is growing in intensity, at Collins we want to lead the way in delivering on our customer expectations for speed, agility and value. Our combined strengths will provide the ability to deliver disruptive innovations thanks to strong resources invested in research and development.

Defence Turkey: Could you elaborate on the targets of your company in the defence & aerospace sector and how do you envision the company ten years from now in the sector? What does the future hold for Collins Aerospace?



Ibrahim SÜNNETÇİ - Editor of Defence Turkey Magazine with Talel KAMEL - Collins Aerospace VP - Middle East & Africa

Talel KAMEL: Collins Aerospace wants to deliver the industry's most advanced products and services portfolio. We enable high-integrity solutions across commercial, business, and defence spheres. Consider the future of intelligent aviation and defence ecosystem. Few companies touch more components of this ecosystem—or have more opportunities to create intelligent, interconnected systems that design-in performance and design-out cost—than Collins Aerospace. For example, a new aviation data-driven business model will soon enable airlines to access their data that's delivered over our high-assurance global networks. For the first time, our customers will be able to easily manipulate this data for operational and market advantage. And whether it is airborne intelligence, surveillance

and reconnaissance; blended live and virtual training; or a ground-air network tailorable to mission needs, Collins Aerospace is committed to delivering strategic advantage in the battlespace of the future.

DEFENCE TURKEY: How much time, effort and money does Collins Aerospace set aside on R&D annually?

Talel KAMEL: Collins Aerospace invests US\$2.5 Billion in R&D every year, which demonstrates our commitment to innovation.

Defence Turkey: What are the major programs, both domestic and international, that Collins Aerospace is currently involved in?

Talel KAMEL: On both the domestic and international sides we are involved in all major commercial and defence programs. We have a large portfolio of products and services to support our customers. Our ability to drive aerospace technical innovation, provide world class aftermarket support and maintain a relationship with our mutual airline customers that makes us a valuable partner to OEMs, and we'll continue to make those big, bold investments, that will ensure we continue to be the aerospace provider of choice.

Defence Turkey: Let us focus on Turkey. When did Collins Aerospace first start looking at Turkey? Both UTC (such as SEEK EAGLE/DB-110 recce pods) and Rockwell Collins (such as MFDs and CDUs manufactured by Aselsan under license, communications and electronic equipment and technical services for the TAF, image generation and new liquid crystal on silicon projection systems and MiQ seating platform for the THY airplanes) have been working closely with their Turkish military and commercial customers and partners to help Turkey, one of the world's most promising high growth countries. How would you summarize Collins Aerospace's involvement in Turkey over the last two decades?

Talel KAMEL: Collins Aerospace has been involved in multiple endeavors supplying content on both military and commercial platforms and developing indigenous/local manufacturing capabilities. Collins Aerospace will continue to build upon existing partnerships.

Defence Turkey: How does Collins Aerospace approach the Turkish Armed Forces' (TAF) ongoing defence and space related modernization programs such as the Turkish Air Force's National Combat Fighter Aircraft (TF-X) and the Future Jet Trainer [T-X HurJet]?

Talel KAMEL: Collins Aerospace's expansive portfolio is uniquely positioned to provide the TAF with a suite of complimentary products and solutions. Collins defence ecosystems and connectivity are defining the battle space.



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Defence Turkey: Could you elaborate on the existing capabilities and performance of Turkish defence and aerospace companies?

Talel KAMEL: We are committed to the region in the long-term, and specifically to Turkey. Our strategy is to continue to invest locally, helping to build a regional defence & aerospace industry, in line with the regional policies, develop new partnerships and train local talent to strengthen our presence.

Our objective is to continue to serve our customers in Turkey with the highest standards of operational excellence and help them in their future growth with the most innovative and trusted solutions and services.

Defence Turkey: How can Collins Aerospace's technologies can help Turkey achieve its defence and aerospace related aspirations?



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Talel KAMEL: Expanding local capabilities of Collins Aerospace innovative technologies, and advanced solutions will have a positive impact on the defence and aerospace industry.

Defence Turkey: Can you elaborate on the other military and commercial programs that Collins Aerospace would like to pursue in Turkey and cooperate on with local industry? What is the extent of your collaborations in Turkey?

Talel KAMEL: TF-X and HurJet are two strategic programs that Collins Aerospace is currently pursuing. Through increasing our existing presence and focusing on indigenous content and solutions. We are committed to growing and collaborating with local industry leaders in Turkey.

Defence Turkey: Around two decades ago a manufacturing licensing agreement was signed between Rockwell Collins and



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TurAF 142nd Squadron (Call Sign Ceylan) is equipped with DB-110 EO/IR reconnaissance pods and assigned to recce duties

Aselsan for the local production of MFDs (such as MFD-268E3 and C5) and CDUs (such as CDU-900) for both helicopters (such as Black Hawk, Sea Hawk and Cougar) and aircraft (such as CN235 and C-130) in TAF service. Rockwell Collins' avionic and communication systems were also used under the HeliMod-II Program. Meanwhile during the Eurasia Airshow on April 25, 2018 UTC Aerospace Systems signed a wide memorandum of understanding with Alp Aviation to cooperate to begin phased production of components within UTC Aerospace Systems' Kidde Dual Spectrum Automatic Fire/Explosion Suppression (AFES) Systems for military ground vehicles at Alp Aviation's facilities in Eskisehir, Turkey. Can you elaborate on the current status of collaboration between Collins Aerospace and Turkish companies such as Aselsan

and Alp Aviation? Do you have any plan to explore further opportunities to expand the extent of cooperation between Collins Aerospace and Turkish companies and to sign further cooperation agreements with other Turkish companies in the near future?

Talel KAMEL: Partnering for success through complimentary collaborations will enable Collins Aerospace and local partners to expand the existing reach. We will continue to explore and identify various avenues to collaborate.

Defence Turkey: Would you like to add anything in the way of a message to our readers?

Talel KAMEL: Collins Aerospace is committed to our customers and partners in Turkey. We are redefining aerospace with an unwavering commitment to provide disruptive technologies to address the increasing demands of the future ■



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Under a contract that publicized in March 2013 UTC Aerospace provided four DB-110 reconnaissance pods, along with three fixed/transportable imagery exploitation systems, as well as training and logistical support services to the TurAF.

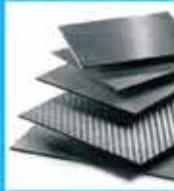
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Turkish Defence Industry Targets US\$ 3 Billion Exports in 2019

President of Defence Industries Prof. İsmail DEMİR and Defence Industry Exporters' Association Chairman of the Board Latif Aral ALIŞ evaluated the current situation and the export targets for 2019 at the Çırağan Hotel in Istanbul on March 29th

Taking the floor at the opening of the meeting, Chairman of the Board of Directors Latif Aral ALIŞ, evaluated the export performance of the Turkish Defence Industry in 2018 and indicated that the export performance of the first three months of 2019 increased by 60% compared to the previous year. Stating that they are pleased with the export figures, ALIŞ pointed out that the defence industry had risen with a homogeneous development of US\$600 Million in the first quarter but it hadn't started running yet. Emphasizing that the number of companies and Defence Industry investments significantly increased during this period, ALIŞ also stated that most of the new companies are working in the defence industry.



Latif Aral ALIŞ- SSI Chairman of the Board

ALIŞ underlined that there is a pleasing increase in the value-added per kilogram of defence industry products. "The value-added per kilogram in the Defence Industry approached 46 dollars, so we are selling technology now."

Noting that the current position of the Defence Industry is still behind the five largest exporting countries in the world, ALIŞ stated that their target is to become one of the top five major export companies in the world within a few years, "We aim for 60% growth in the first six months of the year. Turkish products became quite competitive in the global market in terms of quality and price. Their value in the world has increased now."



President of the Defence Industries Prof. İsmail DEMİR said, "The increase in the export figures is pleasing but it is far below our expectations. We have prominent companies and outstanding products in the international market."

This significant increase in the first quarter of 2019 is also reflected in the figures. Turkish Defence Industry companies completed sales worth US\$175 Million in January, US\$171 Million in February and around US\$250 Million in March. In the same period of 2018, these figures were US\$106 Million in January, US\$149 Million in February and US\$147 Million in March.

According to the information we received, the target of US\$3 Billion set for 2019 does not include the MILGEM and ATAK platforms

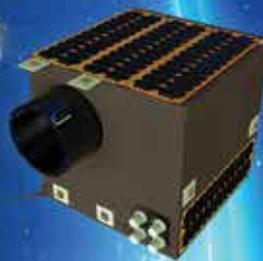


Prof. İsmail DEMİR- President of Defence Industries of Pakistan and the T129 ATAK helicopters for the Philippines. This figure is expected to increase with the start of these projects.



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IAG - Providing Full Vehicle Armoring Solutions

In an interview with Defence Turkey magazine, Alper ALPAY- General Manager of International Armored Group / Transparent Armor Systems FZE shares insight on the company's facility in Turkey, their STANAG-4569 Level 2a certification and long list of successful deliveries spanning the globe

Defence Turkey: International Armored Group (IAG) was established in 1996 and has 20 years of experience specializing in the fields of design, engineering, prototyping and manufacturing of armored commercial and tactical vehicles. Could we start our interview with a brief summary of IAG's position in the global armored vehicles market and its footprint?

Alper ALPAY: That is correct International Armored Group was established in Canada in the 90's and now has over 20 years of experience in the armoring industry. Over the years we have grown to become one of the most technologically advanced armored vehicle manufacturers in the world. We invest heavily in R&D making us the market leader in vehicle certifications and breakthrough designs and technologies in the armoring field. We have a large global footprint with 9 locations worldwide in Turkey, the United Arab Emirates, the United States, Canada, the United Kingdom, South Africa, Bulgaria, Italy and Pakistan. We also have representations in Bangladesh, Iraq and most recently Chile.

Defence Turkey: IAG Turkey has had a production facility in Bursa since April 2014. What can you tell us about the 2018 performance of the company and its daily/monthly vehicle manufacturing/armoring capacity? Could you inform us about the current military vehicle production and armoring activities carried out at your facilities in Bursa?

Alper ALPAY: IAG's Turkey facility has enjoyed steady and sustainable growth since we opened it in 2014. Currently we have an extension project underway to double the production area and production capacity with new machinery and capital investments. With these investments, by the end of 2019, our monthly production capacity will reach 50 vehicles per month.

In IAG's Turkey facility we only manufacture concealed commercial armored vehicles such as luxury sedans, 4x4 Off-road vehicles/SUVs, 4x4 pickups, armored busses and



Guardian 4x4 APC

minibuses, armored cash in transit vehicles and armored security/sentry booths.

Defence Turkey: What can you tell our readers about IAG's Mine-Resistant Ambush Protected (MRAP) vehicle solutions? You have exhibited the Guardian Xtreme MRAP solution at the IDEX 2019 Fair. Could you inform us about the ballistic and mine protection capabilities it provides to the user? What can you tell us about the certification process and the tests conducted at the TNO test center in the Netherlands?

Alper ALPAY: Our first fully certified vehicle to STANAG 4569, the IAG Guardian Xtreme MRAP, completed its testing at the NATO accredited TNO test center in the Netherlands. The Guardian Xtreme is certified to STANAG 4569 AEP 55 Level 2a and 2b for mine protection as well as ballistics however it also passed the additional STANAG Level 3a mine testing with flying colors.

Defence Turkey: The 8.2ton Guardian Xtreme is presented as having superior ballistic and mine/blast protection compared to other vehicles in its class. Recently, it has been tested for STANAG-4569 Level 3a mine/blast protection. Could you inform us about the testing activities?

Alper ALPAY: The IAG Guardian Xtreme MRAP is based on the commercially available Ford F550 chassis with the 6.7 Liter Diesel Super Duty engine. The Guardian Xtreme comes with a wide variety of variants such as 4x4, 6x6, solid axles with 5 link rear coil/shock suspension or fully independent suspension.

Basing the MRAP vehicles on commercially and globally available brand such as Ford gives a big advantage for easy supply of spare parts and lowering the maintenance cost of the vehicle in operation.

With its light curb weight of 8.2 tons the IAG Guardian Xtreme is the lightest MRAP vehicle available on



The footage of IAG Guardian Xtreme MRAP -STANAG-4569 Level 3a mine/blast test

the market which has full certification to STANAG 4569 AEP 55 Level 2 and Level 3a.

In addition, the 6.7 Liter Super duty diesel engine and light curb weight gives the Guardian Xtreme an unmatched 49 hp/t power to weight ratio and superior mobility both on road and off-road.

Defence Turkey: The Rila MRAP, with a carrying capacity of 12 personnel, is the newest and largest member of the IAG's Mine-Resistant Ambush Protected (MRAP) vehicle product range. The vehicle is reported to have similar ballistic and mine/blast protection (Level 4a and 3b). Could you share with our readers the current certificates and the ballistic/blast tests carried out with the Rila MRAP?

Alper ALPAY: Rila MRAP will be the new member of IAG's MRAP family scheduled to complete its testing within 2019.

The RILA MRAP is designed to provide protection up to STANAG 4569 AEP 55 Level 3 ballistic and mine protection and additionally we are planning to test it against STANAG 4569 Level 4a for mine protection. The RILA MRAP is also based on commercially available chassis and it will be adjustable on 3 well know global brands. It is available in 4x4 or 6x6 drivetrain with solid or independent axles which will give more flexibility to our customers when choosing the best option for their mission requirements.

Defence Turkey: IAG also provides low-profile armoring solutions for civilian/commercial vehicles used as VIP transports without compromising the appearance of the vehicles. The most well-known of these vehicles are the Toyota Land Cruiser and the Lexus LX570, the more comfortable version of the same chassis. Could you inform us about the ballistic protection level of these vehicles after the armoring process?

Alper ALPAY: We are producing over 100 different brands/models of concealed armored low-profile vehicles with over 500 different variants and protection levels. Our concealed armored vehicles production includes luxury vehicles, 4x4 off-road vehicles and pickups,



The footage of VPAM BRV 2009 VR7 certified Toyota Land Cruiser 200 series vehicle - the Stanag 4569AEP55 Level 2a mine test

trucks, buses and minibuses, Cash in Transit vehicles, armored ambulances and many other special purpose armored vehicles. We are adding new brands and models to our portfolio every month.

Concealed armored vehicles protection level varies from EN1063 BR2 against 9 mm hand gun threat to EN1063 BR7 against 7,62x51 AP (armor piercing ammunition) threat depending on the customers' requirements and required vehicle engine/carrying capability. Additionally, we offer fully certified commercial vehicles to VPAM BRV2009 VR7 with add on protection to STANAG Level 2a for blast and enhanced side blast protection to 15kg of TNT detonated 2 meters away from the vehicle as opposed to the standard 4 meters away.

Defence Turkey: You have become one of the few companies with STANAG-4569 Level 2a

certification as a result of your studies to increase the level of protection for these vehicles. Could you tell us about the tests carried out at the TNO center in the Netherlands?

Alper ALPAY: We tested our VPAM BRV 2009 VR7 certified Toyota Land Cruiser 200 series vehicle against the Stanag 4569 AEP55 Level 2a mine threat. Level 2a refers to 6 kg of TNT placed under the front driver side tire of the vehicle. During the test Hybrid 3 test dummies were placed on the driver and rear seat which take 25 different measurements with sensors during the blast. All measurements from the dummies were in the acceptable range indicating that the occupants would not suffer any life-threatening injuries. This earned us the Stanag Level 2a mine protection certification. It is worth noting that our certification was carried out on the driver side front wheel where there are lots of



İbrahim SÜNNETÇİ met with Alper ALPAY in IDEX 2019, Abu Dhabi

openings in the firewall for pedals, steering column and passthroughs. This is a very difficult certification to pass as it takes extreme engineering and know-how to be able to protect these areas during a large blast.

Defence Turkey: Could you inform us about your ballistic glass production capabilities and their protection levels?

Alper ALPAY: The Transparent Armor Systems ® is part of the IAG family specializing in ballistic glass, frame systems and doors production. The ballistic glass that we produce are certified for all of the protection levels below:

- › EN1063 from BR2 to BR7
- › NIJ – from NIJ1 to NIJ IV
- › STANAG 4569 from STANAG 1 to STANAG 3
- › UL – UL10

Our ballistic glass production facility is located in the United Arab Emirates and our 2nd production facility is already under construction in the United States which will be serving the markets in the US, Canada and South America.

Defence Turkey: Could you tell us about your customer portfolio?

Alper ALPAY: Our architectural ballistic glass solutions customer portfolio consists of government organizations, international aid and peacekeeping organizations such as NATO and UN, Police, Military, private security companies, international oil companies, banks and construction companies.

Defence Turkey: How long does it take to armor a vehicle? Is there a specific timeframe for the process? What is IAG's capacity for the production for armored vehicles?

Alper ALPAY: The armoring timeframe differs depending on the size of the vehicle, armoring level and complexity of the armoring process. We calculate the armoring timeframe of a B6 Armored Toyota Land Cruiser 200 series vehicle as 1 unit and calculate our monthly capacity accordingly. Currently our combined monthly armoring capacity is 350 units/month and with new investments in the UAE,

the US and Turkey by the end of 2019 our total combined armoring capacity will reach 400 units/month.

Defence Turkey: What can you tell us about IAG's participation in the IDEF-19 Fair? How many products will you bring to the exhibition? Will you introduce new products at the fair?

Alper ALPAY: We will display the following vehicles: the IAG Guardian Xtreme MRAP, the STANAG certified Toyota Land Cruiser 200, as well as, the Jaws APC and a Guard Booth. All vehicles and the Guard Booth are armored using TAS ballistic glass.

Defence Turkey: Is there a message that you would like to convey to our readers?

Alper ALPAY: We would like to thank Defence Turkey for giving International Armored Group the opportunity to share our company history, story and product line with your readers. We are honored to be featured in your publication and we look forward to working together in the future ■



Roketsan's Smart Micro Munition Product Family Continues to Prove Itself in the Field

The Smart Micro Munition product family developed by Roketsan to meet current and future combat requirements, consisting of MAM-L and MAM-C versions, continues to perform as promised in combat operations.

The Smart Micro Munition, which can be integrated with the BAYRAKTAR TB2 Tactical and ANKA MALE unmanned aerial vehicles (UAV) in the inventories of the Turkish Armed Forces, the Gendarmerie General Command and the Turkish National Police, has been successfully used in operations since 2016. Enhancing the efficiency of air platforms with a low payload capacity and particularly unmanned aerial vehicles, the Smart Micro Munition will also enter the inventories of friendly and allied nations in 2019. MAM-L and MAM-C outperform their rivals with not only their technologies, but also their operational experience.

MAM-L, with an approximate weight of 22 kg, and MAM-C, weighing 6.5 kg, also stand out as cost-efficient solutions for light attack aircraft as well as UAVs. MAM-C can be used effectively at ranges of up to 8 km, depending on the altitude from which it is dropped, while MAM-L's range can be extended up to 14 kilometers with its Inertial Navigation System (INS) and optional Global Positioning System (GPS) features.

With its high explosive fragmentation warhead, MAM-L is effective against light structures, unarmored ground vehicles, radar antennas and soft targets like weapon pits and personnel dispersed over a large area. In addition, targets that can be effectively hit by the munition are diversified by means of its anti-tank and thermobaric warhead

options. MAM-C, on the other hand, is effective against soft targets such as personnel, unarmored and lightly armored land vehicles, radar antennas and weapon pits.

Roketsan has vast experience in the integration of its Smart Micro Munition product family with air platforms. Roketsan can make the munition ready to use on air platforms that have the required infrastructure, completing all related integration work within a few months. In the event of the infrastructure requiring additional elements, Roketsan offers its customers integration solutions as well as logistical and training support.

Selçuk YAŞAR, President and CEO of Roketsan, says that they are expecting to see significant

interest in Smart Micro Munition from many countries: "The design and application concept of the MAM-L and MAM-C provides its users with the capability of effectively neutralizing time-critical targets, particularly those that arise during reconnaissance and surveillance missions. The precision guidance systems of both munitions, coupled with their small size, equate to a solution with low collateral damage. We see other countries turning their attention to this area, as the combination of Mini Smart Munitions and tactical UAVs represent a more cost-effective solution than all other capabilities within the world's armed forces. We are exporting the first lot of this product family in 2019, and we are certain that others will follow suit."



Newest Member of Roketsan's Surface-to-Surface Missile Family: TRG-230

The TRG-230 Missile, which was unveiled at the IDEF '17 event, is extending Roketsan's surface-to-surface missile family with a new calibre. TRG-230 can be used at distances of 20 to 70 kilometres with its high accuracy and effective fire power. Capable of maintaining heavy fire against high-priority targets, the TRG-230 missile provides timely and effective fire support for manoeuvring units, like the other members of the family.

The TRG-230 Missile can be fired from the Multi-Purpose Multi Barrel Rocket Launcher (MBRL) System manufactured by Roketsan, or from other platforms with a suitable interface for integration, and can be carried, stored and used in complete ready-to-launch missile configuration inside an insulated pod. The missile, which can be used in all kinds of weather conditions, is effective against the following targets:

- › Ports and airports
- › Assembly areas (vehicles and/or personnel)
- › Precisely identified targets
- › Logistical facilities
- › Enemy artillery and air defence systems
- › Command, control and communication systems
- › Enclosed and semi-enclosed areas, such as caves/shelters

"The TRG-230 Missile is one of the newest members of Roketsan's surface-to-surface rocket and missile family, bringing effective fire power to operations. We offer this missile, which can be launched from different platforms and can destroy a broad spectrum of potential targets, not only to users in Turkey, but also to international platforms as a high-tech solution." Selçuk YAŞAR, President and CEO of Roketsan stated.

Technical Specifications of the TRG-230 Missile

Diameter	230 mm
Weight	210 kg
Range	20–70 km
Guidance	GPS* Aided INS*
Control	Aerodynamic Control via the Electromechanical Actuation System
Propellant Type	Composite Solid Propellant
Warhead Type	High Explosive and Steel Ball
Warhead Weight	45 kg
Warhead Effective Radius	≥ 50 m (Highly Explosive)
Fuse Type	Proximity and Precision
Accuracy (CEP)	≤ 10 m

*INS: Inertial Navigation System

*GPS: Global Positioning System





Turkey's Transparent and Neutral Testing Solution Partner Equipped to Meet the Needs of Global Clients

TRtest Company - Bilal AKTAŞ General Manager discusses TRtest's new test center, strategy and its solution partners. The sector will provide consultancy services, as well as a reliable, accessible and affordable test center. TRtest aims to test the ballistic products to be exported abroad on behalf of the customer country

Defence Turkey : What can you say about the organizational structure, vision, and goals of TRtest which was founded with the aim of establishing, operating, maintaining, and providing training services for conformity assessment infrastructures such as testing, inspection, analysis, demonstration, supervision, certification, calibration, and qualification?

Bilal AKTAŞ: TR Test ve Değerlendirme AŞ, started its activities on November 1, 2018, at the Technopark Ankara campus of İvedik Organized Industrial Zone. It was officially established in December 2017 with the partnership of the Presidency of Defence Industries (SSB), Turkish Standards Institution (TSE), TÜBİTAK, the Turkish Armed Forces Foundation (TSKGV), and STM. TRTest set out with the vision of becoming a company that meets the testing needs of both national and world industry with the aim of being an independent and reliable testing authority with indigenously manufactured equipment for testing high-technology and value-added products. Main goals of TRTest can be summarized as; keeping inventory of whole existing testing infrastructure in Turkey and ensuring the effective use of subject testing infrastructure; preventing redundant investments in testing infrastructures; and opening such testing infrastructure to companies operating in Defence Industry and also to various Small and Medium Sized Enterprises (SMEs) in other sectors of industry in Turkey and worldwide. To accomplish this goal, we have been creating a portal that will make this inventory visible to all sectors and will sign agreements through which their use will be offered to the military and civilian sectors. The portal will also serve as an interface for accessing the testing capabilities of private sector enterprises.

Defence Turkey: Have you conducted a classification and inventory study on testing capabilities and test centers within the public, private sector,



and universities since taking your new assignment? What is your assessment of the sector regarding the existing testing capabilities?

Bilal AKTAŞ: We initiated our study at TRtest with reference to the work we conducted with the SSB before. First of all, we are in contact with the SSB to update this study. Furthermore, we also identified more than 1,000 test laboratories accredited by TÜRKAK. With the launching of TRtest, test-oriented companies in the private sector began to contact us, and we are bringing their talents into our inventory. We now have quite a large portfolio with the defence industry testing inventory, TÜRKAK inventory, testing inventory of the Ministry of Industry and Technology, including the non-accredited inventories of companies with production-oriented testing capabilities. In the coming days, we will expand and classify this inventory in order to quickly and effectively match testers with test centers.

We will integrate our inventory study with the existing test infrastructures at our universities, and I believe that ninety percent of the tests required by the domestic industry can be met in our country.

Defence Turkey: From your vision, we see that you are aiming to serve as a bridge that builds trust between companies and existing test centers in order to meet the needs of the sector rather than being an investor. Can you explain this in more detail?

Bilal AKTAŞ: Since our domestic industry started to provide products in terms of subsystems for national projects such as ALTAY, ATAK, ANKA, MILGEM, and HISAR after transitioning to designing products from simply manufacturing them, this led to the need of accessing reliable test centers where the companies producing the subsystems would entrust design information of their product. Moreover; as valid for both domestic and global companies; sometimes, companies are faced with situations where they need to use the testing capabilities of their competitors. With its corporate structure and work ethic, TRtest ensures an environment of trust that makes it possible for manufacturers to test their products in facilities of a rival company with TRtest personnel which will secure protection of the private information.

Defence Turkey: Do you have any infrastructural studies and marketing activities to present the existing test centers as competitive centers to be preferred by foreign companies in addition to Turkish companies? What is your vision about this?

Bilal AKTAŞ: The capability to carry out tests does not only concern the necessary equipment but also our trained human inventory. Our study on domestic test infrastructure inventory began to mature. Marketing these capabilities abroad is also a part of our vision. In this context, we have contacted certain foreign

companies. We discuss joint investments in testing capabilities which Turkey needs as well as marketing of domestic testing capabilities with them. We have test equipment capacity and trained human resources to conduct tests especially in the fields of ballistic protection, textile, and chemical analysis in our country. Regarding the test sites, we have test sites that most countries do not have, and I believe that this potential can be marketed abroad.

Defence Turkey: TRtest and test companies sign agreements for the use of test infrastructures. With these agreements, the test companies offer their test infrastructures to the sector under the coordination of TRtest. Can you inform us about the scope and objectives of these agreements? What tests can be carried out under the coordination of TRtest?

Bilal AKTAŞ: We aim to provide the laboratory inventory in Turkey to customers in a fast and reliable way. Environmental tests, fungus test, Electromagnetic interference (EMI) and Electromagnetic Compatibility (EMC) tests and ballistic tests can be carried out under TRtest coordination. With TRtest and its solution partners, the sector will attain the right consultancy service, as well as a reliable, accessible and affordable test center.

Defence Turkey: There is a small number of Turkish companies involved in the production of test equipment. What are your efforts to increase production, competition, and localization in this regard?

Bilal AKTAŞ: As TRtest, with the collection of test infrastructure inventory and test manufacturers inventory, we are starting to see more clearly what kind of insufficiencies or duplicities we have on the subject of testing. To support the production of domestic test equipment; there are plans to establish "Test Centers" for the areas that need testing activities and to equip these centers with domestically produced equipment.



Defence Turkey: How do you evaluate the sector in the field of ballistic testing capabilities and centers? It has a significant position in the domestic private sector in this field. In this context, do you have any studies on meeting the domestic and international test requests?

Bilal AKTAŞ: We have already signed contract with Nurol Technologies Inc. and Garanti Apparel Composites Technology Industry and Trade Co. Inc. which have TÜRKAK accreditation. We began to carry out tests with our own trained personnel in these facilities. Companies with ballistic test infrastructure provide us with the necessary logistic support and tests are conducted under the supervision of TRtest. We have eliminated dependence on foreign countries in the testing of ballistic

vests and helmets. This case was recorded as the first success of TRtest. We are equipped to meet the requests from abroad with a transparent and neutral test service.

Defence Turkey: Finally, is there a message you want to give to our readers?

Bilal AKTAŞ: Our domestic test infrastructure inventory study began to serve the defence industry sector. I would like to inform the companies, which could not find a test center to conduct the tests they need, that we can help them to fulfill their test requirements within the country if they submit their test requests via the request form at www.tr-test.com.tr and also I would like to thank you for sparing your time to talk with me about our company, TRtest ■





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Leonardo Offers Comprehensive Security Solutions to Turkey

“We’re very keen to continue to support the security of the Turkish people across a wide range of areas. Building upon our international expertise and the best-practice projects we have already delivered in-country” said Leonardo’s SVP International Marketing and Strategic Campaigns Marco BURATTI to Defence Turkey Magazine

Defence Turkey: What will Leonardo’s focus be at IDEF 2019?

Marco BURATTI: Leonardo will be bringing some of our most iconic products to IDEF 2019, including our M-346 advanced trainer aircraft for next-generation fighter pilots and our well-known AW101 helicopter, a three-engine, medium/heavy, multi-role platform that is in currently in operation from the Arctic to the Antarctic. Importantly, we’ll also be taking the opportunity to present some of our most recent developments, such as our Counter – Unmanned Aerial Systems (C-UAS or ‘counter-drone’) products.

Defence Turkey: Do you think your C-UAS solutions could be of value to customers in Turkey?

Marco BURATTI: We are aware that companies in Turkey have started to research and develop indigenous solutions in this area, however the threat won’t wait for these to mature malicious drone activity is a real and present danger today and we’re already seeing the chaos that drones can cause at major airports. When Gatwick and Heathrow airports in the UK faced suspicious drone activity, it was Leonardo’s Falcon Shield solution that was deployed by the Royal Air Force in response. Meanwhile, the Italian Army and Air Force are also

securing their airspace with tailored Leonardo C-UAS products.

Defence Turkey: So, there is not a single ‘one-fits-all’ C-UAV product?

Marco BURATTI: No, the needs of customers are too diverse for a single product configuration to properly cover such a range of requirements: customised solutions are essential. The system is based on an open architecture and can be tailored with different sensors and effectors depending on the operational requirements of a customer and the size of the facility they’re protecting. Leonardo can also go beyond security and provide added value in other, related

areas, such as in Air Traffic Control/ Management.

Defence Turkey: Leonardo has already provided solutions for Turkish air traffic control and maritime security, are there any other fields where your experience could be beneficial?

Marco BURATTI: It's important that I note that Leonardo is able to provide security solutions in almost every field, whether that be critical infrastructure, oil and gas, major events or many others, and I'm referring to both physical and cyber security too. We have extremely strong credentials in the cyber security domain as NATO's cyber defence mission partner: a relationship that was renewed recently in February when the NATO Communications and Information Agency awarded us a new 18-month contract enabling continuity in the delivery of cyber-incident detection and management capabilities.

Defence Turkey: Is there anything you would like to add?



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Marco BURATTI: I'd just like to reinforce that Turkey is a well-established and valued partner for Leonardo and we're expecting this relationship to grow ever stronger as we continue to provide a best-in-class portfolio of products and services in close partnership with Turkish customers and industry. For instance, when we offered our C-27J multi-mission airlifter to Turkey, we

already had plans for continued investment in that product: now we're delivering on those plans. I'm making reference of course to our new C-27J firefighting configuration which we launched last month. This further expands the range of roles that can be performed by the aircraft, cementing its position as the most advanced multi-mission aircraft available on the market today ■

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MKEK to Introduce New Weapons and Munitions at IDEF '19

Mechanical and Chemical Industry Corporation is one of the leading institutions for the Turkish Defence Industry. MKEK has been the main supplier of the Turkish Armed Forces since its establishment. With a wide range of products, the company not only serves the Turkish Armed Forces but also takes part in the International Defence Industry Market by exporting to more than 40 countries. As in the past, MKEK continues to manufacture world-renowned defence industry products by following the technological developments in the world. MKEK will be exhibiting its new weapons systems at IDEF '19 the 14th International Defence Industry Fair in Istanbul, held at the Büyükçekmece TÜYAP Fair and Congress Center between April 30 - May 3, 2019.

This year at IDEF, MKEK will display the Yavuz Vehicle Mounted 155 mm/52 caliber SPH and the Boran 105 mm Air Transportable Light Towed Howitzer systems which were previously introduced at IDEF17. In addition, MKEK plans to unveil its newest projects, the 20 mm and 12.7 mm Gatling-Style Rotary Gun systems and the 120 mm Mortar System for the first time in IDEF 19. The company launched these projects with its own resources to strengthen the Turkish Armed Forces and to increase capabilities of the Turkish Defence Industry.

The "Yavuz" 6x6 Vehicle Mounted 155 mm/52 caliber Self-Propelled Howitzer System

Mechanical and Chemical Industry Corporation (MKEK) unveiled the "Yavuz" 155 mm Self-Propelled Howitzer Systems mounted over 6x6 vehicles at IDEF 2017 for the first time. MKEK launched the "YAVUZ" project in April 2016, using the company's own resources to develop a 6x6 vehicle mounted 155 mm howitzer system in line with the needs of the Turkish Armed Forces. The project was started in order to integrate the existing weapon system into the MAN 6X6 vehicle. In the case of demand, the howitzer system



can also be integrated into vehicles such as VOLVO, SCANIA, RENAULT, MERCEDES, BMC, ASTRA, KAMAZ, and VOLAT. MKEK successfully completed the sub-assembly integration and testing activities in the project and the qualification activities for the system were started. The company also successfully carried out firing tests at different elevation angles with a total of 40 ammunition using the 155 mm MOD 274 HE-ERFB/BB (High Explosive Extended Range Full Bore Base Bleed) Ammunition and M107 HE ammunitions. MKEK continues its efforts to reduce the weight and improve the ergonomics of the system. When compared to the 155 mm PANTER towed howitzer, the YAVUZ self-propelled howitzer offers superior features such as ammunition carrying capacity (18 rounds), shoot-and-scoot capability, high maneuverability, armored cabin for crew members and ability to climb a 40% gradient with a 30% side slope.

The "Boran" 105 mm Air Transportable Light Towed Howitzer System

MKEK launched the 105 mm Air Transportable Light Towed



Boran 105 mm Air Transportable Light Towed Howitzer System

Howitzer (BORAN) project to fulfill the operational requests of the Commando and Infantry units for Airborne Operations. The system can calculate its own position and identify targets without usual deployment procedures thanks to its modern command and fire control systems. It has a minimum range of 17 kilometers and 6400 NATO mils (360°) firing capability. The howitzer weights around 1800kg and can be airlifted with a medium-lift utility helicopter and deployed in a short time for fire missions. Design Verification Tests of the M1 and M2 type prototypes were successfully completed and seven howitzers are expected to be produced in 2020 following the completion of the Product Qualification Tests.

20 mm and 12.7 mm Gatling-Style Rotary Gun

In order to meet the needs of the Turkish Armed Forces, MKEK initiated Gatling-style weapon systems projects to domestically design, develop and produce 20 mm six-barrel rotary cannons and 12.7 mm three-barrel rotary machine guns for application on a variety of air, land and sea platforms, including helicopters, fixed-wing aircraft, land-based vehicles, and naval vessels. The Gatling-style Rotary Gun Projects consist of 5 phases including Requirement Analysis and Determining System Requirements, Preliminary Design Phase, Detail Design Phase, Technology Demonstrator Production, and Technology Demonstration Tests. Preliminary Design and Detail Design phases of the projects have successfully been completed, and the Technology Demonstrator Gatling gun prototypes have been produced.



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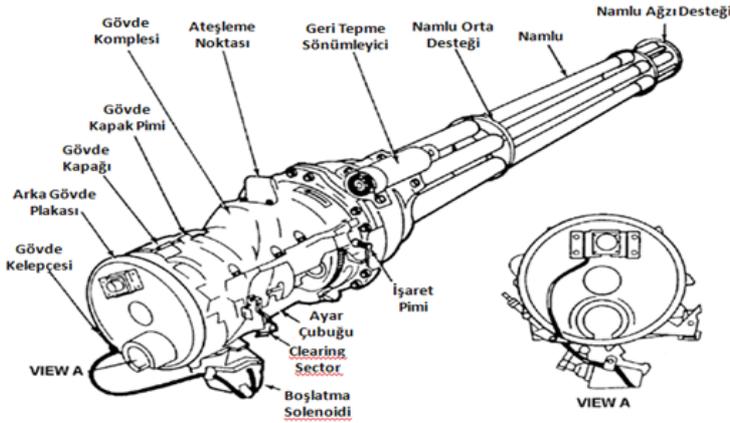


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20 mm Gatling Gun Technical Specifications:

- › Quick Change Barrel
- › Weight: 112,5 kg
- › Muzzle Velocity: 1030 m/s
- › Rate of Fire: 4000-6000 rounds per minute
- › Action: Hydraulic, electric, pneumatic
- › Feed System: Linked or linkless
- › Recoil Force: 9,4 kN
- › Dispersion: 8 milliradians diameter, 80% circle
- › Operating Temperature Range: -46, +52 °C

12.7 mm Gatling Gun Technical Specifications:

- › 12.7x99 mm NATO,
- › Standard NATO M9-linked (Closed Loop – Pull Out)
- › 3-barrel Gatling-style,
- › Barrel Length: 900 ± 50 mm,
- › Electrically driven,
- › Feeder/Delinker Unit,
- › Gun Control Unit (GCU)
- › Total System Weight without Ammunition: 75 kg,
- › Rate of Fire: 1000 + 200 rounds per minute
- › Effective firing range: 1.700 meters,
- › Mean time to repair (MTTR),
- › Mean time between failures (MTBF),
- › Reliability: %0.1 failure rate,
- › Dispersion: 5 milliradians diameter, 80% circle,
- › Light-weight and small size.

120 mm Mortar System

MKEK initiated the project to design, develop, manufacture, test and qualify a 120 mm Mortar



System. Within the scope of the project, five different alternatives were studied for the system and the most optimal solution was provided by analyzing the technological feasibility, manufacturability, availability, modularity, ease of use and costs. Later in the project, MKEK designed and analyzed the Barrel, Base Assembly, Elevation Assembly, and Breech Assembly, which are the sub-main assemblies of the weapon system. Following the analysis, sub-assemblies were produced, and the weapon integration was successfully completed.

Technical Specifications:

- › Weight: ~10 ton
- › Barrel Length: 1900 mm
- › Range: 9 km
- › Ammunition Capacity: 30 rounds
- › Rate of Fire: 10 rounds per minute
- › Traverse: ±3200 mils
- › Elevation: 800-1200 mils

Mechanical and Chemical Industry Corporation also carries out other strategic projects to provide domestic and national alternatives for the various weapons systems and ammunition currently used by the Turkish Armed Forces. The changing nature of the threat environment and the lessons learned during the cross-border operations in Syria influenced the R&D initiated by MKEK.

Research and Development Projects

The company has almost completed the production of the 120 mm tank ammunition family with the development of the 120 mm HE-T and HEAT-MP-T ammunition. 155 mm MOD 274 HE-ERFB/BB artillery rounds have been manufactured and delivered to Turkish Land Forces for the Firtına and Panter/Yavuz

howitzers. MKEK also mobilizing its capabilities to manufacture defence products, that are hard to import from abroad, through domestic means. The company launched projects to manufacture guided ammunitions and smart munitions. Additionally, MKEK works on the development of domestic engines that can be used in land vehicles of the Turkish Armed Forces.

120 mm MKEK MOD300 HE-T Tank Gun Ammunition Project

One of the latest developments in the Turkish defence industry was the successful testing of 120 mm HE-T tank ammunition developed by MKEK. In line with the requirements of the Turkish Land Forces Command for 120 mm HE-T Tank Gun Ammunition to be used against open and sight defilade targets, MKEK launched a project with its own resources to develop and produce such



ammunition. In this context, MKEK designed the warhead body, fins, and the fuse. Following the production of the prototypes, wall penetration and muzzle blast tests were carried with an M60-T Tank. During the tests, the 120 mm MKE MOD300 HE-T Ammunition was fired against concrete structures/fortifications and effectively destroyed the barricaded targets. MKEK successfully completed the R&D activities in the project and signed a contract with the Turkish Land Forces Command for a total of 8000 rounds. The first 1000 pieces have been delivered and the product qualification process has been completed.

120 mm HEAT-MP-T Tank Ammunition Development Project

MKEK will produce the Combustible Cartridge Case, Case Adapter, Case Base, Electric Primer, Fuse, and Propellant as part of the project. The High Explosive Anti-

....

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Making its mark on critical projects, such as projects in navigation, autonomous systems and cyber security, STM has been assuming a leading role in the defence industry by carrying the know-how acquired in line with its target of indigenous production to the international level.

STM Savunma Teknolojileri Mühendislik ve Ticaret A.Ş. is one of the most crucial players in the defence industry with its know-how and experience which spans thirty years and in line with a decree of the Defence Industry Executive Committee of 1991, it was established in order to provide consultancy to the Turkish Armed Forces and Presidency of Defence Industries and to serve in the development of critical technologies. Today, the company conducts its activities under three primary divisions: engineering, technology and consultancy with the support and guidance of the Presidency and the Presidency of Defence Industries. Developing its capabilities with the help of its know-how in engineering and experience STM has been contributing to the defence industry of our country with valuable projects mainly on areas of military navigation, autonomous systems and cyber security while executing its activities for sharing its capacities with friendly and allied nations. Actualizing its recent investments particularly in export -focused growth, by entering the list of Top 100 compiled by Defence News magazine in 2018, STM was included in the group of the world's top 100 defence companies.

Advanced Engineering Experiences in Military Naval Platforms

So far STM has assumed critical tasks in many projects, design, construction and modernization and detailed engineering activities for battle ship platforms. The MilGEM project is at the top of these tasks where STM seized the opportunity to benefit from the know-how and experience of the Naval Forces Command. Proceeding with the engineering experience gained through the MILGEM project, STM acted as the main contractor within the scope of the project for the modernization of the AY class submarines, again with the support of the Naval Forces Command and won

the tender for the modernization of the Acosta 90B submarines of Pakistan in 2016 as part of the activities regarding the submarines.

The Pakistani Fleet Replenishment Vessel Project was designed from scratch in line with the demands of the Pakistani Naval Forces. It is the greatest military vessel export project accomplished in the Turkish defence sector. In the project, which was delivered in 2018, in addition to the design and equipment package, STM provided technical support to the Karachi Shipyard. Continuing to deepen its know-how with each accomplished project, STM has built a knowledge-base in which its capabilities are increased and cultivated with each project.

Indigenous Autonomous Systems with Advanced Technology

STM has been working toward developing critical technologies and place great importance to R&D studies. The autonomous drone systems used for kamikaze and surveillance, developed by the engineers of STM to this end through indigenous resources, are among the indigenous defence technologies that Turkey has gained in recent years. Known as the kamikaze by the public, the ALPAGU is the first indigenous fixed wing smart ammunition system, the KARGU is the rotary wing smart ammunition system, the mini UAV TOGAN with surveillance and reconnaissance purposes and the ALPAGU BLOCK II has continued to be developed by being equipped with more powerful features. STM is providing outstanding tactical capabilities to be used by the Turkish Armed Forces in operations for the fight against terrorism and security operations. Positive feedback is being given regarding the KARGU which is currently included in the inventory and which used in active operations in the field. Presently STM continues, with fervent determination, its activities to gain both artificial intelligence capability and swarm capability for the autonomous system group.

Effective Solutions in Cyber Security

In addition to manufacturing technology, STM has been making significant investments in maintaining

the security of these developed platforms, cyber security stands out as a strategic area of activity for STM. Cyber security has become a critical issue for the overall security of the country and STM's main approach in this area is the identification of the threat through intelligence activities before it emerges, or it causes a vulnerability and adopting measures accordingly. The STM Cyber Fusion Center, which is a first in Turkey, is offering Cyber Threat Intelligence, Cyber Operations and Harmful Malware Analysis services within the aforementioned framework. With its developed infrastructure and competent staff, the company is presently providing services to numerous civil and governmental institutions.

The integrated indigenous cyber security decision support system CyDecSys™ provides services such as automatic software that analyzes threats and offers improvement methods. This software automates operations such as building network topology, vulnerability scans, classification based on risks and forming attack trees and supports the establishment of the national vulnerability database and management of cyber security procedures. CyDecSys, introduced by STM, stands out as a critical product in information technologies security and is an important complementary product in cyber security.

The Goal is to Become a Global Player

Within the Vision 2023 framework established by the Presidency, STM aims to achieve export -based growth and enter the league of 50 countries on the list of the Defence 100 in the next five years. Focusing on becoming a global player by developing projects capable of competing on an international scale, STM will be concentrating its investments for the upcoming period in the following areas: submarines and surface platforms, unmanned vehicles, cyber security and artificial intelligence. STM also places significant importance on the building of new cooperation relations with friendly and allied countries, providing consultancy, support and training towards the establishment of required infrastructures.



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Karel AG102 and TAG102 – Gateway devices convert the connected FXS, FXO, ISDN PRI and HF/VHF radio interfaces into Ethernet/IP data and transmit it to IP networks via IP ports. Gateway devices not only satisfy MIL-STD-810G and MIL-STD-461F military standards, but also can be configured according to customers' requirements. Karel TAG102 provides the communication of satellite or ethernet networks with analog radio connections and supplementary element for tactical field IP communication. Karel DS200T military PBXs have ability to communicate local and remote users via HF-VHF radio interfaces and also E1 and IP lines with radio link connection capability. These platforms provides data and voice transfers; supports any type of IP/SIP phones as subscriber and it makes video conversations possible.



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First Version of ADVENT Software Completed

Doğan ÖZDEMİR - C4I Surface Programs Manager, Havelsan

ADVENT, a new generation Combat Management System (ADVENT CMS) has been accepted by the SSB after an intensive testing process and the first version has been put into service in the KINALIADA corvette. The system has been in developed by the Turkish Naval Forces and HAVELSAN A.Ş. since 2010,

ADVENT software is a result of about 6 million lines of code by Turkish engineers and is a candidate to be one of the world's leading advanced war management systems. It will be used in all of our warships, which are still under construction and will be built in the future, as well as in ships which will be constructed overseas.

ADVENT CMS;

is a completely national and domestic combat management system that

- › has access to fully integrated TDL functions through all operator consoles,
- › is force-oriented instead of single ship,
- › responds to the needs of the network-supported operational approach,
- › seeks to facilitate the user's quick and accurate decision-making through decision support systems,
- › targets a flexible structure in the use of new weapons and sensors.

After the first version of ADVENT CMS is installed in the MİLGEM 4th Ship TCG KINALIADA, the following versions will be deployed in the LHD project. ADVENT is planned to be used in all command control systems that the Turkish Naval Forces will supply in the upcoming period.

ADVENT CMS will be the central component of naval combat systems. This component will meet the command and control requirements of the



commanding team. Within this scope, it will enable the realization of the tactical picture based the ship and task organization levels, providing support for situational awareness, threat assessment and prioritization, engagement planning and implementation of engagement activities.

Capabilities to be Gained

- › Network -Enabled Capability (NAC)
- › Mutual Engagement Capability

The planning and execution of engagement is calculated independently by CMS within the scope of the ship and the coordination of this function is carried out by the Air Warfare Coordinator for the overall task

force. However, because of the nature of the dynamic and fast developing Air Warfare environment, there is a need for fast and effective engagement planning, proper allocation of resources and coordination of this planning with other platforms.

ADVENT CMS aims to fulfill this need by sharing the weapon and sensor capabilities of other platforms in the task force and to make the planning throughout the task group taking into consideration the threats, the units and resources to be protected and to meet the plan mutually through execution capability.

- › Task Force-Focused Services Instead of Single Platform CMS Capabilities, which



F-511 HEYBELIADA MilGem Corvette

are offered as ship-focused (navigational plans, regulations, operational plans, search and rescue, etc.) will be planned and presented by taking into account other platform capabilities where operations are mutually carried out.

> Training Capabilities

Advanced training capabilities are offered both in virtual environment and in the real environment. This training can be carried out on a single platform basis and can be realized together with other platforms that are operated with NAC.

> TDL Functions Integrated with CMS and Having Access Through All Consoles

Currently the multi-link system functions can be accessed only via assigned independent consoles. With its current condition, the consoles and the gained capabilities are not integrated with

the CMS. Through ADVENT CMS, all information shared on TDL networks can be accessed by all consoles, and the TDL functions to be gained will be offered as distributed to all CMS applications.

> Dynamic Integration and Flexible Use of Weapons and Sensors

Thanks to this capability, it will be possible to support the flexible and dynamic integration of new weapons and sensors such as ÇAFRAD, National G/M etc. to CMS, as well as the mutual engagement infrastructure.

> Rule-Based and Integrated Decision Support System

Through this capability, in case the rules described by the operator which are processed by the SYS and the detections which comply with the rules are made, it is possible to warn and inform the operator and to enable the pre-determined actions to be processed automatically.

> Additional Operational Capabilities

ADVENT CMS, in addition to the basic combat capabilities, it provides assistance in mine operations, amphibious operations, defence against asymmetrical threats, search and rescue operations, marine inspection, humanitarian operations and so on.

> Additional Capabilities

ADVENT CMS will provide a user-friendly and flexible operator interface which is developed over the modern hardware and software infrastructure. Moreover, it will have capabilities such as multiple work space, authorized access to functions, dynamic help, situational menu, Turkish and English language assistance, warning infrastructure with operator interaction, 2D or 3D status presentation, infrastructure for dynamic data recording and play.

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Meteksan Defence Shows-off Novel and Ready-to-Use Products at IDEF '19

At IDEF '19 Meteksan Defence is showcasing products that have already entered the inventory and have proven themselves in the field, while also launching new and updated products. Visitors to the event will have the chance to see the latest technological advances and innovations at the company's booth

The products being showcased for the first time at IDEF '19 at the Meteksan Defence Booth are comprised of; MİLSAR, which is a Synthetic Aperture Radar (SAR) and the Ground Moving Target Indicator (GMTI) radar that will become the unblinking eye of unmanned aerial vehicles (UAVs); C-Band Data Link, which will bring a breath of fresh air to the field of UAV data links; KAPAN, which sets the standard in air defence against drones and Retinar FAR, new perimeter surveillance radar; YAKAMOS 2020, which will carry Turkey's knowledge and experience in the field of sonars to the future; the New Helicopter MİLDAR, as a fire control radar for the attack helicopters of the future; KEMENT, which serves as the infrastructure of network-enabled operations.

Speaking about their participation at IDEF '19 Selçuk ALPARSLAN, President of Meteksan Defence, said: "IDEF is a reference exhibition that illustrates the level reached by the Turkish defence and aerospace sector. We are also showcasing what we have achieved to date, giving an idea to the world what type of company Meteksan Defence is by giving hints of what we are poised to accomplish in the future. Our stand is much more crowded than in previous years. On one hand, we are showing products that have already proven themselves on the field, while, on the other, we also have products and solutions on display that are likely to have



Selçuk ALPARSLAN - Meteksan Defence
General Manager

an impact in the upcoming period. We are confident that our stand will be very interesting for the visitors to the exhibition in terms of the technology and innovation being showcased, and we believe visitors will spend a considerable time looking at it."

ALPARSLAN went on to share their objectives for IDEF 2021 and 2023: "Our dream for the future is to demonstrate at IDEF 2021 and 2023 that we are a global brand when it comes to sonars, data links and other solutions. What we have achieved to date has provided us the open road to lead us to that point, to which our focus and enthusiasm is currently directed. As a shorter-term goal, we would like to see MİLDAR and MİLSAR being showcased on actual platforms by IDEF 2021."

Meteksan Defence will host all visitors at its stand number 322C, located in Hall 3.

Helicopter MİLDAR Ready to Serve Aboard Attack Helicopters of the Future

Meteksan Defence has renewed its Helicopter MİLDAR solution in line with evolving needs. The new Helicopter MİLDAR is also making an appearance at IDEF '19 as a system that provides a significant force multiplier by considerably enhancing the firepower of modern attack helicopters.

Following the integration of the Helicopter MİLDAR into the T129 ATAK helicopter, and the successful conclusion of the project's acceptance tests in 2017, Meteksan Defence is now taking the Helicopter MİLDAR into the future by overhauling it with its own resources according to evolving user needs. As Turkey's very first fire control radar operating in the millimeter waveband, and equipped with Target Tracking and Terrain Profiling features, the Helicopter MİLDAR is being showcased at IDEF '19 in a newly modified and advanced version, with its mast-mounted configuration. It is also being displayed in such a way that shows both its external geometry and architecture.

Selçuk ALPARSLAN, President of Meteksan Defence, said that the new Helicopter MİLDAR is a reflection of the company's innovativeness: "The Helicopter MİLDAR is one of the best examples of how the concepts of R&D and innovation are utilized in the defence sector. When we first started working on it, there were

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Technical Characteristics of Helicopter MILDAR

Operating Frequency Band	Ka-band
Operating Modes	Target Tracking and Terrain Profiling (Optional)
Maximum Range	12 km (Target Tracking) / 2.5 km (Terrain Profiling)
Number of Targets Tracked	50
Environmental Conditions	MIL-STD-810F
EMI/EMC	MIL-STD-461F
Low Probability of Intercept	
Frequency hopping	
Small size, light weight and low power consumption	

no other millimeter wave radars being produced in Turkey. We not only developed these technologies indigenously, but also ensured that the very first version of the Helicopter MILDAR possessed all the functions of a modern fire control radar. In time, evolving user needs meant that different physical dimensions and integration options had to be considered. This led us to apply our previously developed technologies to a different architecture, and to roll out a solution that met the needs of our users precisely. In its renewed form, we anticipate that the Helicopter MILDAR will come to occupy an important place in the future of attack helicopters.”

The Helicopter MILDAR is also expected to become one of the main sensors aboard the helicopter to be developed under Turkey’s Heavy Attack Helicopter Project, the contract of which was signed in February 2019. Depending on the choice of the platform integrators, the system may be integrated at different locations on the helicopter. The integration of the system onto the mast, which is the configuration showcased at IDEF, is actually one of the most difficult locations in terms of environmental conditions, and so it can be considered indicative of the system’s ability to be successfully integrated in other locations.

MILSAR - The Unblinking Eye of UAVs

The prototype MILSAR, whose weight, volume and power consumption are sufficiently for the system to be a viable payload for tactical-class UAVs, is being

showcased for the first time at IDEF ‘19.

Technically, the MILSAR is a synthetic aperture radar (SAR) and a ground moving target indicator (GMTI) radar. Due to their ability to provide high resolution images in weather conditions in which electro-optical sensors become ineffective, SAR and GMTI radars have become indispensable on reconnaissance and surveillance aircraft and satellites. The GMTI feature, on the other hand, comes in handy for the long-term surveillance of targeted activities, which is one of the main reasons why UAVs stay in the air for many hours, although the volume, weight and power consumption requirements of GMTI radars generally prevents their usage in smaller UAVs.

MILSAR is the end product of long-standing work by Meteksan Defence on radar technologies that were first launched in 2007 with the MILDAR project. This, in itself, provides cues to the system’s performance. As a system developed by engineers of Meteksan Defence, one of the main features that makes MILSAR stand out is its ability to be used effectively in tactical UAV-sized



platforms. Based on advanced technologies and an innovative architecture, MILSAR is low in weight and small in size, and sets itself apart by requiring only the level of power that a tactical UAV can generate.

In the light of the technological depth and experience it has acquired within the scope of the MILDAR project, Meteksan Defence has succeeded in developing three different products: The Helicopter MILDAR, the Automatic Take-Off and Landing System (OKIS) and MILSAR. Meteksan Defence has already rolled out the Helicopter MILDAR and OKIS as individual products. The Helicopter MILDAR has already proven its ability to operate at the desired level of performance under the harshest of environmental conditions, even when exposed to constant vibration. OKIS, on the other hand, has successfully completed integration trials with different UAV platforms.

Meteksan Defence Expands its Data Link Product Family with C-Band UAV Data Link

Meteksan Defence is also showcasing for the first time unique and innovative C-Band Data Links solutions of unmanned aerial vehicles (UAVs) at IDEF ‘19. The system being displayed has already completed many testing processes, and today stands out as a working product that has reached the final stage of its qualification process.

The UAV data link ensures direct communication between



the UAV and the ground control station. The data link transfers the necessary commands from the ground control station to the UAV, while conveying status and payload-related information and feeds from the UAV to the ground control station. The most critically important requirements of a data link are its bandwidth, reliability, and an uninterrupted data transfer, while also ensuring security. Deploying the experience it has gained in different missile projects,

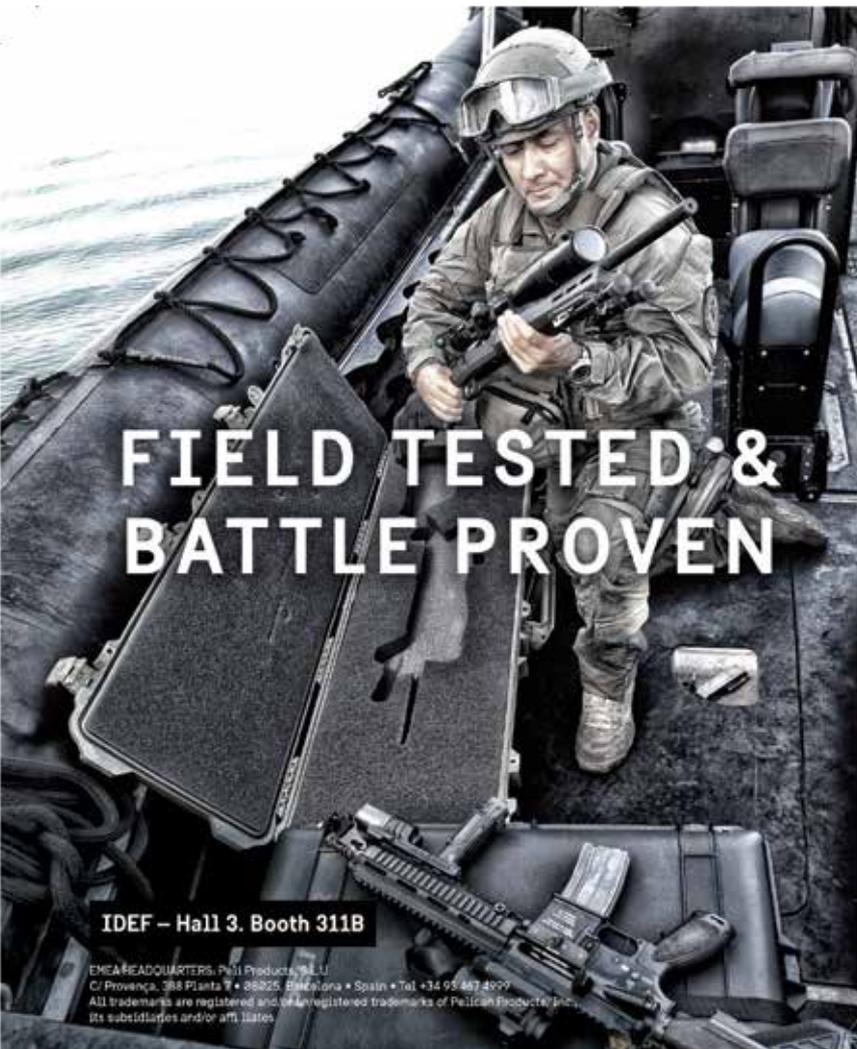
the C-Band Data Link developed by Meteksan Defence for UAVs emerges as an indigenous data link solution that possesses all of these critical features.

The directional and non-directional antenna of the C-Band Data Link were produced by Meteksan Defence indigenously. This has made it possible to avoid any potential antenna procurement-related problems that may arise during serial production in the event of an embargo, and to increase the level of indigenouness at a system level by creating the means to develop and produce broad-band antennas in the 4.4-5.85 GHz band through domestic capabilities. It has also become possible to develop antennas in line with the benefits identified through link and budget analyses. Furthermore, the antenna weight has been reduced significantly as a result of the decision to have the reflective surface of the ground unit reflector

antenna made of carbon fiber composites. Last but not least, the radome of the non-directional antenna for the air platform has been designed in such a way that it is more resistant to ambient conditions.

When determining the C-Band Data Link's technical requirements, Meteksan Defence took advice from the Turkish Armed Forces (TAF), which ranks among the world's leading users of UAVs in operational settings. After making an analysis of previous work related to the ANKA and BAYRAKTAR TB2 UAVs, Meteksan Defence designed a system that can be used by the TAF and also by friendly and allied nations, once the qualification process has been completed.

Selçuk Alparslan, President of Meteksan Defence, describes the C-Band Data Link as an example of Meteksan Defence's proactive product development approach: "The data link studies



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IDEF – Hall 3, Booth 311B

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we have carried out, especially within the scope of our missile projects, have granted Meteksan Defence significant experience in terms of human resources, technology, infrastructure and the business ecosystem. We transfer this experience to areas in which we identify a need using our own resources, without waiting for an appropriate project to be announced. The C-Band Data Link is the product of such an approach. We are certain that our product will provide high performance, reliability and security to our users, as a competent and competitive solution to UAV platform manufacturers,” Alparslan said.

Meteksan Defence Establishes Infrastructure for Network-Enabled Operation with KEMENT

KEMENT, a system that provides network-enabled capabilities to cruise missiles, is also being showcased at IDEF '19 for the first time at the company's booth.

Network-enabled operation allows cruise missiles – which are used to neutralize high-value targets from hundreds of kilometers away – to be launched according to a “fire and control” rather than a “fire and forget” principle, which greatly enhances the effectiveness of the missile and permits the updating of mission parameters. This is precisely what has been achieved by the KEMENT system, developed by Meteksan Defence as the prime contractor. Serving as a special tactical data link for cruise missiles, KEMENT

allows such missiles to establish communication with different friendly units as they navigate towards their target, thus allowing for changes in the missile's mission definition according to changes in the target area.

KEMENT was first integrated into the SOM cruise missile developed jointly by ROKETSAN and TÜBİTAK SAGE. The technology of the system makes a difference in terms of its band width; its resistance to electronic warfare; its image transmission capability; its ability to form and manage dynamic networks; and its low weight, volume and power consumption. Furthermore, owing to its software-based design and its use of an indigenous waveform, the system also meets the special requirements of the Turkish Armed Forces (TAF).

Commenting on this prospect, Selçuk ALPARSLAN, President of Meteksan Defence, said: “Although KEMENT was developed for cruise missiles, it is a system that harbors all of the functions of a National Data Link that can be used by the armed forces in general. The up-to-date and flexible solution laid out by KEMENT is likely to enable its evolution into the National Data Link in a fairly swift manner. At Meteksan Defence, we are ready to convert our government's investments in this project for the National Data Link, as a cost-effective approach. Showcasing the KEMENT at IDEF '19 as a system that is ready to serve is a strong indication of our resolve in this regard.”

In the previous IDEF exhibition,

KEMENT was displayed during a special demonstration on May 10, 2017 as part of a special session that was joined by representatives of the Presidency of Defence Industries and the Turkish Naval Forces Command. This year, KEMENT again makes an appearance at IDEF 2019 as a ready-to-use system that has already successfully completed its flight tests.

Retinar FAR-Equipped KAPAN to Set Standards in Air Defence Against Drones

The KAPAN Anti-Drone system developed by Meteksan Defence will also be displayed at IDEF '19 together with the novel Retinar FAR sensor at the company's booth.

Perimeter surveillance radars stand out as an effective solution for the detection of drones, which are a prominent present day asymmetrical threat, within the scope of critical infrastructure and border security applications. Using such radars as a starting point, Meteksan Defence developed the KAPAN Anti-Drone System within a brief period of time using its own resources, effectively launching it in 2018. At IDEF '19 the KAPAN Anti-Drone System is being showcased together with the new Retinar FAR radar system, which greatly enhances its performance.

The Retinar FAR is a product of Meteksan Defence's in-depth



analyses and rigorous field tests regarding drone detection. This version of the Retinar fields a new antenna that has been designed specifically for the surveillance of air space and for the detection of drones with high performance hardware and special algorithms.

The Retinar FAR can detect aerial targets at longer ranges and scan a broader area, thus turning the KAPAN into a more potent drone hunter. Capable of seeing farther with the Retinar FAR, the KAPAN Anti-Drone System neutralizes targeted drones through countermeasure systems provided by Meteksan Defence's solution partners, such as jamming and laser weapon systems.

YAKAMOS 2020 Sonar to Unveil at IDEF '19

The YAKAMOS 2020 another star product of the company, is being unveiled at IDEF '19 is the new version of the YAKAMOS sonar that was developed and produced as part of the Turkish Navy's MİLGEM project. Visitors to IDEF '19 will have the opportunity to see a scaled mock-up of the YAKAMOS 2020's wet end unit at the Meteksan Defence stand, as well as the actual console of the dry-end units, which is expected to be located aboard the ship in the very close future. The YAKAMOS 2020 is expected to be integrated first into I-Class Frigates.

The YAKAMOS Sonar is currently serving with great effect aboard the TCG HEYBELİADA (F-511), TCG BÜYÜKADA (F-512) and the TCG BURGAZADA (F-513) corvettes of the Turkish Navy. The YAKAMOS 2020 will see the addition of many technological and architectural innovations to its predecessor, while maintaining field experience, proven algorithms and interfaces, as many sonar operators have become accustomed to YAKAMOS. As a more compact, competent and modular system with an easily configurable software and hardware architecture, the YAKAMOS 2020 was developed as a system that will be readily adaptable to evolving technologies as well as changing acoustic



environments, and that will surpass its rivals in the global market through its superior capabilities. Due to the enhanced efficiency of its power modules, the system is capable of operation for longer periods, while the updates to its sensor architecture enable it to detect potential threats over much greater ranges.

Selçuk ALPARSLAN, President of Meteksan Defence, emphasizes that the YAKAMOS 2020 represents the pinnacle attained by Turkey in the field of underwater acoustics: "As Turkey's center of excellence for underwater acoustics, we developed the YAKAMOS 2020 taking into account user needs, evolving threats, technological advances and the outcomes of our own R&D studies. The YAKAMOS 2020 is not a system that emerged suddenly out of the blue. The YAKAMOS, which we treat like a living system, has been constantly improved upon ever since the start of our industrialization efforts, and every new capability that we have added to the sonar has been implemented on the versions already integrated

aboard ships. The YAKAMOS 2020 can be likened to a system that brings together all previous work. This process also shows that, in the event of the YAKAMOS 2020 being selected for I-Class Frigates, it will be a constantly evolving system, following in the footsteps of the YAKAMOS."

Another important development was selection of the YAKAMOS Sonar for MİLGEM Corvettes, which will be added to the Pakistan Navy's inventory. The YAKAMOS thus demonstrated its success as a competitive product in an international arena. Selçuk ALPARSLAN stressed the importance of this development from the standpoint of Pakistan, a friendly and allied nation: "This project will supply a highly competent sonar to the Pakistan Navy. Moreover, as part of technology transfer obligations, we will be building a very close cooperation with the Pakistan Defence and Aerospace Industry. We are constantly improving the YAKAMOS, and the sonars we will deliver to Pakistan shall be the most up-to-date, harboring all of the mentioned improvements. With the delivery of the YAKAMOS, we will forge yet another long-term and added-value generating cooperation with Pakistan. We are eagerly looking forward to that day." ■



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AVCI – Anti-Drone System

The SDT AVCI Anti-Drone system is designed to detect, track and defeat Mini and Micro size rotary and fixed wing drones. Various sensor subsystem configurations are available based on requirements. Detection and tracking multiple threats with radar, identifying and tracking of the threats with EO and Thermal Cameras, determination of pilot direction using a DF receiver are available features. The detected drones can be defeated using directional /omni-directional jamming solutions or hard-kill solutions.



Avci Anti - Drone System

processed and unprocessed data are recorded and then analyzed using smart filters. The distinguishing feature of the developed system over its opponents is that it can detect all narrowband, wideband, Direct Sequence Spread Spectrum (DSSS) and Frequency Hopping Spread Spectrum (FHSS) signals and make them ready for listening.

Communication Signal Monitoring and Localization Systems

SDT has developed a new generation of Communication Monitoring and Localization System to respond to all these needs in the electronic battlefield in the most efficient way. The system detects narrowband and wideband signals with high sensitivity, finds signal direction and source position and classifies and resolves those signals. All time critical operations are performed in real time automatically. The resulting

SDT Speeds up in Virtual Combat Training Simulators!

Since its establishment in 2005, SDT provides combat training solutions for the armed forces. Among them are Embedded/Live Air Combat Training Systems and Embedded/Virtual Missile Training Simulators. SDT's embedded and live training products are currently in use on F-4 and

F-16 aircraft for the air combat training of air forces. Providing turn-key solutions for various units of naval forces for virtual combat training centers, SDT has completed internal R&D studies and has launched a new product for the Turkish and international markets.

The company is introducing the newly launched product, SMART (Small Arms Trainer), at IDEF 2019. SMART is utilized for providing military/civilian security personnel with an easy and cost-effective training aid to improve their basic/tactical marksmanship. SMART is a compact, portable and easy-to-install product. With its flexible structure, SMART lets users create and upload their own training scenarios. It supports both computer graphics and video-based scenario technologies. SMART is a complete training aid with its live feedback and After Action Review features. You can visit the SDT booth to experience all of the features of SMART.



SDT Air Combat Training (ACT) Solutions

Among SDT's Embedded Simulation System (ESS) solutions, Airborne ESS was SDT's first involvement in air combat training system development back in 2007, which was successfully

deployed on a fighter aircraft and delivered to the Turkish Air Force (TurAF) in 2011. SDT developed CGF simulations as well as high fidelity models of aircraft systems such radar, RWR, CM/ECM and missiles for the ESS. The system is fully integrated to aircraft OFP and has gone through several ground and flight tests before final deployment. ESS provides “Constructive” elements into the “Live” environment for enhanced air combat training capabilities. Another version of the ESS solution was exported to South Korea between 2016 and 2017 for the use of Republic of Korea Air Force (RoKAF).

One of the important elements of SDT’s Embedded Simulation System (ESS), Air Combat Maneuvering Instrumentation



(ACMI) which was successfully developed by SDT and certified via flight tests conducted together with TAI and the Turkish Air Force on F-16 aircraft. SDT’s ACMI system (pod and ground system) is ready for serial production for the domestic market as well as the international market.

SDT SAR & LIDAR Technologies

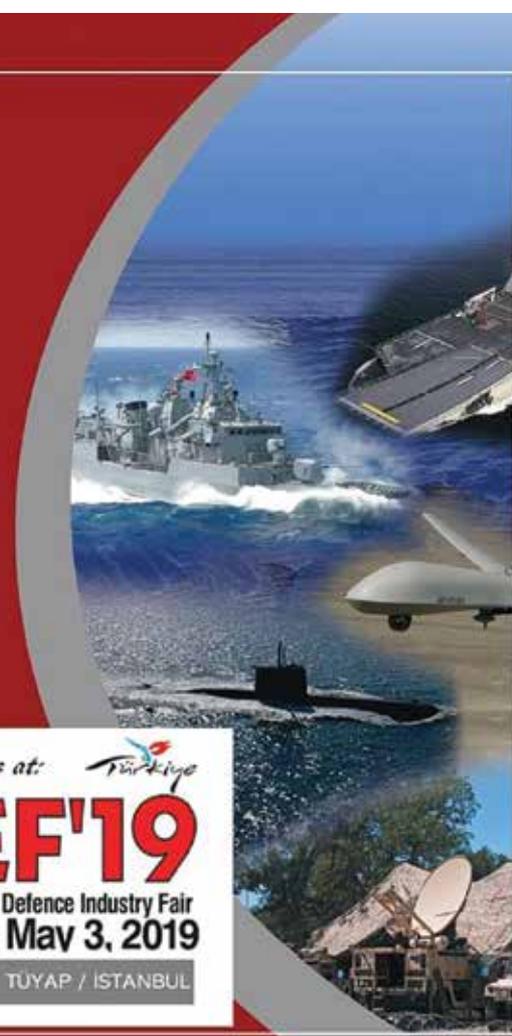
As one of the important elements of SDT’s remote sensing products and capabilities, SAR Systems are advanced imagery radar systems that are being widely used for Reconnaissance and Surveillance purposes on space borne and manned/unmanned airborne platforms.

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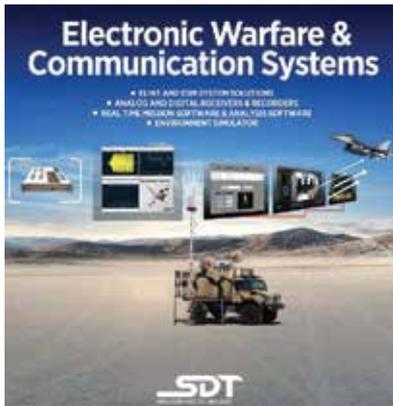


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SAR Systems have intrinsically superior features such as:

- › All weather, Day and Night operation
- › Very high-resolution imagery (in the cm range)
- › Extended stand-off ranges (> 100 km)
- › Precise geo-location
- › Change Detection (Coherent/Amplitude: CCD/ACD)

SDT SAR Capabilities and Image Samples

SDT has been developing and integrating SAR System Solutions to different platforms and ground exploitation stations for many years. With a solid background in SAR and complementary advanced technologies, SDT offers distinguished end-to-end solutions and services in this field. The following list presents SDT SAR capabilities, to emphasize a few:

- › End-to-end SAR System Solutions
- › Real-time SAR Signal Processing
- › Stripmap Spotlight ISAR
- › SAR Image Exploitation Applications
 - › On board or at Ground Station
 - › Exploitation and Intelligence
- › Automatic Target Recognition
- › Change Detection (CCD/ACD)
- › SAR Viewer
 - › STANAG-7023 compliant SAR/ISAR imagery
 - › DEM Generation (in development phase)
 - › Debriefing
- › Mission Reporting
- › Catalog, Archive and Dissemination (CAD)
- › Modelling and Simulation
- › Real-time Recording of Raw and Processed SAR Data

LIDAR Data Analysis

SDT's image processing team has recently started to work on Lidar data analysis as another remote sensing application. The Lidar sensor has aroused interest in the world for its property of supplying 3D information of the scene. This property complements the other sensors and thus increases the performance of the recognition algorithms well. SDT would like to utilize its multi-sensor data fusion capabilities on a sensor set that includes Lidar sensor beside the electro optic, SAR, MMWR and hyperspectral.

Weapon Control and Interface Units

As a result of the accumulation of more than ten years of airborne and land vehicle based weapons systems electronics control applications, the product range of SDT on this track has increased together with the acceleration of missile integration projects designed and developed by Roketsan on other platforms. The Weapon Carrier Vehicle project of the Turkish Armed Forces, the main contractor of which is FNSS, the Weapon Control and Interface Units Development Project, the intention is the integration of KORNET and OMTAS missiles to land vehicles and ensuring that all tower functions are performed according to the employment at the tactical field.

The products which had been designed and integrated to the vehicles by SDT within the context of the project are; 15" Multifunctional Shooter Display (NE), Platform Interface Unit (PAB), Shooter Interface Control Unit (NAKB), Cornet Missile Adaptation Unit (KOFUB) and Cornet Distance Selection Adaptation Unit (KOMSUB) 15. Within the context of the same project, as ROKETSAN's subcontractor, OMTAS Mission Unit (OGB) was designed and integrated to the same vehicles.

Within the scope of these products; all hardware designs and software development and unit production was completed

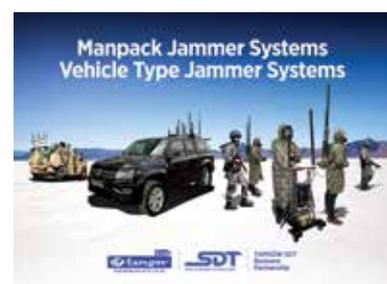
by SDT. SDT's units manage all of the servo drivers on the tower, the motors, the thermal sighting device, the laser distance meter, the inertial measuring unit, machine gun drivers, together with all of the sub units inside the vehicle which provide data to the system and thus enables execution of all of the functions required to enable anti-tank missile firing.

Vehicle Type RF Jammer Systems

The SDT and TAMGOR partnership has been producing Vehicle Type RF Jammer Systems designed for VIP and convoy protection for Radio Frequency Controlled Improvised Explosive Devices (RCIED). These systems defuse threats activated with handheld receiver, wireless phones and remotely controlled devices using their RF protection shield. The system has been designed and produced with local capabilities. Customizable mechanical adaptation is easily possible per each host vehicle.

Manpack Jammer Systems

The SDT and TAMGOR partnership has been producing Manpack Jammer Systems designed for personal protection for Radio Frequency Controlled Improvised Explosive Devices (RCIED). These systems defuse threats activated with handheld receivers, wireless phones and remotely controlled devices using their RF protection shield. The system has been designed and produced with local capabilities. The Manpack Jammer System can be carried easily with its push and pull kit and is also adaptable for any vehicle without the need to make modifications ■





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Turkish Defence Industry Review - March & April 2019 News

As we approach the IDEF'19 Fair, we have closely followed the recent developments in the Turkish Defence Industry in March & April and reviewed the latest developments that have occurred over the last two months

ARES Shipyard to Build 105 Patrol Boats for the Coast Guard

ARES Shipyard signed a contract with the Presidency of Defence Industries for the construction of 105 patrol boats on February 19, 2019. The patrol boats will be deployed on a range of missions including combating illegal migration, search, and rescue (SAR), anti-human trafficking, and maritime security and safety. The first of the vessels is scheduled to be commissioned in 2020.

The signing ceremony of the project was held at the SSB headquarters in Ankara with the participation of the President of Defence Industries Prof. Dr. İsmail DEMİR, Deputy Minister of Interior Mr. Mehmet ERSOY, Commander of the Turkish Coast Guard Rear Admiral

(LH) Ahmet KENDİR and company representatives.

The decision on the Project was taken at the Defence Industry Executive Committee chaired by President Tayyip Erdoğan on October 2018. The project is planned to last for six years and The ARES 35 FPB boats, which will be produced for the Coast Guard Command for the first time, will be used all inland waters and coastal areas of Turkey.

HÜRKUŞ-C launched TOGAN for the first time

Domestic HÜRKUŞ-C aircraft was successfully launched TOGAN ammunition for the first time. The first successful launch of light and low-cost TOGAN ammunition, developed by TÜBİTAK SAGE, was announced on the Official TUSAŞ/

TAI Twitter account on March 30. During the test, four air-launched 81mm TOGAN mortar ammunition dropped from the underwing hardpoints on the HÜRKUŞ-C aircraft. This accomplishment proved that HÜRKUŞ-C will now be able to carry out close air support (CAS) missions. With the acquisition of TOGAN capability, the operational cost of the HÜRKUŞ-C is aimed to be further reduced.

Under the HÜRKUŞ-C Light Attack and Armed Reconnaissance Aircraft mass production project, 18 aircraft were ordered for the Turkish Land Forces Command and Gendarmerie General Command. The armed HÜRKUŞ-C, which will provide close air support to the Gendarmerie units in the operation areas, was painted in matte black in February at the request of gendarmerie pilots.



The First OMTAS Missile Fired from KAPLAN STA Hit Its Target!

FNSS successfully conducted the first firing test of the OMTAS missile from the Kaplan Anti-Tank platform on February 13. The test firing was carried out as part of the Anti-Tank Vehicle (ATV) Project while the qualification tests of the two different wheeled and tracked anti-tank platforms (Pars and Kaplan) was still ongoing.

FNSS conducted the firing test after completing the integration of OMTAS missile into the Anti-Tank Remote Controlled Turret (ARCT) with the support of Roketsan. The company also integrated a KORNET missile into the same turret last year and successfully carried out firing tests. Project teams from both the Presidency of Defence Industries (SSB) and the Turkish Land Forces Command were present during the firing tests carried out in Karapınar, Konya on 13 February 2019. The KAPLAN and PARS deliveries are scheduled to start this year following the completion of qualification tests for both vehicles.

The Anti-Tank Vehicle (ATV) contract between the SSB and FNSS Defence Systems was signed on June 27, 2016 and entered into force on October 14, 2016. Within the scope of the project FNSS will deliver 184 ATVs based on KAPLAN tracked armored vehicle and 76 ATVs based on PARS 4x4 Wheeled Armored Vehicle (WAV), 80 of the KAPLAN ATVs will be equipped with KORNET-E ATGMs and the remaining 104 will be equipped with Roketsan's MIZRAK-O/OMTAS ATGMs. All the 76 PARS 4x4 ATVs will be equipped with Roketsan's MIZRAK-O/OMTAS ATGMs.

Aircraft to be Fitted with Stand-off Jammers Arrive in Turkey

On March 15th, the aircraft to be fitted with airborne stand-off jammers as part of the HAVA SOJ project has arrived in Turkey. Upon inspecting the aircraft, President of Defence Industries İsmail DEMİR said, "We aim that the HAVA SOJ will be more advanced than the other systems operational around the world."

Turkey has received the first two Bombardier Global 6000 business jets to be fitted with HAVA SOJ Electronic Warfare System developed



by Aselsan. The HAVA SOJ, also known as the Remote Electronic Support/Electronic Attack Ability in Air Platform Project, was initiated by the Presidency of Defence Industries (SSB) to develop electronic warfare special mission aircraft.

President of Defence Industries İsmail DEMİR, as well as the representatives of Turkish Aerospace Industries (TUSAŞ/TAI), Aselsan, Air Forces Command, and Bombardier, inspected the aircraft at TAI facilities.

Receiving information about the aircraft and the systems to be fitted, İsmail DEMİR said, "We have taken concrete steps toward the implementation of these systems which had been envisioned and planned for a long time. We aim that the HAVA SOJ will be more advanced than the other systems operational around the world."

The initial contract for the HAVA SOJ (Remote Electronic Support/Electronic Attack Ability in Air Platform) project to develop an electronic warfare special mission aircraft was signed between the SSB and Aselsan and was later transferred to Aselsan-Turkish Aerospace joint venture.

Under the project, Aselsan-Turkish Aerospace will develop four HAVA SOJ systems and deliver the same to the Turkish Air Force Command (T AFC) between 2023 and 2027. The system will be able to detect, identify, locate, jam, and spoof

enemy communication systems and radars so that they cannot be used against friendly elements particularly in cross-border operations. Thus, the Turkish fighter aircraft can safely operate without any EW threat.

The HAVA SOJ system, which has superior technological features than the Land-Based Remote Electronic Support/Electronic Attack (KARA SOJ) system, will combine various electronic warfare capabilities with additional critical mission components.

All of the electronic warfare mission systems to be integrated into HAVA SOJ Systems will be nationally developed and produced in Turkey. The SSB also plans to complete the modification and certification process of commercial aircraft in Turkey with national resources. The HAVA SOJ project demonstrates the outstanding electronic warfare capabilities of the Turkish defence industry considering only a few companies has the ability to accomplish such a formidable project in the world. The project will make a significant contribution to Turkey's goal of becoming an "information and technology-exporting country" thanks to the high export potential of the product. Regarded as the ultimate point in technology, the HAVA SOJ system will be a monumental step toward the goal of minimizing foreign dependence on defence systems when it enters the Turkish Armed Forces (TSK) inventory.



Ukraine Receives Bayraktar TB2 UAV

On March 20th, Ukrainian President Petro Poroshenko announced on social media that Ukraine received the Bayraktar TB2 unmanned aerial vehicles (UAVs) purchased from Turkey. Stating the advanced capabilities of Turkish UAVs, “Modern UAVs Bayraktar TB2 made in Turkey are already in Ukraine,” Poroshenko said on Twitter. President Poroshenko also shared information about the recent agreement to purchase Bayraktar TB2 unmanned aerial vehicles for the Ukrainian military.

Stating that they continue to strengthen the Ukrainian army with modern weapons and equipment, Poroshenko stressed that the purchase agreement is part of a partnership program between Ukraine and NATO member states. Addressing the agreement between Ukrspetsexport and Baykar Makina, “The next step of the program is the creation of a Ukrainian-Turkish joint enterprise in the southeastern Ukrainian city of Zaporizhia that will produce components for modern unmanned systems.” added Poroshenko. According to the agreement, Baykar Makina will produce six Bayraktar TB2 unmanned aerial vehicles and deliver them to Ukraine within a year. Along with the UAVs, three ground control stations and other equipment will be delivered as well.

New National ANKA-AKSUNGUR UAV Makes Its First Flight

On March 21th, Turkey’s new twin-engine ANKA-AKSUNGUR unmanned aerial vehicle (UAV) with high load capacity successfully completed its first flight. Turkish Aerospace Industries (TAI)



introduced the ANKA-AKSUNGUR UAV, previously known as Anka-2, for the first time on March 20. The high load capacity UAV successfully carried out a 4-hour 20-minute test flight using the automatic landing and take-off feature. The twin-engine ANKA-AKSUNGUR unmanned aerial vehicle is expected to perform long-term missions up to 40,000 ft.

TUSAŞ had launched the Anka-2 Project with its own resources to develop a new UAV with a higher payload capacity. The twin-engine medium-altitude long-endurance UAV will perform reconnaissance, surveillance, and combat missions. The UAV will be able to carry up to 750kg of useful load. ANKA-AKSUNGUR will be powered by the indigenous PD170 turbo diesel engines developed by TUSAŞ Engine Industry (TEI) under the Operative UAV Engine Development Project.

Innovative and High-Tech – Turkish Helicopters will Utilize Lasers to Avoid Obstacles

On April 4th, The Presidency of Defence Industries and Meteksan Defence signed an agreement for the Helicopter Obstacle Detection System (HETS) Project. The project was launched to provide aircraft, especially helicopters, with a fiber-laser-based collision avoidance system to detect natural or man-

made obstacles in low-altitude flights. Natural (trees) and man-made obstacles (powerlines, poles, settlements) pose a risk for helicopters during flight, especially in nighttime conditions.

Obstacle Detection technologies for such purpose are divided into active and passive types. The active detection typically utilizes sensors such as radar/LIDAR to increase situational awareness, while passive systems use software-based solutions. Currently, Turkish aircraft use a passive obstacle detection software based on the “Map Obstacle Database” created by General Directorate of Mapping (GDM). So far, 457 tablets, which include all the obstacle and elevation data across the country, were delivered to the Turkish Armed Forces to be used in various types of helicopters.

The aim of Active HETS Project, signed between the SSB and Meteksan Defence, is to develop innovative and advanced technologies that can operate without an obstacle database. With the system, aircraft, especially helicopter platforms, will be able to navigate safely in low altitude flight conditions. The system detects wires/obstacles using an indigenously developed eye-safe laser and alerts the pilots in advance with audio-visual warnings to prevent collisions. In the later



stages of the project, Meteksan aims to provide interoperability with the current Passive HETS system to create an integrated structure with high resolution, wide scanning angle, and high precision. Within the scope of the project, it is aimed to develop a national light-weight system with low power consumption which can be integrated into different platforms, especially the new generation multi-role helicopter.

With the development of this system, Turkey will acquire a critical LIDAR/LADAR infrastructure that can be used in a wide range of applications such as autonomous and unmanned systems. The domestic laser transceiver unit to be used in HETS project was developed as part of the "Fiber Laser Development Project" between the Presidency of Defence Industries and Meteksan. The prototype system has successfully detected a 1-centimeter diameter power transmission line over one kilometer.

ASW Shield Against Submarines

On March 23, Aselsan continues to work on equipping the Tuzla Class New Type Patrol Boats with the National Anti-Submarine Warfare (ASW) Rocket and Launcher System. According to the 2018 annual report published by Aselsan, the Anti-Submarine Warfare (ASW) Rocket and Launcher System was integrated into the 4 New Type Patrol Boats commissioned by the Turkish Naval Forces command in 2012. Under the National ASW Rocket and Launcher System Procurement Project, the Presidency of Defence Industries (SSB) and ROKETSAN signed the contract in the last quarter of 2018. As part of the contract, 12 ASW Rocket Launcher Systems including related equipment will be produced by Aselsan and will be integrated into the Tuzla Class Patrol Boats. The company will also provide the necessary training for the ASW system.

Anti-Submarine Warfare (ASW) Rocket and Launcher System can be integrated into different types and sizes of naval platforms or fixed positions on land to protect critical bases and ports from submarines. The ASW rocket launching system addresses the most sophisticated of modern submarine threats, thanks to

its automatic engagement capability and the control of detonation depth inherent in its advanced time-delay fuse and the insensitive characteristics of both warhead and rocket motor.

The launcher can be automatically laid on target using data from a variety of shipborne sensors (sonar, gyro, GPS, meteorological, etc.) and can prosecute targets at ranges of 500-2,000m and 15-300m depth. The stabilized launcher can fire rockets in single or salvo modes from sealed launching tubes that provide environmental protection for the munitions. The tubes, which can be manhandled by two individuals, have a shelf life of 10 years.

The ASW rocket has insensitive (IM) high explosive warhead and IM motor which are desired in modern naval weapon systems. The ASW Launching System (developed by Aselsan) has stabilization, automatic and manual launcher laying capabilities. The Fire Control System can process the navigation and target data obtained from the naval platform.

Turkish Paratroopers to Train with Unique Simulator

On April 11th, Hezarfen Parachute Simulator, which allows paratroopers to be trained in a virtual reality environment, was delivered to the Turkish Land Forces Command with the coordination of Presidency of Defence Industries. Developed by Havelsan, Hezarfen became the first parachute simulator to enter the inventory of the security forces as domestic and national production. The simulator enables the users to experience real-life scenarios and emergency situations, from jumping to parachute opening and descending to the targeted point.

Hezarfen Parachute Simulator, which has superior features compared to similar systems, aims to minimize the foreign dependence in this field. Attracting a great deal of attention in both national and international events, the simulator is also expected to bring export success in the coming period. The Hezarfen Parachute Simulator offers a cost-effective solution that increases its users' level of training,

planning, and readiness within a repeatable and safe environment in a short time.

The system allows real-time development of vital capabilities during different weather conditions, emergencies, and variable winds. It aims to improve the user's actual performance by using a high-resolution database and virtual reality. The Hezarfen Parachute Simulator also increases operational success by providing information about terrain conditions.

By using virtual reality environment, the system aims to lower training costs. The Hezarfen Parachute Simulator allows its users to repeat the parachute training at anytime and anywhere, regardless of the outside climate and weather conditions. Moreover, the system records the maneuvers, controls, and methods of the personnel, enabling further evaluation by the instructors.

Unique Cannon for T129 ATAK Helicopters

On April 10th, the Presidency of Defence Industries launched a project to design and develop 20 mm three-barrel rotary cannons with national and domestic resources. The "20 mm Cannon Development Project", which is part of the second 100-Day Action Plan, was signed between the Presidency of Defence Industries and TR Mechatronic Systems.

The project aims to design and develop the 20 mm cannon, which is currently being utilized in T129 ATAK helicopters, with national and domestic resources. During the first phase of the project, 34-unit 20 mm cannons will be produced, including four prototypes and following the qualification process the mass production activities will be started in accordance with the possible requirements.

Under the project, all critical subsystems and components of the cannon will be developed with domestic capabilities. System-level qualification activities for the four prototypes are planned to be completed within 30 months. When completed, the system is expected to be used on different land, air, and sea platforms.

Aselsan Nationalizes Infrared Detectors

On April 7th, Turkish Defence Giant Aselsan acquired the capability to produce infrared detectors that can be used in various platforms such as reconnaissance & surveillance, heat-seekers, targeting systems, unmanned aerial vehicles and electro-optical systems of the National Combat Aircraft.

Turkey's advanced technology center Aselsan recorded significant progress in the development, production, and integration of infrared detectors which are the main components of the high-performance military system.

Infrared detector technology incorporates the most advanced techniques of science and technology that emerge from long and comprehensive research. Studies in this area provide effective and superior results, often paving the way for the development of other critical technologies. Owned by only a handful of developed countries and manufacturers, this technology is carefully protected, and its presence is considered as a sign of sophistication and superiority.

Infrared detectors, one of the main components of high-performance military systems, can also be used in different civilian applications. Countries with this technology are more advantageous than other countries against threats during day or night, especially in adverse weather conditions such as dust, smoke, and fog. In this context, infrared detector technology can change the balance of power between countries.

Due to the advantages and superiority of having this technology, countries are not willing to transfer their knowledge and technology to other countries, instead, they sell their infrared detectors as products. The procurement of infrared detectors as products brings along restrictions such as high costs and export permits. Any system manufactured by using an imported infrared detector is subject to authorization when it is exported to another country. Such situations make it necessary to develop infrared detector technology with national capabilities.

Thanks to its dedicated work for many years, Aselsan acquired the capability to domestically produce



this technology, eliminating the foreign dependency of the infrared detectors. Between April 30-May 3, Aselsan will exhibit its latest products and current capabilities regarding this technology at the 14th International Defence Industry Fair IDEF'19.

Combat Management System ADVENT CMS Accomplished Factory Acceptance Tests

On March 31, Within the scope of the MILGEM Combat System Procurement Project, the Factory Acceptance Tests of the New Generation National Combat Management System ADVENT CMS, developed by ARMERKOM and Havelsan were completed following an intensive testing process.

Under the project carried out by the Defence Industry Presidency (SSB), approximately 6 million lines of code were written by Turkish engineers. As a candidate for being one of the world's most advanced combat management systems, ADVENT CMS is planned to be used in all the Turkish warships that are still under construction and will be constructed in the future.

The ADVENT CMS will be installed for the first time on the newly built TCG Kinalıada, the 4th ship of the MILGEM class. The Combat Management System will also be used in Turkey's largest military vessel, the Multipurpose Amphibious Assault Ship TCG Anadolu, which is expected to be launched in the coming months.

The ADVENT SYS system will allow multiple units in the ship to jointly use weapons and sensors. It will enable the navy to make more precise and faster decisions in case of sudden reactions. In addition, Navy elements will be more coordinated with the new generation Network Assisted Data Integrated system.

Aselsan to Equip F-16s and TF-X with New Domestic Radar

On March 24th, A protocol was signed between the SSB, the Air Force Command and Aselsan for the development of multi-function the Active Electronically Scanned Array (AESA) nose radar to modernize the radars of the F-16 aircraft in the Air Force Command inventory.

According to the Aselsan annual report, activities for radar systems were carried out in cooperation with universities and domestic solution partners by using design, production and test infrastructures at the company's Gölbaşı Radar and Electronic Technology Center.

In the first phase of the project, the "F-16 AESA Nose Radar Development Project Phase-1 Protocol" was signed between the Presidency of Defence Industries and Aselsan, successfully launching the program which was part of the second 100-day Action plan.

The radar to be developed by Aselsan with its own resources will be able to perform air-to-air and air-to-ground tasks such as SAR, target detection, tracking, and precise tracking which are critical for F-16 aircraft.

Active Electronically Scanned Array (AESA) is a type of Phased Array Radar that acts as a transmitter and receiver with numerous small solid-state transceivers (TRMs). Advanced Active Phased Array Radars are able to propagate wavelengths over a wider frequency range compared to Passive Electronically Scanned Array (PESA) radars, making them difficult to detect from background noise. Aselsan has been working on radar systems with AESA technology for a long time. Aselsan plans to complete the AESA radar for F-16 jets by 2021 and the TF-X National Combat Aircraft by 2023.

Another Success for the HİSAR-A Missile

On March 20th, Turkey's first domestic national air defence system HİSAR-A scored a 100% success rate against a target aircraft flying fast at a high altitude during its first vertical firing test from a missile launching system.

HİSAR Projects are launched by the Presidency of Defence Industries to meet the air defence needs of Turkish Armed Forces with local and national resources. HİSAR missiles are being developed indigenously to protect military bases, ports, facilities, and other national strategic assets against aerial threats. The system can defeat airborne threats such as fixed and rotary-wing aircraft, cruise missiles, air-to-ground missiles, and unmanned aerial vehicles.

Representatives from the Presidency of Defence Industries, Turkish Armed Forces, Aselsan and Roketsan attended the test launch of the HİSAR-A air defence system in the city of Aksaray. During the test, the missile was vertically fired from the launch system for the first time and successfully demonstrated its thrust-vectoring, midcourse guidance (INS-RF/Data Link), target tracking, and infrared terminal guidance (IIR Seeker-EO/IR) capabilities.

Developed by Aselsan and Roketsan as the first national and domestic air defence missile system in Turkey, HİSAR Project aims to acquire critical air defence technologies and develop indigenous missile systems. With the tests carried out so far, critical capabilities of the missile such as vertical launch, autonomous engagement/firing, and terminal guidance were tested. HİSAR-A has a range of 15km at sea level while the HİSAR-O air defence missile can engage targets up to 25km. The missiles feature dual-pulse solid propellant rocket motor, midcourse inertial navigation, data link, and imaging infrared seeker for terminal guidance.

The Presidency of Defence Industries plans to deliver the HİSAR-A (Low Altitude) in 2021 and HİSAR-O (Medium Altitude) in 2022 to the Turkish Armed Forces. Furthermore, Aselsan, Roketsan,



and TÜBİTAK SAGE business partnership continue their studies on the SİPER project, which was initiated to develop an indigenous long-range air and missile defence system.

Turkish F-16 jets Equipped with Advanced SPEWS-II Electronic Warfare system

On March 7th, the advanced electronic warfare system SPEWS-II designed by Aselsan with the support of British defence & aerospace company BAE Systems for the F-16 Block 50C aircraft of Turkey has successfully completed tests and entered service.

The SPEWS-II Electronic Warfare (EW) internally mounted self-protection system project was launched by the Turkish Presidency of Defence Industries (SSB) to provide EW protection in hostile zones for Turkish Air Force F-16 aircraft. So far in the project, 21

of the aircraft have been equipped with the system following the successfully completed tests. The SPEWS-II system detects radar signals coming from homing missiles with its radar warning receiver and warns the pilot. The system's electronic countermeasure capabilities allow it to confuse the signals that enable missiles to find planes and to deceive the missiles by sending signals showing the aircraft in different locations.

The AN/ALQ-178 (V)5+ is an advanced, internally mounted self-protection system specifically designed for the F-16 Block 50C aircraft. Each system requirement has been verified with the full participation of the TurAF (Turkish Air Force) and the performance of the SPEWS-II system has been tested on TurAF F-16 Block 50C aircraft. Within the scope of the project, 60 EW self-protection systems are planned to be used in F-16 Block 50C aircraft ■





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Turkish Defence Industry Displays its Muscles During

by Ibrahim SÜNNETCI



The 14TH edition of the International Defence Exhibition and Conference (IDEX) and the 5th edition of the Naval Defence Exhibition (NAVDEX) were held at the Abu Dhabi National Exhibition Center (ADNEC), which is centrally located in Abu Dhabi, the capital of the United Arab Emirates, from 17-21 February 2019 under the patronage of Sheikh Khalifa Bin Zayed Al NAHYAN, President of the UAE and Supreme Commander of the UAE Armed Forces.

As the only international defence exhibition and conference in the MENA region demonstrating the latest technology across land, sea and air sectors of defence, IDEX and NAVDEX which are the most important maritime defence exhibitions in the Middle East, are organized by the IDEX LLC in association and with the full support of the UAE Armed Forces. NAVDEX 2019 is sponsored by a group of national companies specialized in the defence industry, most notably the Emirates Defence Industries Company (EDIC), the strategic partner of the IDEX and NAVDEX 2019 exhibitions, in



addition to the Abu Dhabi Ship Building Company (ADSB), the main partner of NAVDEX 2019.

Held on an internal and external area spanning over 168,000m², including 12 indoor exhibition halls, the concourse, the atrium and a large outdoor exhibition area (a naval jetty with a total length of 551m and a NAVDEX Pontoon with a length of 50m at ADNEC's marine facility and Zayed Port in Abu Dhabi), which represents a 26% increase compared to 133,000m² in 2017, the 2019 edition of IDEX and NAVDEX also witnessed a record number of international and local participant companies since IDEX's inception in 1993. The number of exhibitors increased by 6% to 1,310 compared to 1,235 companies in IDEX/NAVDEX 2017. International companies have accounted for 85% of the total number of companies, while the number of local enterprises exhibited at IDEX and NAVDEX 2019 reached 170, representing 15% of the exhibitors.

The UAE was the largest exhibitor with the biggest pavilion in terms of space at this year's IDEX event with 170 companies from the defence and its supporting sector, followed by the US, France, Germany, Italy and Saudi Arabia. The largest exhibitor from the UAE was the EDIC, was a joint venture between Mubadala Development and Tawazun Holding.

The number of participating countries also increased by 9% or 62 countries compared with 57 in 2017. Over the five days, IDEX and NAVDEX attracted more than 124,370 visitors, as well as 1,213 media representatives from 42 countries, or an increase of 16% compared to the 2017 event. The next editions of IDEX and NAVDEX will be held during 21-25 February 2021. According to Humaid Matar Al DHAHERI, Group CEO of the Abu Dhabi National Exhibitions Company (ADNEC), as of 21 February 2019, bookings for the 2021 edition have already reached 70%.

Being held concurrently with the IDEX since the inaugural event in 2011, NAVDEX has experienced steady and solid



growth in the number of regional and international participants. This year's event was held over approximately 40,000m² of exhibition space with the participation of more than 100 exhibitors from 23 countries. The 2019 edition of NAVDEX saw the participation of four countries for the first-time including China, Saudi Arabia, Thailand and South Korea. Furthermore, NAVDEX 2019 hosted a total of 16 visiting naval vessels from 14 friendly and fraternal nations (Australia, Bahrain, Bangladesh, China, France, India, Italy, Pakistan, Saudi Arabia, South Korea, Sri Lanka, UAE, UK and the US). These naval vessels include a variety of hardware, notably frigates and destroyers – positioned at ADNEC's marine facility and Zayed Port in Abu Dhabi. A total of 16 manned and unmanned boats with lengths from 5,3m to 16,45m from 4 countries (UAE, UK, US and Sudan) also were displayed at NAVDEX Pontoon and performed live demonstrations on-water throughout the event.

The 2019 editions of IDEX and NAVDEX concluded on 21 February 2019 with deals worth AED20,053,699,941 (around US\$5,42 Billion) inked by the UAE Armed Forces with both local and international companies. Over the duration of the exhibitions, 65% of the deals were awarded to international companies, while the remaining 35% were allocated to national companies. The biggest single contract awarded during the event was an AED5.73 Billion (around US\$1,52 Billion) deal related to the Patriot

missile systems manufactured by Raytheon of the US. On the third day of IDEX/NAVDEX AED25.7 Million (around US\$7 Million) contract was signed with the Turkish company FNSS Savunma Sistemleri to supply spare parts and repair services for the ACV-300 tracked armored vehicles. It is worth noting that the previous edition of the IDEX/NAVDEX produced concluding deals valued at more than AED19.7 Billion and the IDEX 2015, attracted more than 1,200 local and international defence manufacturers and contractors and drew over 101,000 visitors from across the world, facilitated business deals worth AED18.3 Billion.

The IDEX exhibition has provided, over 25 years, an international platform for viewing the latest defence and military systems and the industry's latest innovations, making it a key event for promoting innovation, initiatives, ideas and pioneering, he said, while expressing pride at the exhibition's organization and its level of participation, which have contributed to its success. As pointed out by DHAHERI, Group CEO of the ADNEC during Press Conference held at the ADNEC on 11 February 2019, over the past 25 years, the number of exhibitors frequenting IDEX has increased by 400%, with the number of participating countries rising by 250% over the same period. Number of visitors rose by 500%, while the show floor dedicated for the event has gone up by 900% compared to the first edition in 1993.



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Opening Ceremony

Celebrating its Silver Jubilee this year, IDEX 2019 was kicked-off in Abu Dhabi on February 17 with a spectacular opening ceremony including military demonstrations and air shows by the UAE Armed Forces. Sheikh Mohammed Bin Rashid Al MAKTOUM, Vice-President and Prime Minister of the UAE and Ruler of Dubai, and Sheikh Mohamed Bin Zayed Al NAHYAN, Crown Prince of Abu Dhabi and Deputy Supreme Commander of the UAE Armed Forces attended the inauguration ceremony, where they received political and military leaders from various nations participating in IDEX.

The event at the Abu Dhabi National Exhibition Center (ADNEC) started with performances by officers from the UAE military, police bands and Emirati traditional songs and dances. This was followed by a fantastic air show and military demonstrations, including; attack helicopters performing in a combat scenario demonstration, heavy mock firefighters performing in a combat scenario and UAE jets conducting an 'airstrike' in a combat demonstration.

Turkey's Participation

In order to create awareness in the Middle East & North Africa (MENA) region of the Turkish

Defence & Aerospace Industry capabilities, the Presidency for Defence Industries (SSB) has been supporting national participation to defence exhibitions in the MENA region. In this context, Turkey participates in important defence and aerospace exhibitions organized in the MENA region such as IDEX/NAVDEX (UAE), DIMDEX (Qatar), SOFEX (Jordan), Bahrain International Air Show (BIAS) and Africa Aerospace & Defence (AAD, South Africa) and key players from the Turkish defence sector are brought together in a national pavilion.

Presenting great export opportunities for the Turkish defence industry products, Turkey has participated in IDEX Exhibitions at "National Level" with the support and coordination of the Presidency of Defence Industries (SSB) since 2001. Contrary to the exhibitions in 2015 and 2017, Turkey attended IDEX 2019 at the national level with a last-minute decision. As a result of the political tensions between the two countries, Turkey had suspended National Participation in IDEX Exhibitions since 2015. Turkey attended the IDEX 2013 Exhibition at the national level with 36 companies under the coordination of the SSB, whereas the only participants in IDEX 2015 and IDEX 2017 were the defence industry companies pursuing exports in the Middle East and Gulf Region. While 20 Turkish Defence & Aerospace companies attended IDEX 2015, only 12 companies participated in IDEX 2017.

Turkish defence industry companies participated in IDEX/NAVDEX 2019 Exhibitions at the national level under the auspices of the Presidency of Defence Industries (SSB) and the support of the Defence and Aerospace Industry Exporters' Association (SSI). DEFENCE TURKEY Magazine was also present as one of the media sponsors of the event. During the Exhibitions, the Turkish Defence & Aviation Industry was represented by 23 companies and institutions including ARES Shipyard, Aselsan, ASFAT, CES Advanced Composite, FNSS, Havelsan, MILMAST, MKEK, Nicomatic, Otokar, Roketsan, STM,



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MKE AR-GE ÜRÜNLERİ – IDEF 2019

MKE R&D PRODUCTS – IDEF 2019

- 155 mm MODÜLER BARUT / 155 mm MODULAR CHARGE SYSTEM
- 120 mm YİVSİZ HAVAN SİLAH SİSTEMİ / 120 mm SMOOTH MORTAR SYSTEM
 - 5.56 mm OTOMATİK ATIŞ PLATFORMU
5.56 mm ULTRALIGHT REMOTE CONTROLLED STABILIZED WEAPON SYSTEM
 - 7.62 mm OTOMATİK ATIŞ PLATFORMU
7.62 mm ULTRALIGHT REMOTE CONTROLLED STABILIZED WEAPON SYSTEM
 - 12.7 mm DÖNER SİLAH SİSTEMİ (GATLING) VE ATIŞ PLATFORMU
12.7 mm GATLING GUN and 12.7mm REMOTE CONTROLLED STABILIZED WEAPON SYSTEM
 - 20 mm ALTI NAMLULU SİLAH SİSTEMİ (GATLING) VE ATIŞ PLATFORMU
20 mm SIX BARREL GATLING GUN and 20mm REMOTE CONTROLLED STABILIZED WEAPON SYSTEM
- 5.56x45 mm POLİMER UÇLU FİŞEK / 5.56x45 mm POLYMER TIP CARTRIDGE
- 12.7 mm x 99 KNSF (KESKİN NİŞANCI SOLİD FİŞEĞİ) / 12.7 mm x 99 KNSF (SNIPER SOLİD CARTRIDGE)
- 7.62 mm x 51 M118 KESKİN NİŞANCI FİŞEĞİ / 7.62 mm x 51 M118 SNIPER CARTRIDGE
- 12.7 mm x 99 ANTIMATERYAL KESKİN NİŞANCI FİŞEĞİ / 12.7 mm x 99 API SNIPER CARTRIDGE
- 5.56 mm x 45 M193 TİP FİŞEK / 5.56 mm x 45 M193 TYPE CARTRIDGE
- 12.7 mm x 99 M2 AP FİŞEK / 12.7 mm x 45 M2 AP CARTRIDGE
- 40 mm YÜKSEK HIZLI BOMBAATAR MÜHİMMATI / 40x53 mm HIGH EXPLOSIVE AMMUNITION (HV)
 - 40 mm YÜKSEK HIZLI PROGRAMLANABİLİR PARÇACIKLI MÜHİMMAT
40x53 mm PROGRAMMABLE PREFRAGMENTED HIGH EXPLOSIVE AIR BURST
 - 105 mm HAVADAN TAŞINABİLİR HAFİF ÇEKİLİ OBÜS (BORAN)
105 mm AIR TRANSPORTABLE LIGHT TOWED HOWITZER
- T-155 mm 52 cal. MKE YAVUZ OBÜSÜ / T-155 mm 52 cal. MKE YAVUZ HOWITZER GUN
- 120 mm MKE MOD 300 HE-T MÜHİMMAT / 120 mm MKE MOD 300 HE-T AMMUNITION
- 120 mm MKE MOD 310 HEAT-MP-T MÜHİMMAT / 120 mm MKE MOD 310 HEAT-MP-T AMMUNITION
 - OZOK EL BOMBASI / OZOK HAND GRENADE
- MKE MOD 50 BİLYELİ EL BOMBASI / MKE MOD 50 PRE-FRAGMENTED HAND GRENADE
- MKE MOD 125 TERMOBARİK EL BOMBASI / MKE MOD 125 THERMOBARIC HAND GRENADE



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Yakupoğlu and Yonca-Onuk JV. Among the Turkish companies, Aselsan made the biggest contribution with its 350m2 stand at the exhibition. ARES Shipyard, Desan Shipyard, Havelsan, STM and Yonca-Onuk JV companies set up their stands at NAVDEX Exhibition. Aselsan, Military Factory and Shipyard Management (ASFAT), CES Advanced Composite and Defence Technologies, FNSS Defence Systems, Garanti Apparel Composite Technologies, Gül Automotive, MKEK, Otokar, Roketsan, T-Kalip, Transvaro, UNIFO, and Yakupoğlu set up their stands at the Exhibition Hall 10 in the National Pavilion. Lastly, MILMAST Lifting Systems and Nicomatic companies set up their stands at Hall 8.

Despite the National Participation of the Turkish Defence Industry companies this year unlike the last two exhibitions, the level of the Turkish Delegation, however, was quite low as opposed to the previous event. While Turkey was represented by former Chief of General Staff Gen. Hulusi AKAR (appointed as Minister of National Defence on July 9, 2018) on the first day and President of Defence Industries Prof. İsmail DEMİR on the third day during IDEX 2017, this year Turkey and the SSB were represented by the Middle East and Africa Division of the International Cooperation Department.

The UAE's support for the

2013 Egyptian coup d'état, UAE Government's decision to list the "Muslim Brotherhood" organization supported by the Turkish Government as a Terrorist Organization, and Turkey's alignment with Qatar against the diplomatic and logistical embargo of the UAE, Saudi Arabia, Bahrain, and Egypt, led to deep political tension between the governments of the UAE and Turkey. As a result of Turkey's political decisions, bilateral relations with Egypt and later diplomatic relations with the UAE and Saudi Arabia have been strained. As a reflection of this situation, important defence industry export projects, including the ones in the signing process with the aforementioned countries, were shelved. As the political tension between the two countries continues, it is not possible to sell a new weapon system and technology to this country in the near future.

Unlike 2013, as a result of the political tension between the two countries, UAE senior officials did not visit the Turkish Pavilion during the IDEX/NAVDEX 2019 Exhibition. Moreover, the fact that Turkish companies cannot secure contracts in the UAE market as before and the negative opinions on the defence industry sales made to Qatar, has also created new business opportunities for foreign companies with similar products. For example, Spanish Escribano Mechanical &

Engineering company presented its Guardian 20 (12.7mm), Guardian 30 (30mm), Sentinel 20 and Sentinel 30 Remote-Controlled Weapon Station solutions as an alternative to Aselsan STAMP and STOP/SMASH systems and displayed them just behind SERDAR Anti-tank Missile Launching System (MLS) at IGG stand in Hall 4 during IDEX 2019. As a family-owned company, 32.2% of the Escribano's shares were acquired by Oman's State General Reserve Fund (SGRF) in 2016. According to our information, although the Spanish company is highly competitive and offers more attractive prices than Aselsan, it lags behind Aselsan in terms of product quality and the performance of weapons/sensors used on the RCWS solutions. Escribano was also preferred by Oman authorities as part of ARES Shipyard's boat export to Oman (due to the fact that the majority of the shares belong to Oman). Furthermore, during IDEX/NAVDEX 2019 Exhibitions, Turkish Defence Industry companies that export to Qatar were not allowed to share any information or visuals related to the sales to this country, and the use of the Qatar Flag on the products they exhibited were not allowed. For example, the Qatar Flag on the models of the boats sold to Qatar in the ARES Shipyard stand was covered up with tape in accordance with the requests of UAE authorities.





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Turkish Defence Industry Companies Activities

Aselsan

Turkey's largest defence industry company, Aselsan made the biggest contribution from Turkey with its 350m² stand at IDEX 2019. Aselsan exhibited its Counter Mortar Radar, ACAR Ground Surveillance Radar, IHASAVAR Anti-Drone & Rcied Jammer System, AselBUOY Passive Directional Sonobuoy, ZARGANA Submarine Torpedo Countermeasure System (together with Decoys and Launcher), Day-Night Electro Optic Systems, Unmanned Ground and Aerial Systems, Remote Controlled Weapons Systems, MIDAS Fibre-optic Distributed Acoustic Sensor, SEDA Gunshot Detection System, Submarine ESM Antenna, Intercept Sonar System, Identification Friend or Foe (IFF) System, Satellite Communication System, Information Security Systems, and Military & Professional Communications Systems at its stand in the Exhibition Hall 10.

Aselsan displayed its SERDAR Anti-Tank Missile Launching System (ATMLS) remote weapon station (RWS) at the International Golden Group (IGG) stand within UAE Pavilion in Hall 4, together with IGG Aselsan Integrated Systems, a joint venture between Aselsan and its local partner IGG. In addition, Aselsan's remote-controlled MILAS LMM Missile Launching System with 4 LMM Missiles was displayed onboard AHM-11 Unmanned Surface Vehicle (USV) at Al Marakeb Boat Manufacturing Company stand during NAVDEX Exhibition. Furthermore, an Al Marakeb AHM-13 Unmanned Surface Vehicle fitted with an Aselsan 12.7mm STAMP RCWS performed a live demonstration at NAVDEX Pontoon. Aselsan Middle East (AME), an Aselsan-KADDB joint venture company based in Jordan, also exhibited its products at its stand at KADDB Investment Group Pavilion in Hall 1.

Aselsan sold 150 SERDAR Anti-Tank Missile Launching



Systems (together with NuroI Makina YORUK/NMS 4x4) to Qatar last year and successfully performed a live demonstration of the system with KORNET-E Anti-Tank Guided Missiles. The Aselsan product system also scored a direct hit on a target at 4km with a Skiff ATGM, during the previous tests carried out in Ukraine. The SERDAR Anti-Tank Missile Launcher System can be equipped with two or four ATGMs including the long-range Russian Kornet-E and the Ukrainian Skiff ATGMs, as well as the mid-range Javelin ATGM. However, as of February 2019, firing tests with the Javelin ATGM has not been performed yet. Although Tawazun officials have participated in the live demonstrations of the SERDAR

and MILAS Systems, a purchase order for these systems is not expected in the near future due to the current political conjuncture.

The MILAS Missile Launching System (MLS) for the LMM Missiles was launched between Aselsan and Thales UK companies based on the Memorandum of Understanding signed on February 11, 2010. In concern with the LMM missiles, Aselsan developed MILAS MLS in two different configurations; the lightweight configuration with the capacity of carrying four missiles developed for the MRTP 16 type boats in the inventory of the UAE and the heavyweight configuration of 650kg weight with the capacity of carrying eight missiles designed for platforms with higher weights such as the FPBs and corvettes. The engineering development activities of both the MILAS MLS solutions with the ability to launch Thales UK production LMM and StarStreak Missiles were completed, the target tracking trials with the MLS was executed in Istanbul in 2014 and the initial firing tests were conducted in the United Kingdom also in 2014. The new cooperation agreement signed in February 2015 between the two companies envisaged the continuity of the shooting tests at sea and the execution of joint marketing activities for the potential customers besides BAE for the LMM MLS. The qualification phase of live firing tests with the MILAS MLS were successfully completed in 2016.



As one may remember, in 2009 Aselsan signed a contract with the UAE for the sale and delivery of 150 STAMP (12.7mm M2 HB) and STAMP-G (GAU-19 Gatling guns) systems to be used in various naval platforms of the UAE Navy and Critical National Infrastructure Authority (CNIA). According to our information, Aselsan delivered only 134 STAMP Remote Controlled Stabilized Weapon Systems to date. 34 of the STAMP Systems were integrated on MRTP16 Class Fast Intervention Boats delivered by Yonca-Onuk JV of Turkey to the UAE's Critical National Infrastructure Authority (CNIA). Since 2013, 50 of the STAMP systems that were delivered between 2013-2015 have been stored in a disassembled state at depots in the UAE. The 10-year economic life of the STAMP Systems is expected to end by 2023. Although Aselsan could not sign new contracts due to the current political conjuncture between the two countries, the company continues to provide spare parts and maintenance services for the STAMP Systems delivered in 2015.

On the other hand, there has not been any concrete progress on the sale of 50 STOP systems so far. Initially, the first contract called for 50 STOP Systems armed with 25mm Oerlikon KBA cannon. However, when the UAE authorities changed their requirements from 25mm to 30mm, Aselsan developed a new version of STOP 25 mm STOP Remote Controlled Stabilized Naval Gun System called SMASH/MUHAFIZ) armed with the ATK product Mk44 Bushmaster II cannon. Aselsan also performed live-fire tests with the 30mm SMASH Remote Controlled Stabilized Naval Gun System in the UAE, however, the procurement process of the SMASH/STOP Systems later were canceled. Aselsan exhibited the IHTAR Anti-Drone System at the previous event and attracted a great deal of attention from UAE authorities two units were planned for each airport at that time) but due to the political circumstances



Aselsan displayed SERDAR AMLS at the IGG stand within UAE Pavillion

between the two countries, this interest did not turn into an order. Equipped with the MILMAST's mast system, the Aselsan IHTAR Anti-Drone System has recently performed a special demo in Saudi Arabia. Within the scope of the two-day event organized by SADEC LLC (founded in 2016 as a joint venture of Aselsan and Taqnia DST), the system was introduced to the Saudi Arabian Authorities including ARAMCO, SAMI, KAUST, Water Decollation, Saudi Electricity Company, Jails Authority, and Anti-Drug Force. Moreover, in January 2019, Aselsan successfully completed its 500th IHTAR Anti-Drone delivery for both domestic

and foreign customers.

According to our information, the end users from the UAE are quite satisfied with the quality and performance of Turkish Defence Industry products. Moreover, the fact that Turkish companies can provide faster service support compared to foreign companies/suppliers has also created considerable satisfaction for the customers. However, as a reflection of the political tension between the Governments, UAE customers had to shelve military purchases from Turkey and even dismantled some of the Turkish Defence Industry products used in their platforms.



Aselsan's 25mm STOP Remote Controlled Stabilized Naval Gun System seen here onboard PN's Himmat Fast Attack Craft anchored at NAVDEX Pontoon

ARES Shipyard

Having signed the first contract with Oman for the sale of ARES 85 Hercules boats in November 2018, ARES Shipyard held a meeting on 18 February with the Omani Delegation for the second tender as part of the IDEX/NAVDEX 2019 Exhibitions. ARES Shipyard is one of the three shortlisted companies in the second tender process. While the first contract covers fourteen 26m boats, the second tender calls for twelve 36m boats.

On November 13, 2018 ARES Shipyard announced that it has been awarded a contract to supply 14 ARES 85 HERCULES multi-role patrol boats to the Royal Oman Police Coast Guard (ROPCG). The contract was signed between the Inspector General of Royal Oman Police (ROP) and the General Manager of ARES. This is Turkey's first naval vessel supply contract with Oman. Deliveries are scheduled to be completed in four years. The ARES 85 HERCULES vessels are fully customized to meet the ROPCG's needs and provide the agency with a much-expanded capability to patrol and secure the nation's waters. The vessels have an overall length of 25,95m, a beam of 5,85m, a draught of 1,20m and a displacement of 70 tons. To be built by Fiber Reinforced Plastic (FRP) composites the ARES 85 HERCULES boats will have a maximum speed of 45+ knots.

Having signed a contract on March 26, 2014, for the delivery of 17 HERCULES Fast Patrol Boats from advanced composites in three configurations (five 24m ARES 75, ten 34.5m ARES 110 and two 48.5m ARES 150) to the Qatari Coasts and Borders Security Department, ARES Shipyard managed to complete the delivery of the boats 20 months before the date specified in the contract. During DIMDEX 2018 ARES Shipyard received a follow-on contract to deliver three 48,5m ARES 150 Offshore Patrol Vessels and six 24m ARES 80 Special Operation Boats, to be armed with Aselsan's 12,7mm STAMP and 30mm STOP/MUHAFIZ Remote Controlled Stabilized Naval Weapon Systems. With this order the total number of ARES Shipyard boats to enter the Qatari Coasts and Borders Security



Department by the end of 2020 has been increased to 26. ARES Shipyard is currently negotiating with the Qatari Navy for the sale of two 27m long (+2 options) boats with an aluminum body. Within the scope of the contract, the boat personnel will be trained in Qatar, and the Qatari Navy will receive maintenance support for 6 years.

ARES Shipyard signed a contract with the Presidency of Defence Industries (SSB) in February 2019 for the Control Boat Project of the Coast Guard Command (SGK). The project, covering the procurement of 105 boats, was launched in February 2018 and the first offers were submitted in April 2018. However, the project was shelved before reaching an agreement. Later on, the project was revived with the decision of the Defence Industry Executive Committee (SSİK) meeting on October 11, 2018, and the contract negotiations were reinitiated between the SSB and ARES Shipyard at the end of October. Following the successful conclusion of the negotiations at the end of January 2019, the contract for 105 ARES 35 FPB type control boats was signed on February

17, 2019, between the SSB and ARES Shipyard. ARES Shipyard will complete the construction and outfitting activities of the ARES 35 Control Boats, each of which will be constructed from carbon-reinforced composite materials with the multi-material molding (MMM) technique, within 10 days to keep up with the delivery schedule. According to the contract, ARES Shipyard will build 3 boats per month and the SSB will accept 6 boats every two months. The deliveries of the vessels will start in 2020 and will be completed within 5 years. The ARES 35 FPB type control boats will have an overall length of 11m, a beam of 3,3m, a displacement of 85 tons and a cruising range of 160 nautical miles.

The ARES 35 Control Boats will have a top speed of 35 knots and will be used by the Turkish Coast Guard Command as part of enforcement against smuggling activities. Boats that will be in use in all inland waters of Turkey will be deployed primarily at the Aegean Sea, where high incidences of human trafficking have occurred. Along with smuggling activities, the ARES 35 Control Boats are anticipated to intervene in all criminal incidents.



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CES Advanced Composites and Defence Technologies

Participating in the IDEX Exhibition for the first time this year, CES displayed its vehicle protection and personal protection products at Hall 10 at IDEX 2019. With successful sales in both domestic and international markets, the company exhibited its widely acclaimed add-on armor and spall liner solutions for vehicle protection as well as its ballistic vests, helmets, plates and shields for personal protection. The main feature of these products is that they are designed to be as light as possible and the lightest materials are used in production processes. Using the same quality materials as its international competitors, CES is quite determined to create superior ballistic protection solutions with better craftsmanship and engineering. Continuing its production activities in three different fields, namely Aviation, Ballistic Protection, and Defence, CES had the opportunity to meet with its suppliers and customers in the scope of IDEX 2019. CES met with the leading suppliers of light armor systems including its own suppliers and examined their products at the Exhibition. According to our information, there is a serious interest in CES products from Saudi Arabia, the United Arab Emirates, Pakistan, and India. The company also had the opportunity to improve the relations it had established at ADEX (Azerbaijan) and IDEAS (Pakistan) Exhibitions during IDEX 2019.

Undertaking the armoring process of critical ship parts under the MILGEM Project, CES also is tasked with providing spall liners as part of the M60T FIRAT MBT modernization program. Furthermore, CES also has experience in ballistic protection solutions for aircraft/helicopters. Participating in the armoring of Black Hawk and Mi-17 helicopters in Turkey, CES cooperates with Paramount Group in the international arena for helicopter armoring solutions. CES is currently one of two qualified companies in the world who is already competent to produce armor kits (both cockpit

and cabin floor) for Black Hawk helicopters.

As one of the three companies manufacturing Ballistic Helmets in Turkey, CES closely follows the tenders of the Turkish Armed Forces and the Turkish National Police. In line with the requirements of the Turkish Armed Forces, the Presidency of Defence Industries is expected to open a new tender soon for the new ballistic helmet model with add-on armor against rifle bullets. Pre-qualification tests have been completed for the tender with a high purchase volume, and the tender process is expected to start in the coming days.

FNSS Defence Systems

Having delivered 133 ACV-300 armored vehicles in various configurations to the UAE Land Forces in the 1990s, on the third day of IDEX 2019, FNSS signed a contract valued at AED25.7 Million (around US\$7 Million) with the UAE Ministry of Defence for the spare parts and maintenance of ACV-300s. As the first Turkish Defence Industry Company that secured a contract in the Gulf Region, FNSS displayed its Anti-Tank Remote Turret (ARCT), TEBER-30/35 Remote Controlled Turret (RCT) System, and Pars III 8x8 with SABER-25 Turret products at Hall 10 at IDEX 2019.

FNSS developed ARCT for the Turkish Land Forces Anti-Tank Vehicles (ATV) Program. ARCT was developed utilizing state-of-the-art technology, the most current design approaches and combat



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experiences by the user. As an indigenous development project, ARCT was designed from the onset as a dedicated ATGM turret. This particular feature has been instrumental in the attainment of a highly effective solution in terms of missile effectiveness and system survivability.

Completing its 30th year in the defence industry, FNSS is ready to be a pioneer of future manpower operated turrets integrated with both wheeled and tracked armored vehicles by using cutting edge technology and user-centered designs. SABER-25 and TEBER-30/35 RCT turrets incorporate the latest technologies in turret drives, fire control, protection and lethality. Its compact dimensions and lightweight makes SABER-25 a suitable choice for different types of armored vehicles. TEBER-30 RCT is equipped with the Mk44 30mm/40mm dual feed automatic cannon with 250 ready-to-fire



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rounds and has a maximum cyclic rate of fire 200 rounds/minute. TEBER-35 RCT is equipped with 35mm/50mm dual feed automatic cannon with 100 ready-to-fire rounds and has a maximum cyclic rate of fire 200 rounds/minute. TEBER-30/35 RCT can work night and day under all weather conditions and battle environments thanks to its integrated sensors and other electronic systems. Both the gunner and the commander can control all functions of the turret.

FNSS has previously held talks with the UAE on the sale of the SAMUR Armoured Amphibious Assault Bridge and the AZMIM Amphibious Armoured Combat Earthmover, and a delegation from the UAE Armed Forces visited Turkey to attend a special demonstration. However, due to the straining of the diplomatic relations between the two countries, the UAE decided to cancel this acquisition at the last moment.

Havelsan

Havelsan participated in NAVDEX 2019 with its senior management to increase the presence of its products and solutions in new markets. On the first day of the exhibition, Chairman of the Board Dr. Hacı Ali MANTAR and General Manager & CEO Ahmet Hamdi ATALAY welcomed the senior officials from other companies at their stand. Raytheon's International Business Development Team was also among the visitors of Havelsan. During the exhibition, Deputy General Manager of Training and Simulation Technologies Mehmet Akif NACAR and Vice President of Command Control and Combat Systems Savaş YANIK informed their visitors about the simulator technologies and naval combat systems.

Closely following nearly 20 big and small tenders in Oman, Havelsan is now competing in an international tender against key players such as Airbus Defence & Space (ADS offered STYRIS Coastal Surveillance System



solution) and Indra for the Oman Coastal Surveillance Radar System. In the July 2018 tender, Havelsan offered a similar version of the radar system currently installed under the Coastal Surveillance Radar System (CSRS) Project for the Turkish Coast Guard Command. The tender is expected to be finalized this year. Last year, Havelsan delivered a strategic level C4I (Command, Control, Communications, Computers, and Intelligence) System to the Oman Ministry of Defence. According to our information, the delivered system was successfully used during a military exercise in October 2018. Havelsan also takes part in the production and delivery of the GENESIS-based Combat Management System (CMS), which will be used in four Jinnah Class Corvettes built for the Pakistan Navy. Havelsan engineers are

currently working on an improved version of the system. The Jinnah Class Corvettes will accommodate a number of differences in weapon and sensor equipment compared to the ADA Class Corvettes, therefore, the GENESIS-based CMS to be installed on the ships requires a number of modifications and updates for the integration of new sensor and weapon systems. The ships will be equipped with the SMART-S Mk2 3D Search Radar and include LY-80/HHQ-16 Medium-Range Air Defence Missile System and C802 Anti-Ship Cruise Missiles. For the integration of these new Chinese weapon systems into the vessels, the necessary Interface Control Documents (ICDs) must be shared with Havelsan. As of February 2019, the negotiations with Chinese officials on this issue were continuing.





MILMAST

Founded by the partnership between the advanced engineering company FIGES Technology and SSTEK Defence Industry Technologies in 2017, MILMAST has achieved remarkable success in telescopic mast systems. This year, MILMAST participated in IDEX 2019 with a wide range of products that can be used for various purposes in both civilian and military fields. The company exhibited its robust, stable, and low-maintenance electro-mechanical carbon-fiber composite FTM, FHM, and FOM series MAST Systems with extended height up to 3-15 meters at Hall 8 in German Pavilion. MILMAST also manufactures military trailers in addition to telescopic mast systems. In this context, the company has designed a lightweight military trailer with a 2-ton load capacity for KALKAN-II radars. Manufactured from an aluminum chassis, the trailer can be airlifted by helicopter and is also equipped with an auto-leveling system. The national contribution rate for MILMAST telescopic mast systems currently exceeds 97% (over 60% in terms of raw materials). Currently carrying out 64 separate projects at the same time, the company has received a new mast order from Aselsan. MILMAST can produce a mast within 4 days if the materials are ready, and it has a production capacity of 60 masts per month. The company also offers a 2-year product warranty as well as a 10-year spare parts supply guarantee to its customers.

Otokar

Long-Term supplier of the Turkish Armed Forces (TAF) and one of Turkey's leading 4x4 Wheeled Tactical Combat Vehicle designer and manufacturer, Otokar participated in the IDEX 2019 Exhibition together with Al Jasoor, a joint venture between UAE's leading investment company Tawazun and Otokar Land systems.

At IDEX 2019, Otokar exhibited its TULPAR Light Tank (debuted as SAFA in the UAE) and the RABDAN 8x8 Infantry Fighting Vehicle (IFV), which was ordered under a US\$661 Million (approximately AED2 Billion) contract signed in February 2017 at IDEX 2017. The RABDAN IFV was fitted with Russian-made two-man turret armed with a 100 mm 2A70 gun, a 30 mm 2A72 coaxial cannon and a 7.62 mm PKT coaxial machine gun, whereas the SAFA/TULPAR Light Tank was fitted with CMI Cockerill® 3105 turret armed with a high-pressure 105mm Cockerill gun as well as an advance auto-loader system. According to the Otokar 2018 Activity Report, the TULPAR Light Tank successfully completed firing tests in Europe and is already being tried by two different users. Otokar also displayed the ARMA 6x6 with BOZOK Turret System, COBRA II 4x4 with the KESKIN Turret System and the MIZRAK-S 30 RCWS (Remote Controlled Weapon System). Another RABDAN IFV fitted with a BMP-3 turret also performed a live demonstration during the opening ceremony.

Otokar started the delivery of

the RABDAN IFV to the United Arab Emirates Army in the last quarter of 2018 (October/November). In this context the first RABDAN armored vehicles out of production successfully completed acceptance tests at the Otokar plant in Sakarya as well as amphibious and firing tests in the Gulf, and the first batch was delivered to the UAE. Following the delivery of the first batch of RABDAN IFVs late last year, the vehicles were included in the inventory of the UAE Armed Forces. As of February 2019, a total of 30 vehicles were delivered, and this number is expected to reach 120 by the end of 2019. According to the contract, the first 100 vehicles will be built at the Otokar plant in Sakarya and the remaining vehicles will be built at the Tawazun Industrial Park facility in Abu Dhabi. In this context, Otokar started the mass production of RABDAN vehicles in 2017. Due to the urgent need of the UAE Armed Forces, deliveries are carried out 4-5 months before the schedule specified in the contract. In this context, a workshop was established by Otokar/Al Jasoor in the UAE for the final assembly of vehicles. In addition, with the signing of the second phase of the contract, the total number of vehicles to be delivered will be increased to 700. The first deal includes the delivery of 400 RABDAN IFV to be fitted with the 100mm gun (BMP-3 turret), whereas the second order will cover an additional 300 RABDAN





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Otokar's COBRA Wheeled Armored Vehicle in UAE Armed Forces service took part in opening ceremony

vehicles in various configurations. Otokar/AI Jasoor has also started training activities for the crew (driver, vehicle commander, gunner) and maintenance personnel of RABDAN IFVs in the UAE. In this context, delivery of the training support equipment was completed in early February.

Otokar armored vehicles also serve in the Armed Forces and Security Forces of Bahrain, Kuwait and Saudi Arabia. In this context, according to the SIPRI Database, the Bahrain National Guard is equipped with a total of 73 ARMA 6x6, 21 Akrep/Scorpion and 185 COBRA 4x4 Wheeled Armored Vehicles, while Saudi Arabia National Guard employs 93 COBRA 4x4 armored vehicles. According to our sources Kuwait fields Otokar vehicles among its security forces and in order to provide support service for these vehicles Otokar recently established a logistics base in Kuwait. Otokar received the first order for the ARMA 6x6 APC in December 2010 (valued at US\$11 Million and covered the delivery of 13 ARMAs) and a follow-on contract in June 2011 (valued at US\$63 Million and covered 60 ARMAs) from Bahrain, the first export customer for the ARMA 6x6.

According to the Otokar 2018 Activity Report, even though the company closed 2018 with TL 1,679 Billion in sales, down 6% compared to 2017 due to the developments in Turkey, the company still achieved a net profit of TL164 Million, which is a 65% increase. In 2018 more than

%60 of Otokar's revenues came from the export market. Otokar doubled its export figures year on year and reached USD211 Million in export revenues. In 2018 the share of exports in total sales also rose from 31% to 65% compared to the previous year and defence products took the lion's share in exports.

Otokar also closely follows the Modern Main Battle Tank Tender of Oman Royal Land Forces, which covers 76 tanks. In July-August 2018, Otokar participated in field tests (mobility and firing tests) carried out in Oman with the ALTAY PV2 prototype. The final decision/selection in the tender is expected to be announced in 2019.

Roketsan

Not having the chance to secure new contracts due to the political tensions between the

two countries, Roketsan, as one of the active Turkish Defence Industry companies in the region, participated in IDEX 2019 with an impressive array of surface-to-surface, air-to-surface, anti-submarine warfare, and guided missile products including the SOM ALCM, TEBER-82, MAM-L, MAM-C, OMTAS, UMTAS, L-UMTAS, CIRIT, CIRIT Smart Launcher, ASW Rocket as well as guided and unguided artillery rocket systems. Attracting a great deal of attention from visitors, Roketsan shared information about the domestic and national weapon systems with the high-ranking officials of various countries such as Colombia, Romania, and Azerbaijan. Having signed its first export contract with the UAE in December 2003, Roketsan has exported more than USD\$500 Million worth of products and technology to the UAE until the end of 2013 (including the agreement signed in 2013 with Tawazun Holding for the direct sale of 10,000 CIRIT Missiles and 4-cell CIRIT Smart Launchers). As a result of the political tensions between the two countries, Roketsan almost lost the UAE market, however, the company continues to provide spare parts and maintenance/repair support for the products that have already been delivered or produced under license. Lastly, Roketsan sold an unspecified amount of MAM-L and MAM-C smart micro munition to Qatar for use in BAYRAKTAR TB2 UCAVs.



STM

STM participated in NAVDEX 2019 with a large team under the leadership of General Manager Murat IKINCI, exhibiting the scale models of 17,000-ton PNS Moawin (AOE-39) fleet replenishment tanker (commissioned by the Pakistan Navy on October 16, 2018), The FAC-55 Fast Attack Craft designed for the Turkish Naval Forces, ADA class Corvette, TF-4500 Anti-Air Warfare Frigate, and the 1.700-ton TS1700 submarine to be equipped with the Air-Independent Propulsion (AIP) system. STM products, autonomous drones (kamikaze and surveillance) and DAR (Through the Wall Radar) system were exhibited at the International Golden Group (IGG) stand in Hall 4 at IDEX 2019. Meanwhile, on February 17, STM signed a Cooperation Agreement with IGG to improve its operations in the Gulf Region.

On February 8, 2019, the Presidency of Defence Industries and a joint venture formed by STM-Aselsan-Havelsan-ASFAT (including KBST as a sub-contractor) signed a contract on the Mid-Life Upgrade (MLU) of four Preveze Class (Type 209/1400) diesel-electric submarines commissioned between 1984-1999. According to our information, The MLU contract calls for the replacement of the existing ISUS-83/2 Combat Management System with MÜREN SYS (CMS) and the integration Sonar integration and Control system (SEDA) and Torpedo fire control system (TorAKS). The four submarines of the class are set to be delivered in 2023, 2024, 2026 and 2027 respectively. With the MLU modernization, the Preveze Class Submarines will be able to launch DM2A4 torpedoes as well as Mk48 Mod 6AT and AKYA heavyweight torpedoes. Within the scope of the MÜREN AY modernization program, the existing old generation Combat Management System of Ay Class submarines were replaced with MÜREN SYS (CMS) and DM2A4 and AKYA Heavyweight Torpedoes were successfully integrated into the submarines. Furthermore, with



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the torpedo launch test carried out in 2018, Turkey became the first country in the world that successfully fired a DM2A4 heavyweight torpedo from a Type 209/1200 class submarine.

Yonca-Onuk Shipyard

At the NAVDEX 2019 Exhibition, Yonca-Onuk JV Shipyard, one the leading players in the MENA region, exhibited scale models of the MRTP16 Fast Intervention Boat which was previously delivered to the UAE's Critical National Infrastructure Authority (CNIA), as well as the Onuk MRTP45 and MRTP34 Attack Boats offered as part of the Turkish Type Fast Patrol Boat (FPB) Program for the Turkish Navy.

Under a contract awarded during IDEX 2009 Yonca-Onuk

JV completed the delivery of 34 MRTP16 Class Fast Intervention Boats (FIBs) in 2015 to the UAE's CNIA in cooperation with its local partner Abu Dhabi Ship Building (ADSB carry out the construction of 22 boats). Yonca-Onuk JV Shipyard has been awaiting to receive a contract for the second batch of 31 boats. However, due to political dispute issues between the Turkish and the UAE governments stemming from the 'Muslim Brotherhood' and the military coup in 2013 in Egypt, (the UAE and Turkey had a serious dispute as a result of positions they held on these issues) the order for the second batch of boats did not take place so far. All the MRTP16 boats are armed with Aselsan's STAMP (with 12.7mm M2HB) and STAMP-G (with GAU-19 gun) Remote Controlled Stabilized Naval Weapon Systems.



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During the DIMDEX 2018 Exhibition, Yonca-Onuk secured a contract from the Qatar Emiri Naval Forces to deliver four MRTP24/U Special Operation Crafts (SOCs) and four MRTP24/U Fast Missile Crafts (FACs, for which contract has not come into force as of 18 February 2019). According to Yonca-Onuk JV officials, the construction of MRTP24/U SOC, which would be the Qatari version of Turkish Navy's new SAT Boat design, will be started soon. The MRTP24/U SOC will be armed with one Aselsan's 12,7mm STAMP Remote Controlled Stabilized Naval Weapon System. Whereas the MRTP24/U FACs will be armed with a pair of STAMP Remote Controlled Stabilized Naval Weapon Systems as well as Aselsan's remotely-controlled BORA Low Altitude/Short Range Naval Air Defence System to be armed with MBDA's Mistral missile. At the end of 2018, MBDA successfully demonstrated the use of the Mistral missile against fast boats such as FIACs (Fast Inshore Attack Craft).

As part of the Fast Patrol Craft Project, Yonca-Onuk JV planned



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Yonca-Onuk JV carried out MLU of two MRTP15 VBSS boats of the PN's SSG(N) during January-October 2018 in Istanbul

to start the deliveries of 8 boats as of February 2019 and the first boat was still undergoing testing as of February 18. The production of 2 new improved SAT boats to be constructed for the Turkish Navy has started and the vessels are scheduled to be delivered at the end of 2019. Unlike the 22m long (overall length of 24m, as the MRTP model boats are named after the length of their hull, the

overall length of the boats differs from the name of the model) MRTP 22/U SAT Boats previously delivered to the Turkish Navy, the new SAT Boats will be 24m in length (overall length of 26m). Additionally, the boats will use a new series of diesel engines and the internal configuration of the vessels will be changed according to the requirements specified in the tender specifications ■



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MRP-12 Fast Patrol Boat seen here during a sea trial



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Rheinmetall Showcases Hybrid Protection Module at IDEX 2019

At IDEX 2019 Rheinmetall has presented its Hybrid Protection Module for the first time at its stand. Combining active and passive protection technology, the Hybrid Protection Module is primarily designed to be mounted on the sides of tracked and wheeled tactical vehicles.

The new Hybrid Protection Modules allow for an integrative approach: passive protection components simultaneously serve as interface and shield for the components of the active protection system ADS-Gen.3 Active Vehicle Protection System (AVPS). Conversely, the ADS-Gen.3 AVPS components comprise ballistic functions and characteristics. The specially harmonized bulkhead design features two layers. The first one, the external protection layer, protects the ADS-Gen.3 AVPS components against shell fragments, small arms fire and other sources of mechanical stress. The ADS-Gen.3 AVPS countermeasure component is embedded in the first protection plate from the outside. The deflector of the countermeasure serves simultaneously as part of the first layer of passive protection. The sensors of the system (a mix of optronics and radar sensors) are contained in the space in between.

In standalone mode, the complete module already offers additional ballistic protection that significantly enhances the basic integrity of the vehicle hull. The integrated ADS-Gen.3 is effective against rocket-propelled grenades and anti-tank guided missiles (ATGMs). It is designed to intercept and destroy ATGMs from ranges as short as 10 meters (33ft) by using a directed explosive detector. The incoming ATGM is detected by a mix of optronics and radar sensors. Operating at 20GHz to 30GHz wavebands the radar sensor can detect incoming ATGMs at ranges of 30m (98ft), but thanks to its very low output power of around 1 watt the radar sensor can not be detected by enemy's ESM sensors at ranges greater than 350 to 400m. According to Rheinmetall the ADS-Gen.3 can



cope with multiple attacks thanks to its capability to defeat 4 incoming missiles/rounds within 0,5m² area with a timing difference of 100 milliseconds between the missiles/rounds

The prime advantage of this new possibility for ADS-Gen.3 AVPS integration into tactical vehicles is its compact size: the Hybrid Protection Module is less than 150 mm in height. Moreover, it is relatively simple to install and can be mounted onto existing vehicles. The Module thus offers an easy-to-implement way of adding active protection technology to a platform. The new modules can replace existing add-on passive protection elements either completely or in part. Furthermore, the modules can be mounted to vehicles in preparation for a specific mission.

Thanks to variable material configurations, Hybrid Protection Modules can be readily adapted to meet individual customer requirements. Rheinmetall has already fabricated various prototype modules, successfully conducting rigorous ballistic trials of variously configured modules with rocket-propelled grenades and antitank guided missiles.

During IDEX 2019 we had an opportunity to have a quick word with Mr Stefan HAASE, Rheinmetall Active Protection GmbH Managing Director on the Hybrid Protection Module.



Defence Turkey: Can you elaborate on the Hybrid Protection Module?

Stefan HAASE: It is an integrated Active Defence System (ADS). It is deeply integrated now. We never had it before. We had it always as modules that attached to the vehicle and detached when it's not needed anymore. It is the first time that it comes with passive armor. Integrated meaning it is now in the passive armor of an armored vehicle. We have an outer layer in certain protection level and an inner layer. Such modules like spaced add-on armor, in the space we integrate the ADS. It uses countermeasures to disable shaped charge weapons, which approach the vehicle.

Defence Turkey: Can it be effectively used against ATGMs with tandem warheads?

Stefan HAASE: Yes, here you can see the shot at a close distance 10 meters against the ADS. Metals in the way of the sensors get harmed but the threat is still disabled prior to impact. That is something for lighter vehicles.

Defence Turkey: How many effectors do you have? How many intercepts can you perform with this system?

Stefan HAASE: In such a module it is always one sensor with one effector. Alongside the vehicle, we would usually distribute between 20 to 30 modules.

Defence Turkey: So, each sensor has a specific angle of point of view when the missile approach. What about the reloading time?

Stefan HAASE: You can see the countermeasure sits in a very rigid metal structure. You just take off the countermeasure and bring in a new

one and a new detonator. If you suspect the electronics are harmed, you can change the entire module and bring a new module to connect it and it works.

Defence Turkey: There are too many modules on the vehicle so do you have to change all these modules?

Stefan HAASE: No, the number of modules is identical alongside the vehicle. If one is suspected of having a failure you can take it off but as you can see, they all look the same, so you don't have individual shapes. For more sophisticated shapes you get individual shapes, but the passive armor needs to cover the exact part of the vehicle.

Defence Turkey: So, what about protection capability against ATGMs with top-attack capability?

Stefan HAASE: There are two possibilities. One is you have an over-flying top attack, in such cases, the countermeasure fires upward, and the other one is dive attack like a HellFire then you need another countermeasure which really fires high load of fragments to the sky, but the advantage is you have no collateral damage to consider. There is no infantryman in the sky.

Defence Turkey: Does the system use an effector with a warhead or burst fragments to destroy the target?

Stefan HAASE: You can see the disabling mechanism as the Eryx ATGM is coming we fire a charge through the direction of the warhead.

Defence Turkey: So, at we at the video it uses directed explosive?

Stefan HAASE: Yes, and as you can see it is firing downwards now, you can have the same ones firing upwards.

Defence Turkey: Do you use optical or radar-based sensors?

Stefan HAASE: Both. We have a radar-based sensor to pre-alert and to track, and an optical sensor for ideally identifying the exact spot of the warhead.

Defence Turkey: Has it become operational or still under development?

Stefan HAASE: It is operational on Leopard 2 Main Battle Tank (MBT) with a customer that I cannot disclose but we delivered more than 80.



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Stefan HAASE - Rheinmetall Active Protection GmbH Managing Director

Defence Turkey: What can you tell us about the deployment of the Hybrid Protection Module on Leopard 2A4 MBTs?

Stefan HAASE: Alongside you will get roughly ten of these modules. Here is one and that would be for turret protection. Usually, the turret is the most exposed part of the tank, so you need to put it on the turret. For the Leopard, we put the ADS only on the turret, and we can protect parts of the hull from the turret by firing downwards as you have seen. The missile comes in a little bit lower, so the system has to consider the position of the turret at this moment of time and select the right count measure to take care of the missile. We had great trials with SSB and people from Turkey.

Defence Turkey: Did they witness live firing trials? When?

Stefan HAASE: Yes, it was already two or three years ago.

Defence Turkey: What about weight penalty? For example, if you add this module on Leopard 2A4 MBT?

Stefan HAASE: For Leopard MBT, you get around two tonnes with the right passive armor.

Defence Turkey: In this configuration?

Stefan HAASE: Yes. For Leopard MBT honestly, something like this here would be much more massive because you have another kind of KE threat that you have to think about.

Defence Turkey: So, can it also provide protection against KE rounds?

Stefan HAASE: That is the idea. This is an add-on module with KE functionalities as well. The projectile has to travel through the spacing that is very good for passive armor

as well. You decouple the outer skin and takes the jacket from the armor piercing ammunition and you have AP core fresh and naked intercepting new armor. There are lighter solutions as well that can go down to several hundred kilograms. When you want to really protect the turret and up-armor the Leopard 2A4 turret you get two tonnes, which is feasible.

At IDEX 2019, Rheinmetall also presented its subsidiary Rheinmetall Protection Systems Gulf (RPSG). Operating in Sharjah in the United Arab Emirates (UAE) since September 2017, the company is a subsidiary of Rheinmetall Ballistic Protection. RPSG develops and produces ballistic protection elements. Its product range extends from protection level NIJ IIIA right through to STANAG 4569 Level 4.

Meanwhile, rounding out its portfolio in the field of protection technology for military vehicles, the Düsseldorf-based Rheinmetall Group is completing its force protection portfolio with taking over the operational assets of IBD Deisenroth Engineering GmbH. According to press release issued by the Rheinmetall on 26 March 2019 the parties have agreed not to disclose the purchase price. The transaction is to take effect on 1 June 2019. The buyout reinforces Rheinmetall's position as a major supplier of advanced defence technology to the ground forces of Germany, its allies and other likeminded nations.

IBD Deisenroth Engineering is a world-renowned supplier of passive protection systems, principally for military vehicles. The company has around 120 employees achieved a revenue of €35 Million in 2018 ■

MILMAST



MILMAST – Designing Advanced Engineering in Telescopic Lifting Systems, on Track to Become a Global Brand

Established in 2015 as a brand of Figes to focus on telescopic lifting system (Mast) technologies, which were not available in Turkey at that time, MILMAST Telescopic Lifting Systems is specialized in the design and manufacturing of Mast systems featuring a patented locking system and a very low nested height. Today the company's product range includes FTM, FHM and FOM series Mast systems made of electro-mechanical carbon fiber material with an extended height of between 3-20 meters and can be used for many fields both in military and civil services. At the IDEX 2019 Exhibition, Defence Turkey talked with Yasin TÜR, MILMAST Sales Manager & Co-Founder, to get firsthand information on MILMAST's participation at IDEX, the company's product range and ongoing programs both in Turkey and in the region

Defence Turkey: What would you like to say about your participation in IDEX 2019? What can you share about the products you exhibited at the event?

Yasin TÜR: We attended the IDEX Exhibition with a last-minute decision. Our booth was in the German Pavilion. The first impressions of the visitors were better than we expected. Honestly, we didn't expect such good feedback and the number of visitors. The companies and individuals who are interested in this subject came here and met with us, and we had the opportunity to show ourselves. Company-level meetings were fruitful; however, we did not find what we expected from the delegation-level meetings. We exhibited our standard FTM series Masts with a patented lock safety system, as well as our new series of products. We take the FTM series to every event we participate in. This product became the primary

choice for especially Aselsan led projects in Turkey. Recently, we have launched our new FOM Mast series for the Main Battle Tanks. The system is designed as a compact solution for companies that want to install a mast on platforms with limited space. The product that we brought to IDEX as a mock-up has a nested height of 70cm and an extended height of 2,5m. The FOM series masts with 150kg and 250kg payload capacity have three different types that can extend from 92cm to 4 meters and from 1,2m to 6 meters. You can use the same payloads that we use on our FTM series with FOM series Masts as well. The FOM series is only preferred if the user has limited space. It is smaller than the FTM series and has a different mechanical structure design. We created this system by considering the more specific design requirements.

Defence Turkey: Where will you install the FOM series Masts on the MBTs?

Yasin TÜR: We install the mast on the tank turret. They want the mast to face the same direction with the turret when it is rotated. We are still working on this design. The product prototype will become ready within one month, we have built a mock-up, verified the design of this product, and passed all the processes successfully.

Defence Turkey: One of the images Aselsan shared during the FIRAT-M60T Project signing ceremony shows a Mast system on the tank. Was that your product?

Yasin TÜR: No, it is not ours. We know that the existing system is procured from abroad. With this project, we have actually provided an indigenous alternative to that system. In the future, we will participate in domestic and international tank modernization projects with this product. It is still in the prototype stage, but we continue our efforts for the production. We have successfully completed the design phase and requirements analysis. The qualification process of the system is still ongoing.

Defence Turkey: Did you start the localization activities for the aforementioned mast with your own initiative or was it a request from the user?



Yasin TÜR: This request came from Aselsan, but we were already following the requirements in the project. We are the leading company in the market now and we continue our efforts in this direction. We focus on the needs and closely follow the procurement process. Eventually, we set out to provide a successful solution and introduced this product.

Defence Turkey: Will it be unveiled at IDEF '19?

Yasin TÜR: We will unveil this product at IDEF '19. We are planning to demonstrate the system on a vehicle. We are still working on it.

Defence Turkey: Can you share some information with us about the FTM Series Masts?

Yasin TÜR: FTM series Masts are one of our first products that can extend from 3m to 15 meters. This series became very well-known in projects. In total, we have delivered more than 200 of them. While we supply a significant part of them to Aselsan, we deliver the system to other domestic companies as well.

Defence Turkey: Will you supply the masts for the three Pedestal-Mounted CİRİT (PMC) System ordered under the contract signed between Roketsan and Turkish Land Forces Command?

Yasin TÜR: Yes, we will supply the masts in that project, we are currently waiting for the orders. We will provide the same series (FTM). We concluded our studies and successfully completed the field tests. At that time, it was not clear whether the carrier platform will be tracked or wheeled. We carried out our tests on a tracked vehicle.

Defence Turkey: Is there any difference between the tracked and wheeled platforms regarding the Mast performance?

Yasin TÜR: Tracked vehicles lead to higher vibration. Wheeled vehicles don't have this problem. With the PMC Project, we also started working with Roketsan.

Defence Turkey: Under a contract signed with Qatar Armed Forces, 1 set of shelter-based Border Security System with Aselsan's design and production sensor systems and security management software was delivered in 2018. Did you take part in this project with your Mast systems?

Yasin TÜR: The masts used in the project were not ours. As far as I know, our products were not ready at the time when the contract was signed. We were in the qualification process.

Defence Turkey: What would you like to say about the new FHM series Masts that you just added to your product range?

Yasin TÜR: The FHM series can carry lighter payloads compared to the FTM series. These Masts can carry up to 50kg of payload (recommended 25-30kg). FHM series Masts are designed to be used for more light-weight operations. We have completed the qualification process for this product. Similar to the FTM series, FHM Masts have also a nested height of 3m and an extended



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height of 15 meters. Thus, it becomes a cost-effective solution that is not over-designed. The FTM series masts are excessively large to carry lighter payloads. We have provided a clever solution for this requirement with the FHM series Masts.

Defence Turkey: Are you involved in the TASMUS (Tactical Area Communications System) Project, which Aselsan sold to Azerbaijan?

Yasin TÜR: We continue our studies on the TASMUS project. It's not exactly clear yet, but we're working in the background currently. The first party delivered does not include our masts however the second party will probably be equipped with our system. Our products are currently in the design phase. The project calls for some additional requirements and we continue our work to meet them.

Defence Turkey: Could you inform us about the fairs you will participate in the future as part of your 2019 exhibition planning?

Yasin TÜR: We aim to participate in both national and international exhibitions. Following the IDEX exhibition in Abu Dhabi, we attended the LAAD Fair in Brazil. After that, there is the IDEF '19 Fair. This year we will also participate in the MSPO Exhibition in Poland and the Gulf Defence & Aerospace (GDA) Exhibition in Kuwait.

Defence Turkey: Can you share with us the figures regarding the turnover and export of MILMAST in 2018?

Yasin TÜR: At present, 80% of our orders came from domestic companies, 75% from Aselsan

and 5% from other automotive companies. Only, 20% of our orders come from abroad. The reason is, foreign customers have additional requirements that needed to be tested, so the deliveries take time. For example, we received an order of 1 + 100 units from Korea. In this context, we have delivered the first system and also signed a pre-contract for 100 pieces. The project was launched about 1.5 years ago, and the studies on the mast carrying vehicle are still ongoing. The mast system to be delivered will be equipped with electro-optical systems for reconnaissance and surveillance. There is no problem with the mast, but there is still a delay due to the change of the vehicle requirements on the end-user side.



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Defence Turkey: Will Aselsan SARP-L (approx. 80kg without armor and ammunition) and SARP Dual (approx. 290kg without armor and ammunition) Remote Controlled Stabilized Weapon Systems be mounted on your Mast product?

Yasin TÜR: These systems will be mounted on FTM series masts. The recoil of the weapon system is the most important issue here. Therefore, we are working on a specific product that can withstand the recoil force of the SARP-L/ Dual (approx. 350-400kg) system. The new product can be used on both fixed positions and vehicles, especially during border security missions. We are planning to exhibit our new product at IDEF '19.

Defence Turkey: What are the differences between the new product and the other series Masts?

Yasin TÜR: There is a difference in the material used which means the new mast will probably have a maximum height of 4 meters.

The recoil force will not allow a higher mast system as it will be too unstable. We aim to manufacture the new product with carbon fiber composite materials again. However, if the analysis results show us that we can manufacture a more stable product with aluminum, then we will switch to different materials. The analysis studies are currently underway.

Defence Turkey: Will the cables pass through the Mast when a system is mounted on it?

Yasin TÜR: The cables won't be inside the mast; they will be wrapped around the mast body from the outside in the form of a spring. There are different formats and projects abroad like this. We aim to achieve it in Turkey.

Defence Turkey: Will your new Mast system provide fire-on-the-move capability or will it only allow the user to shoot from a stationary position?

Yasin TÜR: Truly, our first goal is to manufacture a product that will allow the user to shoot from a

stationary position. After that, we aim to further develop this product.

Defence Turkey: Which products will you exhibit at IDEF'19? What would you like to say about the products that will be introduced for the first time?

Yasin TÜR: You will have the opportunity to examine all our products at IDEF '19. We plan to display all the FTM, FOM, FHM series, as well as the new trailer with an automatic leveling system which will be introduced for the first time at IDEF.

Defence Turkey: Yasin TÜR, is there a message that you would like to convey to our readers?

Yasin TÜR: In fact, we are moving towards becoming a global brand. We are trying to establish business partnerships. In addition, we have opened representative offices in France and Russia. Every week, we conduct remote meetings with them and receive information about current projects and programs. I believe we will receive good news from these countries in the future ■

THE NATIONAL BUSINESS PARTNER OF TURKISH DEFENSE INDUSTRY

We have started to serve as a business partner of our customers from design to production in defense and aerospace industry with the strength we have received from our R&D investments and our experience of up to half century in the transportation industry.

As Ditaş, we are at IDEF 2019, 14th International Defense Industry Fair, Hall 5, Booth 501C



CES Advanced Composites National Leader in Ballistic Protection with International Standards

Established in late 2012 to meet the demands of international industrial institutions in aerospace, defence and security industries, by providing reliable, ingenious and cost effective advanced composite solutions CES Advanced Composites & Defence Technologies Inc., a subsidiary of Açık Group, is a designer, developer and manufacturer of advanced composite parts and assemblies

While it was only a small workshop in 2012, CES Advanced Composites & Defence Technologies underwent rapid and substantial growth through investments in human resources, facilities, equipment and infrastructure, becoming a factory operating in line with international standards and with a global reach. It is worth noting that the large majority of these investments have been made using the Company's own resources, or with revenues generated by the Açık Group's other activities. CES Advanced Composites plans to double the investments that made so far by the end of 2020, through the opening of factories in different locations around the globe.

From its premises established in an area of nearly 20,000m², CES Advanced Composites provides its business partners with a wide spectrum of services, ranging from conventional methods to highest standard production techniques that require the highest level of aviation certification. Through its recent major investments, CES has now the largest production and R&D capacity in Turkey that enables the company to fulfill its wide production portfolio both in advanced composite and advanced armor fields.

Today company has the necessary infrastructure, capability and capacity to position itself as the leading supplier of advanced composite materials, engineering services and tooling equipment in the local market. Offering globally competitive solutions, particularly in ballistic protection, the company also has ambitious goals for exports. In terms of its goals for 2020, CES Advanced Composites is aiming to export 50% of its products to global customers and to become one of the world's leading companies in the field of composites. Allocating a significant



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percentage of its turnover to R&D, the company has been declared as an R&D center by the Turkish Ministry of Economy.

With its expertise in composite material design, development and production, CES Advanced Composites' know-how has enabled the development of a leading range of products for a broad spectrum of applications. As well as focusing on the defence and aerospace industry, CES Advanced Composites is continuing its research and development activities to utilize its expertise in land and naval platforms, whilst increasing its capacity in ballistic plates manufacturing.



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CES Advanced Composites currently continues its production activities in three different fields, namely; Aviation Composites, Defence Composites and Ballistic Protection.

In the field of Aviation Composites, company supplies parts to the platform producers such as Airbus, Lockheed Martin (Sikorsky) and Turkish Aerospace (TUSAŞ). Aside from these companies, CES Advanced Composites is also an approved supplier for Leonardo, and have this year entered a qualification process for Boeing. Company executes its works in the field of aviation in accordance with the "build-to-print" approach, which involves the customer sharing production details with the company, after which they carry out the production part through qualified and constantly-inspected processes. Aviation has very tight quality control requirements, which manufacturing company should fully absorbed and fully implement them in all of its manufacturing processes, even those unrelated to aviation. CES Advanced Composites further crown its superiority over its competitors in the market with quality certificates they have received. Six years ago, company was certified to AS9100 standard, the highest indication of

quality in aerospace and defence sectors. CES Advanced Composites is in fact one of the few companies in Turkey that they have shortlisted as a possible candidate in the field of composites. In the meantime, company also continuing its efforts to develop its own aviation products, such as parts for aircraft cabin interiors.

CES Advanced Composites current activities cover all aspects of the defence sector, including those that are not directly related to ballistic protection. Company works with Turkey's leading land platform manufacturers, such as BMC, FNSS and Otokar. In lieu of metallic parts, CES Advanced Composites design, produce and integrate onto vehicles advanced composite parts that lighten the platform and consequently increase their mobility, while fully meeting the relevant structural and physical requirements. Company carefully selects the optimum materials and manufacturing processes to be used in these works, laying out the most cost-effective and appropriate solutions. In some projects company has already begun working with their customers' engineers right at the draft design stage in order to add more value. Aside from land vehicles, company is also producing advanced composite parts for various other products manufactured by the sector's leading players, such as Aselsan, Havelsan, Roketsan and Kale Aero, as well as the various institutions of TÜBİTAK.

Ballistic Protection is definitely CES Advance Composites' area of expertise. They have a highly competent team, up-to-date technologies that make a difference, and a strong network of raw material suppliers, all of which help them roll out globally competitive solutions. In this field company's leading position can be clearly understood, not only by looking at the technical features of equivalent products, but also the comments they receive from different users around the world. Their product range in this field contains a diverse portfolio of different products, including ballistic helmets, ballistic plates and vests, spall liners and add-on armor. With its engineering power, CES Advance Composites has become the only local supplier for land vehicle platforms for add-



on armor solutions and the largest supplier for spall liners. The main feature of these products is that they are designed to be as light as possible and the lightest composite materials are used in production processes. Using the same quality materials as its international competitors, CES Advance Composites is quite determined to create superior ballistic protection solutions with better craftsmanship and engineering. Today thanks to its wide product portfolio CES Advanced Composites meets various mission-critical demands of different end users in ballistic protection. As one of the three companies manufacturing Ballistic Helmets in Turkey, CES Advanced Composites closely follows the tenders of the Turkish Armed Forces (TAF) and the Turkish National Police.

Company also has expertise in the design and application of armor to the mission-critical sections of the naval vessels. In this context, as the first indigenous advanced composite ballistic protection project

of the company and has served as the foundation to all future ballistic protection-related works that are on the company agenda today CES Advanced Composites undertook the armoring process of mission-critical sections of the ADA Class corvettes under the MILGEM Project.

Recently tasked with providing spall liners as part of the M60TM FIRAT MBT Modernization Program, CES Advanced Composites also provides ballistic protection solutions for air platforms (aircraft/helicopters). Participating in the armoring of Black Hawk and Mi-17 helicopters in Turkey, CES cooperates with Paramount Group in the international arena for helicopter armoring solutions. CES is currently one of two qualified companies in the world who is already competent to produce armor kits (both cockpit and cabin floor) for Black Hawk helicopters. Today, CES Advanced Composites is the only company in Turkey, which developed modular ballistic floor panels, armored wing panels and pilot seat armor for air platforms.





EVPÚ Defence a.s. – the Czech Brand for National Security

EVPÚ Defence is the only Czech manufacturer of commander and gunner sights designed for special military vehicles and a leading global manufacturer of electro-optical systems.

EVPÚ Defence, a.s., is a Czech company, the head office of which is in Uherské Hradiště, and which has been known for a long time in the inner circle of army, police, and security forces. The electro-optical systems manufactured in the southern part of Moravia guard frontiers of more than 40 nations all over the world and find frequent use in projects of the Ministries of Defence and police forces of the Czech Republic and Slovakia.

EVPÚ Defence a.s. is the world's leading manufacturer of pan and tilt positioners. Thanks to their own long-term development, manufacturing and maintenance pan and tilt positioners have excellent quality, reliability, long service life and first-rate adaptation to the toughest conditions of use. Due to the great flexibility of their own development department, unstabilized and gyroscopically stabilized pan and tilt positioners can be used in a variety of applications such as border monitoring, anti-drone, unmanned, vehicle mobile systems, boats and others.

Pan and tilt positioners can be tailor-made to the specific requirements of the customer with respect to the application.

MRP, MCM, ARM - for short range systems, payload up to 10 kg
MSM, MSO, NERO - for middle range systems, payload up to 34 kg
GEMA - for middle and long-range systems, payload up to 50 kg
MST, MSR - for long range systems including gyro stabilization

or liquid transfer option, payload up to 150 kg

MALLI - for radar systems, payload up to 20 kg

Each of the models described below was developed for a specific project, which fact shows that the company can provide flexible solutions and offer custom-made products.

CRANE multipurpose sights – a multi-sensor electro-optical container developed primarily for integration into remote-controlled reconnaissance and surveillance

systems and weapon stations.

Within its extensive and growing product portfolio, EVPÚ Defence, headquartered in Uherské Hradiště in the Czech Republic, numbers the CRANE series of the commander's and gunner's sights, featuring cooled or uncooled thermal cameras. The multi-sensor electro-optical (EO) systems have been developed primarily for integration with remote controlled surveillance systems and remote-controlled weapon stations (RCWS) – the latter on combat and security vehicles –



thanks to their modular architecture.

Three versions of the gunner's sight with uncooled camera are offered, intended for integration with RCWS incorporating machine guns of 7.62 or 12.7mm caliber:

- The CRANE SR1G features daylight optics provided by an aiming camera with a horizontal angle of 3.7° and a color surveillance camera with 30x continuous optical zoom and a horizontal angle of 2.3-63.7°, while the 1024x768 thermal camera can switch between a wide field of view (FoV) of 18.1° for area surveillance and a narrow FoV of 6.1° for detail views. Distance measurements up to 32km are provided by a laser rangefinder. The system is entirely digital, the GigE interface providing sensor communications with minimal interference and high quality image data. The CRANE SR1G will be integrated into the RCWS of a new chemical, biological, radiological and nuclear (CBRN) reconnaissance vehicle for the Army of the Czech Republic;

The CRANE XSR incorporates a daylight surveillance camera featuring both monochrome and color modes, with a 36x optical zoom capability. The 640 x 512 pixel uncooled thermal camera has two switchable FoV – 4.6° narrow and 14.3° wide;

In the CRANE SR, two black and white aiming cameras with fixed focal lengths are partnered with the same thermal camera and laser rangefinder as for the CRANE XSR.

Variants incorporating cooled thermal cameras are available for detecting targets at longer ranges and for a use for larger caliber RCWS. Two options are offered:

The CRANE XLR features a cooled thermal camera module with a 640x512 pixel resolution and two switchable FoV of 2° and 10° horizontal angle for dark, dusty and difficult operations. For daylight operations a color surveillance camera module with a 36x optical zoom used. The sight is also equipped with a 20km-range laser rangefinder;

The CRANE LR sight features two monochrome aiming cameras with fixed focal lengths and horizontal FoV of 2.8° and 10.5°.

The bodies of all versions of



the gunner's sights are ruggedized against shock, vibration and all unfavorable weather conditions.

EVPU Defence does not simply assemble third-party components into systems: the company is a specialized manufacturer of the dedicated sensors, which are calibrated and tested in its purpose-built laboratory.

The company registered a high level of interest in the product during the IDEX 2019 exhibition in the United Arab Emirates, thanks to a live demonstration of the product.

The CMS-1 commander panoramic sight is a multi-sensor electro-optical system the sensors of which are mounted on a gyro-stabilized pan and tilt positioner, providing an all-round field of vision to the commander irrespective of light or weather conditions. The vibration-resistant container comprises a daytime zoom camera (30x optical, 12x digital zoom) with a color and a B/W modes. At night or in unfavorable conditions, a continuous-zoom cooled thermal camera is used. Distance measurements are performed by

an eye-safe laser rangefinder which can reach up to 25,000 m. The commander's sight elevation range is between -90° and +70°.

Another interesting product fielded by the Army of the Czech Republic is known as SeeCheck – a system monitoring the surroundings of a vehicle and guarding the safety of its crew.

The Czech Army uses the system on Iveco LMV 4x4 armoured vehicles and LOS-M and Sněžka-M tracked armoured reconnaissance and surveillance vehicles. The SeeCheck system is also integrated into communication and command role versions of the Pandur II 8x8 wheeled armored vehicles which the Army of the Czech Army is currently preparing to field.

The SeeCheck monitoring/display system is designed particularly for monitoring close surroundings of the vehicle, protecting dismounted soldiers, or guarding the perimeter around the vehicle in both daytime and nighttime. The system which EVPU Defence developed on its own initiative and at its own expense consists of a control and display terminal designated TU-1 and a SeeCheck sensor-mounting pan device with a daytime and a nighttime branch. The former comprises a CCD module with a fixed focal length lens and a resolution of 720 TV lines; the nighttime branch makes use of an uncooled thermal imaging module the resolution of which is 324x256 pixels. The fields of view of both modules are optically aligned, their angle being 63°H. Optionally, the system can also be equipped with a sensitive AWIR uncooled thermal camera, or with a daytime/



nighttime AWIR D camera with an IR illuminator.

The TU-1 terminal can control one SeeCheck sensor unit and up to four additional cameras mentioned above. Its side buttons, touch screen, and intuitive control software allow the operator to control the system easily and quickly. The terminal also permits, for instance, to display three videos or to merge images obtained from the CCD and IR modules of the SeeCheck unit.

In addition to developing, manufacturing, and maintaining the abovementioned elements, the company also integrates them into more complex surveillance and weapon systems. Thanks to cooperation with the parent company, EVPÚ a.s., it can deliver complete integrated solutions of remote-controlled surveillance systems and weapon stations. An example of this cooperation is the ZSRD-07 weapon station with a 7.62 mm FN MAG machine gun, which is in the inventory of the Army of the Czech Republic, or with a 7.62 mm PKT machine gun, which is mounted on Iveco 4x4 vehicles used by the Armed Forces of the Slovak Republic. Its new generation, Gladius, which is currently being developed, is armed with a 12.7 mm machine gun (NSVT or M2) and is considered for integration on 4x4 vehicles of the Armed Forces of the Slovak Republic.

TURRA 30 Remote-Controlled Weapon Station

Another example is the TURRA 30 weapon station, whose modular architecture permits the user to choose from various sight, weapon system, electrical equipment, or ballistic protection solutions. The TURRA 30 weapons station is armed with a 30mm Bushmaster Mk44 automatic gun (alternatively with a 30mm 2A42 gun), a 7.62 mm FN MAG machine gun, the 3rd generation SPIKE LR ATGM launcher, and smoke grenade dischargers.

The full version of TURRA 30's sighting system comprises a CRANE XLR stabilized gunner sight with a cooled thermal camera and an independent CMS-1 commander

panoramic sight. The body of the weapon station is armored, the basic version of the armor providing STANAG 1 ballistic protection to the weapon station and STANAG 3 ballistic protection to the vehicle's crew. The weapon station's design permits to fit add-on armor, and thus increase the ballistic protection level. Thanks to ammunition being stored outside the crew compartment, the weapons being mounted above the hull roof level, and the operators being positioned outside the turret assembly, the safety of all crewmembers of the vehicle is greatly improved. TURRA 30's control unit enables full functionality of the vehicle's Battlefield Management System.

TURRA 30's electrical equipment is highly modular and enables maintenance to be performed and modifications to be implemented in an efficient and quick manner. The variability of the weapon station's components, from the basic version up to the complete version with the independent commander panoramic sight featuring the "hunter-killer" functionality, increased level of ballistic protection, smoke grenade dischargers, and other elements,

such as a laser illumination detection and identification system, make the TURRA 30 weapon station a combat asset that can be integrated on a number of vehicles and gives the customer a possibility of choosing from a broad spectrum of configurations and prices.

Laser Warning System

EVPÚ Defence also delivers and integrates an easy-to-operate, reliable laser illumination warning system, capable of alerting the user to a broad spectrum of laser devices, from laser rangefinders or laser target designators to laser beam guided weapon systems and some types of radars.

EVPÚ Defence, a.s., will display many products from its portfolio, including monitoring systems and all types of commander and gunner sights, at the forthcoming IDET fair in Brno. EVPÚ Defence will also be present at the DSEI fair in London, NATO Days in Ostrava, or Expodefensa in Bogota, Colombia, but will not display as many products as in Brno. Additional information about EVPÚ Defence's products can be obtained at

www.evpudefence.com.



Airbus at IDEF '19

Airbus will attend Turkey's IDEF 2019, 14th International Defence Industry Fair, held at TÜYAP Fair and Congress Center in Büyükçekmece, Istanbul from April 30th to May 3rd.

At the exhibition Hall 2, Stand 234, Airbus will display a range of innovative defence and security products and services, including military aircraft and helicopters, perfectly in line with the aspirations of the Turkish Armed Forces in regard with the recently launched modernization programs.

Airbus will showcase a scale model of the A330 MRTT – the only new generation strategic tanker/transport aircraft combat proven and available today. The large 111 tones basic fuel capacity of the successful A330-200 airliner enables the A330 MRTT to excel in air-to-air refueling

missions without the need for any additional fuel tank. Also, on display, the scale mockup of the C295 in Maritime Patrol Aircraft configuration - a very robust and reliable, highly versatile tactical airlifter able to carry up to 9 tones of payload, at a maximum cruise speed of 480 km/h. Fitted with a retractable landing gear and a pressurized cabin, it can cruise at altitudes up to 25,000 ft, while retaining remarkable short take-off & landing (STOL) performance from unprepared, short, or soft airstrips, as well as excellent low level flight characteristics.

A scale mockup of the Astrobus S Earth observation satellite will be on show. The latest generation of Earth Observation Satellites for Very High Resolution (VHR) applications, it combines the advantages of a



low-mass system (around 400 kg only) with the strong performance of a larger Earth observation satellite platform.

Turkey is a key partner for Airbus. With nearly 30 years of successful collaboration in civil and military aviation, Airbus is committed to long-term, mutually-beneficial industrial cooperation, working closer with its partners and customers as flag carrier Turkish Airlines, the Ministry of Defence and Presidency of Defence Industries, as well as Turkey's air force, navy and coast guard.



Combat Proven Protection Technology that Matters



HUTCHINSON®

Established in 1853, Hutchinson is providing smart solutions to meet the most challenging requirements of customers to improve comfort, safety and energy efficiency in mobility on land, in the air and at sea. Our innovations cover a wide variety of particularly demanding markets, from automotive and aerospace to defence, energy, rail and industry.

In defence, the mobility of vehicle in operations is of utmost importance. The survivability of crews and the safety of the equipment depend exclusively on the protection on board.

From more than 80 years, Hutchinson Defence & Mobility has been protecting some of the most important vehicles for nearly all NATO forces and far beyond. The mission of Hutchinson D&M's products is to accomplish the mission through the harshest situations so that troop carriers' vehicles, combat vehicles, logistics trucks and fuel delivery trucks can safely return home.

Based on lessons learned from the field, our specific technologies in wheels: highly sustainable, very lightweight aluminum rims and very special beadlock and runflat solutions are the first step to keep moving safely.

If one or even all tires are damaged and deflated, i.e. by shootings or mine blast explosions (IEDs), combat vehicles are able to escape from the hot-spot relying on Hutchinson D&M's runflats. The unrivalled technology of Hutchinson D&M's runflats allows for key movement in the runflat mode, off road mode, even in soft or hard terrains.

Servicing the Turkish Land forces, with the benchmark of NATO



© Hutchinson

Forces: one-piece rubber run flat, known globally as VF1™, Hutchinson is proud to introduce the MVFI™ run flat range: the same incomparable run flat performance, including a full reliable field hand mountable system: safe, easy and fast to insert without the need for any specific tools.

Besides military, Hutchinson D&M also procures police vehicles, special protected limousines, cash transporters as well as special fire fighting vehicles with a full range of wheel assemblies and run flat solutions.



© Hutchinson

Reduce Direct & Indirect Costs, Cutting Logistics Constraints

Additionally, Hutchinson D&M is promoting the product Tire Saver Shield™. The tire's sidewall represents one of the most vulnerable parts of military wheeled vehicles. It is essential to protect the tires in order to prevent the risk of immobilization caused by sidewall damage, destruction, fire or enemy detection. The Tire Saver Shield™, is in service already in many NATO's forces, and it is a key asset of the vehicle to increase the availability of vehicles and decrease the largest expenses to any fleet of wheeled vehicles in terms of tires, mounting and dismounting of the tire, replacement of the run flat system, towing of the vehicle, logistics, storage, waste disposal, manpower costs.

Reduce Weight, Improves Payload but Keep High Level of Protection

Regardless of the conditions, if a vehicle's fuel tank is perforated, shot, or encounters impacts, then fuel leakage has to be prevented. Sealing



© Hutchinson

a wound maintains vehicle mobility by eliminating the loss of fuel and reduces the risk of fire and explosion. As a solution, the Hutchinson D&M SAFETANK™ instantly seals any entry and exit bullet holes, retaining the fuel inside the tank and minimizing the potential ignition of spilled fuel. Depending on design and specifications, our customized solution seals ammunition wounds up to at least 7.62 NATO/AP, API, 12.7mm, ... By reducing 7 times the weight compared to equivalent level protection of armored steel plates. Hutchinson's SAFETANK™ KIT can be applied on new vehicles and also retrofitted on existing fleets as armored vehicles, tank trailers or tank containers and other applications.

Additionally, Hutchinson D&M supports higher protection and provides weight saving advantages with a passive explosion-proof device: ExploShield™. The second benefit of this solution is the 80 percent reduction in slosh force. On the one hand, the effect makes vehicle handling much more stable since slosh force is completely reduced in all directions, on the other hand it allows the engineers to dispense with anti-slosh baffles, resulting in significant weight saving for the vehicle.



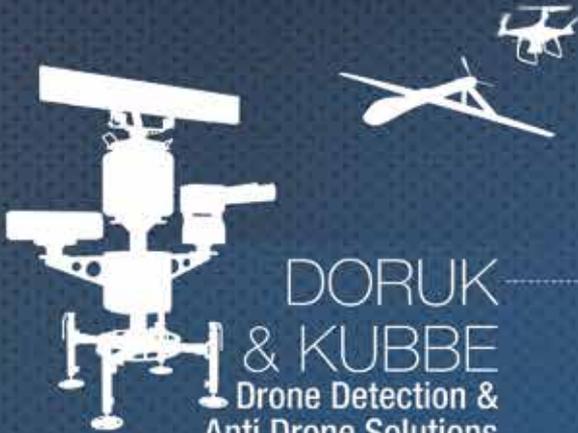
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REMOTE SENSING TECHNOLOGIES FROM SPACE TO UNDERGROUND



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DIMO Corp. Swiftly Fulfilling Aviation and Defence Requirements for North American and European Companies

In an exclusive Defence Turkey interview, Sohrab NAGHSHINEH - President, DIMO Corp. shares insight into the company's position as a global leader in the provision of services and equipment for air, land, and naval forces

Defence Turkey: Can you please briefly introduce DIMO Corp. to our readers? Why was it established and what has been accomplished during last 25 years?

Sohrab NAGHSHINEH: DIMO Corp. was established to support the brave men and women that keep us safe in Aerospace & Defence. Since its inception in 1994, we have created value for many of our customers by solving challenging and complex procurement needs to keep their fleets in the air. Along the

way we have received many awards for quality, delivery, and customer service – but the one that I am most proud of is our Presidential 'Export' Award for Excellence in Export that was presented to us by the US Secretary of Commerce in 2016.

Defence Turkey: Could you please provide some key facts and the organizational structure of the company for our readers?

Sohrab NAGHSHINEH: Dimo Corp is fully recognized and registered with US State Department as well as the Defence Logistics

Agency. Our staff has decades of experience in Aerospace and Defence. Dimo Corp is also TRACE and ISO 9001:2015 Certified; CAGENumber: 1HUX5.

Defence Turkey: As a distributor/representative to a number of major North American and European companies, DIMO Corp. has specialized in fulfilling aviation and defence requirements at a moment's notice. Can you elaborate on the products & services you have provided for customers around the globe?

Sohrab NAGHSHINEH: We deeply believe that for a company like ours to be successful, we must put the Customer above all else. This philosophy has led us to be very diverse in the products and services that we provide, as we are driven by Customer needs. As a result of the Customers we work with, we have typically focused on aircraft such as the F-16, C-130, and UH-60/T-70 Blackhawk. The areas in which we support to a greater degree are Motion Control, Life Support, Avionics, Hydraulic Components, Landing Gears and ISR equipment.

Defence Turkey: Can you elaborate on your MRO & Overhaul and Repairs services for military fixed wing and rotary wing aircraft?

Sohrab NAGHSHINEH: DIMO Corp., along with our trusted partners, have been providing Overhaul and Repair services for military fixed wing and rotary wing for 25 years.

Defence Turkey: What could you tell us about the international presence and market position of DIMO Corp. in the field of parts and component support for military aircraft?

Sohrab NAGHSHINEH: DIMO Corp. established its international presence by opening a sales offices in Ankara and in Abu Dhabi in 2002 to better understand and support the needs of our customers in the region. We are now, providing parts and component support for military aircraft worldwide which includes Turkey.

Defence Turkey: Can you elaborate on your customer portfolio? How many Armed Forces around the globe utilize your services? Why should potential customers and governmental agencies obtain your Services?

Sohrab NAGHSHINEH: DIMO Corp. provides support for the US Armed Forces as well as the militaries of 38 countries, including the TUAf. Due to the exclusive agreements with major US and UK defence companies, as well as carrying a large inventory of parts and components, many of our customers continue to come back to DIMO for their spares and repair needs.



Defence Turkey: How would you position DIMO Corp. in the Turkish market? Can you summarize DIMO Corp.'s involvement in Turkey over the last decades?

Sohrab NAGHSHINEH: DIMO Corp. has been actively providing support for programs such as ANKA UAV, HURKUS Trainer, F-16, UH-60, and C-130 of the Turkish Armed Forces. We decided to work with many of the Turkish aerospace and defence industry talented personnel over 20 years ago. This was due to the fact that we always had absolute confidence in the internal capabilities of Turkish industry. This confidence has resulted in working with major Turkish aerospace and defence companies, such as Turkish Aerospace, Aselsan, Roketsan, Havelsan and many more within Turkey.

Defence Turkey: DIMO Corp. represents a multitude of original equipment manufacturers (OEMs), which enables you to provide services throughout the spares supply chain. Can you elaborate on the OEMs that you represent in Turkey?

Sohrab NAGHSHINEH: We are not able to elaborate on this question due to the sensitivity of certain programs.

Defence Turkey: Can you elaborate on the ongoing programs that DIMO Corp. currently pursues in Turkey? What could be the next program for DIMO Corp. in Turkey?

Sohrab NAGHSHINEH: DIMO Corp. is presently providing equipment for the HURJET, HURKUS-C, and T-129 ATAK Helicopter. We are actively looking

for strong partners in Turkey to provide local capabilities within the country.

Defence Turkey: Can you elaborate on your short and long-term objectives, vision in Turkey?

Sohrab NAGHSHINEH: In the short term we hope to continue supporting the active programs and to see them through to complete production. However in the long-term, we hope to help expand the Turkish indigenous industry by bringing expertise from around the world in-country and setting up in-country repair and overhaul capability for some of the equipment that is currently being worked on outside of Turkey.

Defence Turkey: What can you tell us about DIMO Corp.'s participation at the IDEF '19 Exhibition?

Sohrab NAGHSHINEH: DIMO Corp. is presenting some of the latest advanced defence technologies during IDEF and we are inviting all Turkish defence forces to our stand 221A for a personal detailed explanation.

Defence Turkey: Would you like to add anything by way of a message our readers?

Sohrab NAGHSHINEH: We are proud to be participating in the advancement of Turkish Armed Forces programs and would like to continue bringing added value to our customers in Turkey. It has also been an honor to work with such great Aerospace Industry leaders like Mr. Temel KOTİL of Turkish Aerospace. I truly appreciate his vision in expanding self-sufficiency and looking forward to bringing as much added value to the indigenous work in Turkey ■

PELI Products, Global Leader of Protective Cases, Highlights its 3-level of Expertise in Protecting Armory

PELI Products is the largest manufacturer of aerospace and military approved reusable, recyclable, plastic ATA 300 CAT 1, LRU, AGE, WSTAGE, logistic containers and cases. With more than 40 years of experience in optimal protection solutions PELI Products ensure the success of military mission. PELI's engineers have developed custom solutions for the transport and packaging needed of the defence sector.

PELI Products Keeps Weapons Safe and Secure at Arms Reach with Rifle Cases

These following airtight, watertight containers are also doubles as a lockable rifle rack. The containers configuration includes removable lid with plated Zinc hardware, comfort grip handles, wheels, a humidity indicator and a pressure relief valve. Best of all, when the lid is removed, the weapons remain locked in the cases as a portable weapons rack.

This durable plastic military shipping and storage container **472-M4-M16-4** rifle case is designed to hold 4 fully equipped M4's or M16's or any combination of two M4's and M16's up to four. The outside dimensions are 113,7x 86,4x47cm with a volume



© Pelí

of 450L and a weight of 41kg.

The **472-M4-M16-6** is the perfect storage solution for a 6 pack of M16 weapons or any combination of M16s and M4s, lined up in unshakable custom security.

This **472-M4-M16-8** rifle case is designed to hold 8 fully equipped M4s or M16s or any combination of two M4s and two M16s, up to a maximum of eight. The case's outside dimensions are 113,7x86,4x 66cm, and its volume is 650L with a weight of 55kg.

PELI's 1780 for one-man Arsenal

Can you imagine yourself carrying easily twelve M16's?

Weapons Case features a quick-loading, lockable cross bar and a rotationally molded insert to secure and protect up to twelve M16's or M4's from the most extreme conditions.

Engineered for one-person mobility, the **1780 weapons case** has two double-wide handles and dual sets of polyurethane wheels with stainless steel ball bearings and nylon hubs for extended towing durability.

The case sports an integrated manual pressure regulation valve to eliminate vacuum lock and a humidity monitor gauge with a visible signal to guard against condensation. There are additional standard characteristics such as a lid equipped with the polymer o-ring offering a dust and waterproof seal. The dual action latches open with a light pull and are tested to a failure threshold of nearly 182kg.

PELI's Customised Weapon Cases Ensures the Critical Operations of your Mission

PELI have internal teams with long-term experience in designing everything from simple foam cushions to extremely complex metal structures for use in dramatically diverse shipment, storage, and use conditions – including military deployments and combat situations. From deck-mounted equipment to



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PELI Products: The Most Versatile and Secure Solutions for Immediate Military Deployment

PELI Mobile Footlockers

These tough 472-FTLK-1 and 472-FTLK-LG (large) footlockers, virtually indestructible open wide in seconds and hold tight under duress. The large footlocker is 7cm taller than small footlocker. With its soft-grip handles comfortable for lifting and its two heavy-duty wheels making big loads are more manageable. Dual removable trays are included to separate smaller supplies and for security anywhere lock-ready hasps are incorporated.

PELI Medical Chests

These drawer medical cases are designed to provide maximum protection in any

situation. Impervious to weather, temperature and impact - the rotationally molded shell keeps all your supplies dry, dust free, and secure. With four large drawers for the model **472-MEDCHEST3-4D** and eight including a lockable drawer for your most sensitive and vital equipment for the model **472-MEDCHEST3-8D**. They are providing ample storage for all your bulk items such as gauze, solvents, large prescription bottles and IV fluids. Equipped with wheels, PELI drawer medical cases are easy to carry anywhere you need.

PELI products also offer medical chests solutions without drawer in different sizes.

When Paperwork have to be done, PELI Field Desk is the Solution

Folded into one durable shipping container to become mobile in an instant. Pack in the optional office supplies kit, your desk arrives ready for action. The attached table providing a large and flat work surface with a number of drawers of different sizes and a sturdy field chair, this comfortable chair includes a backrest and can be folded and stored in the lid in seconds.

The **472-FLD-DESK-TA** provides a left side table and the **472-FLD2-DESK-TA** provides



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a right side table for only 37kg and 78x53x72cm, the **472-FLD-DESK-DD** provides two attached tables for a weight of 45kg and 86x63x72cm.

They all contain 6 drawers on the following sizes:

- › Two drawers for your paper work
- › Two drawers that are padlockable for extra security
- › Two large drawers specifically designed for Pendaflex folders

The double tables field desk is build up with two heavy duty wheels, two power Strips - 6 plugs per power strip ensuring you always have a place to plug in your electronics and offer two field chairs.



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The Only Name to Know in Soldier's Knives – Victorinox AG

Sales Director Public Entities, Victorinox AG, Paul CAMENZIND discusses the company's 30-year commercial market in Turkey, their successful history of providing Swiss Army Knives to military forces around the world. The famous pocket knives are a survival tool: multitaskers that deliver in any situation. At their most basic they are a blade: a precision cutting tool. At their most evolved they have pioneered space travel and restarted engines

Defence Turkey: Founded in 1884, the company Victorinox AG has been supplying the soldier's knife to Armed Forces since 1891. How would you best describe Victorinox AG today? Could you please provide some key facts about the company for our readers?

Paul CAMENZIND: When I started with Victorinox 26 years ago the company was purely dedicated to producing cutlery, amongst others the world-famous Swiss Army Knife. Nowadays we have extended our product range also to wrist watches, travel gear and fragrances. This with the aim to strengthen Victorinox brand awareness worldwide and also to offer the consumer an overall Victorinox shopping experience in our own flagship and brand stores.

Defence Turkey: Can we please get an analysis of 2018 from Victorinox's point of view and could you elaborate on your targets for 2019?

Paul CAMENZIND: Talking from my position as market coordinator for the international public entity business at Victorinox, I can say that 2018 showed for this segment typical business development. Certain long expected sales did not happen or were postponed. Other projects which nearly were forgotten could now mostly be concluded. Now we hope and expect that certain deals budgeted for 2018 will be finalized in 2019.

Defence Turkey: While the term Swiss Army Knife has become synonymous with designs from Victorinox, the company's greatest source of revenue still comes from commercial sales. Could you please comment on the respective percentages of your turnover that are generated by institutional and by commercial sales?

Paul CAMENZIND: Victorinox is represented in more than 130 countries worldwide. It is quite obvious that probably in all these markets our partners generate business with public entities without even reporting back

to Victorinox headquarters in Switzerland. Projects with Armed Forces and other public institutions handled from Switzerland only reach approximately 5 % of the pocket-knife and pocket tool business of Victorinox.

Defence Turkey: What could you tell us about the international presence and market position of Victorinox in the soldier's knife sector? How many Armed Forces around the globe use your products?

Paul CAMENZIND: When it comes to pocket knives Victorinox holds a very strong position. There are of course also cheap copies of far eastern production that are seen around which try to penetrate the market. We had cases in which armed forces procured such fakes.....usually single experiences due to the big quality difference to our products that are "Made in Switzerland". When it comes to the multipurpose plier tool business our "SwissTool" finds itself in a more competitive market.

As I mentioned before you will find Victorinox pocket-knives and tools probably in nearly every army of the world. We would however name armed forces of approximately 20 countries as main and regular customers.

Defence Turkey: What kind of new products do you see a demand for in the coming years in the soldier's knife sector? What can the industry expect to see on the horizon as new products and services from Victorinox AG?

Paul CAMENZIND: There is a wide demand for products that are easy and quick to operate. Victorinox is working on that. When it comes to novelties: Victorinox launched last year a new product for the Navy: A pocket knife based on the Swiss Soldier Knife hosting a heavy-duty marlin spike: The "Skipper Pro". At IDEF '19 we will highlight this new product.

Defence Turkey: What can you tell us about Victorinox AG's approach to Turkey as a market for the sale of its products?

Paul CAMENZIND: Our



partners for Turkey, Messrs. EYÜBOĞLU, Istanbul, have established a very solid commercial market for Victorinox in Turkey over the last three decades.

Defence Turkey: What can you tell us about Victorinox AG's participation at the IDEF '19 Exhibition? What are you expecting from the exhibition?

Paul CAMENZIND: Victorinox's 6th participation at IDEF clearly aims to widen the business with the Turkish Army. The final goal is that one day every Turkish soldier will receive a "Turkish Soldier Knife" made by Victorinox as part of his personal equipment.

Defence Turkey: Would you like to add anything by way of a message our readers?

Paul CAMENZIND: We kindly invite readers of Defence Turkey to visit our stand 2 / 225 in the Swiss Pavilion at IDEF '19 and we will show you our range of products specially designed for the needs of a modern soldier or members of police and firefighters. See you soon in Istanbul. Thank you ■

Design and Technology Show by Kale Defence & Aerospace at IDEF

Turkey's well-established industry group, Kale prepares for a design and technology show at IDEF 2019, the 14th International Defence Industry Fair with its original design products. Kale Defence and Aerospace's original products from National Infantry Rifles to Turbojet Engines will be exhibited at the Fair organized under the auspices of the Presidency.

Completing 32 years in the defence industry, Kale Defence and Aerospace participates in IDEF '19 the 14th International Defence Industry Fair with its original design products.

The Group, a stakeholder in global projects working with global customers on one hand, and a contractor of domestic and national projects on the other, plays a strategic role in this regard presenting its expertise to the domestic industry in a business incubator role, will present a design and technology show at the fair with its products.



The Fair will be held at the Istanbul TUYAP Fair and Congress Center between April 30 and May 3 under the auspices of the Presidency, and the original products of Kale Defence and Aerospace, such as Turbojet Engines, Krueger Flaps, Wing-Assisted Guidance Kits, National Infantry Rifle and other light weapons will be exhibited.

In his statement before IDEF, Osman OKYAY, Vice Chairman and President of Technical Division of Kale Group, said: "Our vision in defence and aerospace was determined by our late founder İbrahim BODUR's understanding of 'Everyone would choose the easy way; you



should aspire for the difficult'. Today, when we look back at the sector in which we have spent 32 years, we see that we have a strategic mission, such as being a stakeholder in important global projects, undertaking critical domestic and national projects, and becoming an Incubation Center for the domestic industry. We are proud to be an important part of Turkey's great success story in defence and aerospace with the competence we have gained over the years."

Kale Group's original products to be exhibited at IDEF and specifications:

KTJ-3200 Turbojet Engine:
As a subcontractor of the

Presidency of Defence Industries, Kale has developed the KTJ-3200 Turbojet Engine, nationally and indigenously, which is specifically optimized for use with cruise missiles, target drones or alike. Its features include a compact design, high thrust - low fuel consumption values and starting capabilities in different altitude/mach speed conditions. All controls and accessories of the KTJ-3200 have been developed indigenously by Kale. Thanks to the KTJ-3200's outstanding abilities, with certain modifications it can be adapted to different air platforms.

High Precision Guidance Kit Extended Range: The HGK-ER is a wing-assisted guidance kit that converts existing unguided





1000lb MK-83 and 500lb MK-82 general purpose warheads into long-range, air-to-ground smart weapons. In this way, general purpose warheads, dropped from 30,000 ft, gain the capability of hitting targets from a 100 km range, precisely, in all weather conditions, enabling aircraft to complete their missions safely without entering into the enemy air-defence zone. The HGK-ER is certified to F-16C/D Block 40 and

F 4E/2020 fighter aircraft.

Krueger Flap: The Krueger Flap, manufactured and assembled by Kale for Boeing 777 and 777X model aircraft, is the only flap type used in the front part of the aircraft. These areas extend from the trailing edge of the wing, and they increase the camber and the surface area of the wing when an increase in lift is required at low speeds.

MPT-76 (National Infantry Rifle) and light weapons: The MPT-76 has been designed and developed by Kale since 2008 using completely national and local resources. As of 2017, the MPT-76 has started to enter the inventory of the Turkish Armed Forces and Turkish security forces. The MPT-76, of which Kale is one of the most important designers and manufacturers, is one of the rare rifles that successfully passed the 42

worldwide NATO standard tests such as conditions of cold and hot air, sand, rain and mud.

A light weapon, the KCR556, which entered the inventory of the Turkish Armed Forces and Turkish security forces for over a year ago, is a local and national infantry rifle designed and manufactured by Kale. The KCR556, developed by Kale and is capable of firing 5.56 mm ammunition, is a successful rifle having passed all NATO tests and has been proven working in difficult conditions such as cold, hot, wet, damp, dust and mud.

Kale's another small arms, the new 50-caliber (12,7 mm x 99 NATO) high-precision bolt action sniper rifle KSR50, features a fully modular rail system with Keymod rails that allows the user to attach any accessory. With Kale's design and production, the KSR50 has also entered the inventory of the TSK.

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Photonis - Renowned Global Manufacturer of Electro-Optic Components

In this Defence Turkey interview, Mr. Abou Bakr MOURCHED, Photonis Regional Sales Manager Middle East and Africa, shares insight into the company's long and successful path of expertise, their customer focus, R&D, Engineering and Program Management, as well as innovative new technologies and solutions



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Defence Turkey: Can you please briefly introduce Photonis to our readers? Could you please provide some key facts about the company for our readers?

About Bakr MOURCHED: Photonis is a high-tech organization experienced in innovating, developing, manufacturing, and selling photo sensor technologies since 1937. We operate internationally in several key areas:

- › Defence
- › Research Applications
- › Security & Surveillance
- › Space Exploration
- › Nuclear Instrumentation
- › Physics Research
- › Analytical Instruments
- › Communication
- › Industrial Applications

Our facilities are localized around the world; our headquarters are located in Merignac (France) and we have production facilities located in Brive-la-Gaillarde (France), Roden (The Netherlands), Sturbridge (United States of America) and Lancaster (United States of America). In these facilities our operators work daily on supplying our customers with a wide range of high-performance products, each supported by departments such as Research & Development (R&D), Engineering and Program Management.

Our R&D, Engineering and Program Management teams work

every day on our current product line, as well as innovative new technologies and solutions. These developments are extremely important to ensure that we are providing our customers with the best products possible.

We treasure all of our relations and customers around the world. To serve them in the best possible way, our global Sales team answers all questions with support from our Business Development team, Back Office team and Marketing and Communications professionals. Due to the efforts of our global team we have sold to the special forces of all NATO-aligned countries, the professors of CERN, and have been a part of several space missions.

We are a global manufacturer of electro-optic components used in the detection and amplification of ions, electrons and photons. We are focused on mission critical components aimed at highly demanding customers. We innovate and engineer quality components for integration into a variety of applications such as night vision optics, digital cameras, mass spectrometry, physics research, space exploration and many others.

We design and manufacture in our facilities across the globe and work with our customers to continually improve and innovate our products. We are the most widely deployed night vision tube globally, lead the mass spectrometer detector market,

and have products installed in most space telescopes and high energy physics experiments in laboratories around the world.

Defence Turkey: Photonis is prime contractor for NATO countries and its affiliates and is one of the world's leading companies in the design and manufacture of state-of-the-art Image Intensifier Tubes for military, space and commercial applications. Can you elaborate on Photonis' current night vision products, which are in use in all NATO countries and are largely deployed worldwide? How many Armed Forces around the globe use your products?

About Bakr MOURCHED: Photonis is the world leader in the design and manufacturing of state-of-the-art Image Intensifier Tubes for the military. Night Vision has become a key opto-electronic technology in modern warfare as more and more combats take place by night. Photonis Night Vision products are in use at all NATO affiliates and are largely deployed worldwide. Photonis provides 3 kinds of image intensifier tubes XD4, XR-5 and 4G, whereas 4G is the current benchmark in Night Vision.

Defence Turkey: Can you briefly inform our readers of the major local and international programs that are keeping Photonis busy these days?

About Bakr MOURCHED:

Photonis works worldwide so we are involved in numerous international projects in the role of an image intensification technology provider. Many times, this information is confidential and/or sensitive, but we can mention 2 of the current major programs in NATO countries:

- › 16mm binocular program in Germany 4000 systems (2 tubes each so 8000 tubes in total)
- › German Army driver goggles 4000 systems (2 tubes per system so 8000 tubes in total)

Defence Turkey: What do you see as the strong points of your Image Intensifier Tubes and how do they differ from their competitors in the defence market?

About Bakr MOURCHED: The 16mm Image Intensifier Tube by Photonis was designed to meet the new SWaP (Size, Weight and Performance) requirements of modern armies:

- › Reduced size (by 40%)
- › Reduced weight (by 35 grams)
- › Minimum power consumption
- › While keeping state of the art performance



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The 4G Image Intensifier Tube by Photonis exist in both 16mm and 18mm

- › Smallest halo
- › Ultra-fast ATG
- › Extended bandwidth
- › Better Detection, Reconnaissance and Identification (DRI)

Defence Turkey: What could you tell us about the current technology being used in the field of Image Intensifier Tubes in the global Night Vision market?

About Bakr MOURCHED: Currently, there are 2 types of technology to provide image intensifier tubes, but you should look at this as driving either a car running on petrol or gasoline. Both will bring you to your destination and it just says something about the way and how things are being created. It says nothing about performance and that is what counts when you are an operator in the field.



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Defence Turkey: A few years ago, Photonis launched 4G Technology. How is this technology different from Gen 3 Technology; is it available for export, and is it ITAR-Free?

- › Best DRI available
- › Smallest halo
- › Ultra fast ATG
- › Extended bandwidth

It is the technology selected by most Tier 1 NATO SF and yes, it is ITAR Free. It is available for export to Turkey while it is a NATO country.

Defence Turkey: What about the modernization of the existing night vision systems that currently use Gen 2 and Gen 3 technology image intensifier tubes? Can they be upgraded with 4G Technology?

About Bakr MOURCHED: All systems (NVDs/NVGs) can be fitted/ upgraded with 4G technology tubes and it is a very simple operation requiring very little time and equipment. The tubes manufactured are an industry standard.

Defence Turkey: How is Photonis night vision technology contributing to the modernization of the Turkish Armed and Security Forces?

About Bakr MOURCHED: By supplying tubes to the Turkish Armed and Security forces, Photonis provides them the opportunity to align with the latest standard of Night Vision Technology. 4G is the technology most preferred by Tier 1 NATO SF over the

last few years.

Defence Turkey: How would you position Photonis in the Turkish market? Can you summarize Photonis' involvement in Turkey over the last decades?

About Bakr MOURCHED: Photonis has been working with the major Turkish Optronics companies by supplying image intensifier tubes and digital camera cores for both local and export purposes.

Defence Turkey: Does Photonis have an in-country partner in Turkey to help manufacture night vision systems/goggles? If yes, does your partner also provide in-country maintenance service when the image intensifier tubes need to be repaired?

About Bakr MOURCHED: Photonis is working with major Turkish based Optronics companies manufacturing all types of night vision systems and are also capable of providing in-country maintenance for the night vision devices.

Defence Turkey: Would you like to add anything by way of a message to the participants and visitors to IDEF '19?

About Bakr MOURCHED: Photonis is more than happy to organize a night vision demonstration for the armed forces to experience 4G for themselves. More information can be shared with our visitors at the stand at IDEF – Hall 2 stand 223E ■



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Canovate Group Contributes to Essential Defence Industry Projects

Canovate Group, a 100 percent Turkish company, is one of the world's top 10 global brands with its data centers, technology in fiber optic systems and its end-to-end product portfolio

Aiming to transfer its 40 years of knowledge and experience in R&D and innovation, Canovate Group has made significant contributions to Turkish defence industry projects. Canovate will attend and welcome guests at IDEF '19 14th International Defence Industry Fair (Hall 3 booth 321-E) between April 30 – May 3, 2019.

Stating that they focus on projects that will contribute to Turkey's defence industry, Canovate Group Chairman Mr. Can GÜR said: "In parallel with our 40 years of knowledge and experience including the Internet of Things (IoT), Industry 4.0, ballistic vests, drones, electro-optical radars, terahertz scanners, Urban Safety Management System, and E-Agriculture applications, we will further contribute to the critical technologies required by our defence industry with local capabilities. We are proud to serve our country by transferring years of R&D experience and capabilities to the defence industry."

Turkey's First Electro-Optical Radar "PanTher Radar"

Focusing on technologies that can be used in Turkey's security projects, Canovate developed Turkey's first electro-optical radar "PanTher Radar" after a 3-year R&D period. The radar can be used in a wide range of areas such as border, airports, sites with special security requirements and ports. The company also introduced a color night vision camera called "Falcon Eye" for the protection and surveillance of critical facilities. Additionally, Canovate the developed the "HYPER 360 Radar" electro-optical product with a 360-degree panoramic view capability thanks to the support of the TÜBİTAK 1501 program. With regard to perimeter security and facility safety, the company also conducts studies on essential and integral technologies such as underground



Can GÜR - Chairman of the Board of Canovate Group

acoustic sensors, acoustic detectors, Terahertz scanners, CBRN disinfectants (with TÜBİTAK support), bulletproof vests, and the Internet of Things (IoT) product family at its R&D center located in the Istanbul Çekmeköy factory.

Playing an Active Role in the "Urban Safety Management System" Project

Canovate Group plays an active role in the "Urban Safety Management System (KGYS)" project as the project partner of Aselsan and Havelsan. KGYS is a highly sophisticated nationwide project with approximately seventy thousand integrated cameras around the country. Surveillance cameras are essential systems for implementing traffic regulations and ensuring public safety. As well as acting as a deterrent, camera systems also provide valuable information for security forces and judicial processes. With that in mind, the KGYS system is designed to operate

continuously on a 24/7/365 real-time basis. Canovate manufactures turnkey CCTV site cabinets (also called "KGYS Box") that include cameras and components that meet all electrical and network requirements. The system consists of an uninterruptible power supply (UPS), refrigeration, overvoltage protectors, disconnectors, switches and wiring & cabling equipment. The site cabinets are designed and manufactured to work in harsh climatic conditions (hot, dry, rainy or cold) in different regions of the country.

Canovate Group Defence Industry Product Family

Canovate Group Defence Industry product family includes; PanTher Radar, Hyper 360 Radar, Falcon Eye (Low Light Camera), Terahertz Imaging Systems, and Thermal Sight LOKI.

PanTher Radar: Canovate PanTher Radar uses a rotating thermal camera to provide a panoramic thermal image of an area and increases perimeter security in all weather conditions. The product is much more cost-effective than conventional electromagnetic radars and can detect the thermal signatures of potential threats at night even in adverse weather conditions, alerting the security personnel in advance to arrange an



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appropriate response. The System includes a thermal sensor capable of taking 360-degree panoramic images as well as embedded software for image rendering and threat detection. PanTher Radar's ability to multiply the capability of a single thermal sensor reduces the cost compared to its counterparts. Thanks to these features, the system can be used in military bases, airports, sites with special security requirements, borderline, ports, etc. and it is an alternative to the high-cost radio frequency-based active radars used today.

HYPER 360 Radar: HYPER 360 Radar provides a real-time 360° panoramic image up to 5Mp in size with a high-resolution passive LWIR (Long-Wave Infrared) sensor. The camera captures the reflection of a hyperbolic mirror placed in an ideal position across the lens and creates a single omnidirectional picture that is equal to a composite image gathered from 25 cameras. This technique makes it possible to generate panoramic images with a 360° field of view (FOV) by using a single non-rotating camera. HYPER 360 Radar can detect intrusions or fires and automatically alerts the system users via e-mail using the internet network. Designed to provide years of trouble-free service under extreme field conditions, HYPER 360 can operate in temperatures ranging from -40C to + 65C.

Falcon Eye (Low Light Camera): Falcon Eye has unique features that make it possible to view and record colors throughout the night, even at distances that cannot be seen by the human eye. It provides the ability to spot and record intruders and threats that cannot be seen with the naked eye. Falcon Eye helps security personnel

and law enforcement to improve surveillance, increase security and prevent crimes. The new IR feature of Falcon Eye hand-held version also allows the camera to work and record in monochrome and black-and-white infrared.

Terahertz Imaging Systems:

The Canovate Terahertz Imaging device offers a revolutionary passive human scanning technology. This product provides high throughput screening in crowded places that require high efficiency. The Canovate Terahertz Imaging device cannot be influenced by external factors and provides highly precise scanning results. Another advantage of the system, it enables covert surveillance at VIP locations to prevent disturbances. Additionally, the Canovate Terahertz scanner is recognized as a safe system for stealth-screening. The system can scan more than one person simultaneously and identify various threats thanks to its stand-off detection capability. Terahertz scanner also requires no additional infrastructure and can perform independent scanning.

Thermal Sight LOKI: The LOKI is a portable and multifunctional weapon-mounted thermal sight designed for civilian or military purposes. It can be used as a handheld night observation device or placed in front of a riflescope for sniper applications. LOKI is also the world's lightest and smallest clip-on thermal sight. With an impressive

array of features, the device can be used in various situations to identify concealed targets, during both day and night under all weather conditions. It can also measure the distance of a target (optional) in adverse weathers. In addition to these features, LOKI can capture images, record videos, and provides ballistic calculations including range and elevation angle, atmospheric pressure, temperature, relative humidity, and ammunition type.

Canovate Group Electro-Optical Systems Manager Ulaş ÇIRPICI made the following statement about Canovate Group defence industry product family: "As Canovate Group, we dedicate ourselves to developing indigenous technologies for the Turkish defence industry with local capabilities. In this context, we manufacture all the products in the Canovate defence industry product family in cooperation with TÜBİTAK and universities in our country. The most important factor behind the success of producing the latest technologies is our qualified personnel and our expert engineers. As Canovate Group, we will continue to produce indigenous technologies."

About Canovate Group:

Canovate Group is one of the world's top 10 global brands with its data centers, technology in fiber optic systems and its end-to-end product portfolio. With its 40 years of experience, 100% Turkish company Canovate Group continues to develop high technology products by carrying out numerous R&D projects in the fields of information technologies, telecom, defence industry, ballistic systems, electro-optic systems and heating/cooling. As one of the leading innovation-driven companies in its field, Canovate Group manufactures high technology products with over one thousand employees including a team of engineers on an area of 30 thousand m² at in Çekmeköy İstanbul. Canovate Group companies include Canovate Electronics, Canovate Ballistic Systems, Canovate High Technologies, CanAero, Canovate Energy Systems, Canesis System Integration, and Canovate Real Estate Development.



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Ulaş ÇIRPICI- Canovate Group Electro-Optical Systems Manager

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Amphenol Turkey / Middle East Office, Coordinating Regional Activities, Marketing and Sales for Amphenol Facilities

In this exclusive Defence Turkey interview, Amphenol Turkey & Middle East General Manager, Mr. Hakan SARAÇOĞLU discusses the company's activities in Turkey and the importance of connector selection for long-term project success. The Company designs, manufactures and markets electrical, electronic and fiber optic connectors, coaxial and flat-ribbon cables, sensors, antennas and interconnect systems

Defence Turkey: Firstly, could you please share with us information about Amphenol's core capabilities and products?

Hakan SARAÇOĞLU: Amphenol is one of the world's largest manufacturers of interconnect products in all sectors within 6 continents, 110 operations, over 250 factories and over 10 million-part numbers (Connectors, Cables, Antennas, Sensors).

Amphenol has a flexible structure and specializes in interconnect products and is constantly growing and developing in this direction. Amphenol's biggest strength is the employees who embrace the company as their own. We also have a long lasting 87-years history and solid experience built on a strong foundation and R&D studies.

Since 1932, we have continued to grow both organically and through acquisitions that expand our product range.

Our local and global distributors operate both by holding stocks of standard products and providing technical support for projects. In order to provide better service to our customers, we continue our efforts to assign sector and product-based distributors.

Defence Turkey: How do you asses Amphenol's position in 2018? What are your goals for 2019?

Hakan SARAÇOĞLU: Amphenol grew 17% globally in 2018. As Turkey and the Middle East office, we grew 18,26%, and we would like to continue to grow by 15-20% in 2019.

We address our improvement goals according to customer requests, expectations and needs. In other words, we plan to accomplish our own goals by supporting our customers to achieve their goals.

We will attend the IDEF exhibition as a participant and we have also invited our colleagues from our related factories to attend. We invite all guests to our IDEF Exhibition Hall 3 Stand# 306A.

Defence Turkey: What is your R&D activities? Could you please inform us about your new technologies and new products?

Hakan SARAÇOĞLU: Our R&D departments work closely on a variety of projects with the R&D departments of the world's leading companies (Airbus, Boeing, Sikorsky, Lockheed Martin, Aselsan, TAI etc.). According to the requests of our customers' emerging demands, new connector designs are constantly being developed and manufactured. We continue to increase our diversity by focusing on technological and innovative product ranges.

Our facilities which operate in different markets have very strong R&D departments that develop products according to the regional expectations and based on their product ranges. One of our strengths that gives us an advantage is that we can offer a wide range of new and technological product solutions within the framework of our customers' requests and applications.

Our marketing team in Turkey is composed of experienced engineers. We provide technical support and seminars to our customers so that they can choose the right product in a short period of time. We are dedicated to sharing the developments in the connector market and our future technologies that are newly developed in accordance with the specific needs of our customers.

Defence Turkey: Could you please discuss the company's structure, mission and the key areas of Amphenol Turkey?

Hakan SARAÇOĞLU: Team work with related facilities is very

important for increased efficiency. Balanced & healthy growth in all markets is one of our main targets in our region.

We contribute by sharing new technologies, practices and sectoral developments on connector products with both R&D engineers (customers) and related facilities within Amphenol.

We also facilitate technical support and coordination amongst our customers and distributors with our facilities. As Amphenol has so many facilities and a large product range, addressing the requests and resolving problems in the quickest and best way possible is one of our key roles.

Defence Turkey: Turkey is one of the significant markets for Amphenol, demonstrated through successful collaboration with Turkish firms in the past and with present activities. Could you please enlighten us about your activities in Turkey and ongoing programs in the defense, aerospace, civil aviation and naval sectors?

Hakan SARAÇOĞLU: We have been conducting our current business as well as design work for many years with our local firms like Aselsan, TAI, Roketsan, etc. Our collaboration has continued to increase over the years in various projects (A400M, T129 "ATAK" Attack helicopter, "ANKA" UAV, TASMUS, Military Radios, T625 Multi-Role Helicopter, OMTAS, HISAR, Ground control units, Electro Optic Systems, Future soldier...).



Amphenol maintains its number one position globally with a total revenue of \$1.2 billion from the Military and Aerospace Market all over the world. We strive to build on our position as the global leader, to be number one not only in the military and aerospace market, but also in all markets with our service, experience and product variety.

Defence Turkey: How do you appraise collaboration with Turkish defense and aerospace companies?

Hakan SARAÇOĞLU: We continue to increase our services and sales by improving ourselves according to regional demands and needs with each passing day.

We have professional and strong connections with our military and aerospace customers. We arrange regular visits to assess our customers' needs, complaints and challenges. Based on the customer feedback and our assessment, we



work with our AMPHENOL facilities to create long-lasting solutions by sharing information and best practices with our colleagues and all levels of management where needed. Our colleagues from related facilities are regularly travelling to give trainings on their expertise. We are doing our very best to provide the most appropriate solutions toward resolving problems and addressing needs.

Looking back on the years 2004 to 2018 in the military and aerospace market, our total sales grew 29,8 fold in Turkey and 31,5 fold in our region. We consider this growth as a great result showing successful collaboration with our stakeholders. We rest assured continuing to improve our services through the feedback we receive from our customers.

Defence Turkey: Could you



please inform us on your future plans for Turkey to expand your presence in the market?

Hakan SARAÇOĞLU: As I mentioned before, Amphenol constantly develops its own designs by working with its main customers based on the product ranges that it finds lacking in its own field, or it acquires new companies which will complement the missing product ranges in this respect.

Personally, my greatest dream and desire is to establish an Amphenol facility in Turkey for local production which I believe would be a great opportunity and very beneficial both the company itself and our country.

Defence Turkey: Finally, would you like to add some final thoughts and give a message to our readers?

Hakan SARAÇOĞLU: It may not be feasible for our customers to reach the right products or the right factories quickly amongst a large number of Amphenol facilities; their requirements can vary according to their application and market.

We would like to facilitate the

connector design for our customers by being their single point of contact that supports them during all stages of their project. Military and aviation products are special products with challenging specs based on various applications. Also, engineers should keep in mind that production lead times for military and aviation products can be long.

We always talk about the importance of connector selection for long-term project success. Because no matter how well the performance of the designed electronic devices is, you can only perform as well as the performance of the interconnecting element.

Experienced R&D engineers are aware of this detail and they always start working on the connector selection at the beginning of their project.

As the Turkey and Middle East office, we would like to mention that we are pleased to be providing the necessary support to R&D projects that contribute to the development of our country and to all our customers; they can always reach out to us without hesitation ■





AK-40GL GRENADE LAUNCHER

This unique 40 mm grenade launcher has been designed and manufactured to be used with the new and old generation infantry rifles of **Turkish Military Forces** comprising a Picatinny rail under the barrel. Light and ergonomic design for ease of use and transport, the design for right- and left-hand use (safety latch and double-sided loading) makes it remarkable.



Operation	The action is opened to the right or left side
Caliber	40 mm
Barrel Length	305 mm
Weight (standalone - empty)	2608 gr
Weight (attached to MPT-76 rifle - empty)	1500 gr
Sight System	100-400 m (50 m intervals)

Shooting Velocity	5-6 rounds / minute
Muzzy Velocity	76 m / s
Effective Range	150-400 m
Barrel Life Span	5000 rounds
Type of Ammunition	40x46 mm new and old generation low velocity (LV) ammunition of any type



Nurol Makina to Demonstrate Newest and Combat Proven Vehicles at IDEF '19

Turkish Leading Land Platforms Manufacturer, Nurol Makina is hosting visitors at the IDEF 19 exhibition with two separate stands, one of which is located in an indoor area, while the other is located in an outdoor showroom area. EJDER YALÇIN, NMS and ILGAZ II will be displayed at the indoor stand, whereas the EJDER TOMA and EJDER KUNTER will be showcased at the outdoor stand.

EJDER YALÇIN will be displayed in two separate configurations, namely as an armored combat vehicle fielding the SARP remote controlled weapon system, and as an armored ambulance configuration that will be displayed for the first time at the show. Furthermore, NMS 4x4 YÖRÜK will be showcased as a vehicle that is at the end of its qualification phase and will soon enter into serial production.

ILGAZ II, for which there is ongoing work to integrate new mission systems, will be displayed with a manual turret. EJDER TOMA will be displayed with its standard equipment, which is shown as the reference of its class.

EJDER KUNTER will be presented at the exhibition with a design that has been revised based on feedback from different users.

Up to now, Nurol Makina has delivered more than 1,000 of these vehicles, including members of the EJDER family (the YALÇIN, TOMA, KUNTER), as well as NMS and ILGAZ II to end-users at home and abroad. Another 500 vehicles delivery schedule is underway at full speed.

Emphasizing the success, they have achieved in the international market, Engin AKYOL, the General Manager of Nurol Makina, said: "Looking at the period between IDEF

2017 and IDEF '19 we see that Nurol Makina has significantly solidified its recognition as a global brand. Over the past two years, the number of our international users has increased considerably. In addition to the high performance demonstrated by the vehicles rolled out by our serial production lines, the increase in the number of orders we witness is also due to the confidence felt towards Nurol Makina, which is the sum of many factors such as our corporate stance and the services we offer as



part of four projects. I have to note that this confidence can also be seen in the contracts we have signed for our vehicles that have yet to enter into serial production. Given our current standing, it would be fair to say that Nurol Makina has gained an international-level recognition, both as a brand and a corporate entity, and that each of our vehicles have become recognized brands in their own right.”

Nurol Makina officials are hosting visitors at the indoor stand Number 711/A108 and the outdoor stand in Hall Number 7.

Nurol Makina Prepares NMS 4x4 for Serial Production and First Delivery

Nurol Makina will showcase at IDEF '19 the NMS 4x4, which will give a new impetus to the battlefield thanks to its unique characteristics. The vehicle that is being displayed as a solution has received its first orders and is at the last stage of qualification tests, while also being prepared in the meantime for serial production.

At DIMDEX 2018, Nurol Makina and the Qatar Special Forces Command has signed an agreement for the procurement of a total of 214 NMS 4x4 vehicles.

The NMS 4X4 stands out from its competitors, especially with its add-on armor capability and mobility. While the NMS 4X4 has level 1 ballistic protection without add-on armor plates, it could be increased to level 4 protection with the addition of different types of armor plates. There is also no need for a particular equipment for adding and removing armor plates, when the user wants to change the level of protection according to the particular requirements of the mission. This procedure can be realized in a very short time by using standard materials that can be found even under field conditions. These changes in ballistic protection level are also applicable for the window glass of the vehicle.

Engin AYKOL, General Manager of Nurol Makina, explains the advantages of add-on armor plates as follows: “The user has the opportunity to purchase 50 NMS 4X4 vehicles and 20 armor plate



kits. They will be able to use the NMS 4X4 without additional armor plates when there is no threat. In this configuration, the NMS 4X4 has a longer range. However, before using the vehicle in a zone with a high threat risk, they can simply fit add-on armor plates in order to raise the level of protection. This flexibility of the NMS 4X4 considerably reduces not only the initial procurement cost, but also the life cycle costs”.

In order for the vehicle to use add-on armor, its structure needs to be strong at the points where the armor plates are mounted. Therefore, the use of add-on armor is not possible in vehicles built without taking into account this need at the beginning or they require very expensive modifications. However, the NMS 4X4 is completely ready for add-on armor starting from the design table.

Similarly, it is possible to change the window glass of the vehicle to increase the level of protection and this characteristic is unique for the NMS 4X4. The NMS 4X4 also allows the integration of different weapons systems as needed and it makes a difference during reconnaissance

and surveillance missions and urban combat operations thanks to a low silhouette, a short turn radius and a high speed. The center of gravity of the vehicle is low and it ensures superior road handling. Its top speed of 140 km/h is at the upper segment of its class. Users also gain great advantages when they use the NMS 4X4 and the EJDER YALÇIN together. The use of common subsystems in these complementary vehicles allows for easy maintenance and operation, as well as cost advantages. The NMS 4X4, will be exhibited at IDEF together with the SARP ZAFER turret.

Engin AYKOL, General Manager of Nurol Makina, says that the NMS 4X4 will mark a great success in the following period: “Like the EJDER YALÇIN, the NMS 4X4 is a very special vehicle. It will create new use scenarios where it will be possible for our users to carry out their missions with more security and it will make their life easier. From now on we can say that we are going to present the NMS 4X4 at IDEF 2021 as a vehicle used by many countries and which has managed to become a global brand”.





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OSSA Cluster Creating Joint Competition via Collaboration to Increase Quality, Localization and Nationalization Solutions

In an interview with the Chairman of OSSA Cluster Board Of Directors, Mithat ERTUĞ Interview Discuss how Clusters Benefit from Exploring Solutions and Create Industrial Order and Opportunity together by Holding Joint Meetings and Discussions

Defence Turkey: Mr. Mithat ERTUĞ, as OSTIM's Defence and Aviation cluster, can you inform us about your activities, current number of your members, your areas of activity and the demographic distribution of your members etc.?

Mithat ERTUĞ: As the OSSA Cluster, we have currently 225 members. However, we compare the OSSA cluster with its

capabilities, not the number of its members. We have 225 members in our cluster right now. We have members that can use 50 ERP operating systems and have about 60 AS 9100 certificates and plant security certificates. We define the size of our cluster with the number of qualified companies. When we set up the first cluster, we had 2 companies with AS-9100 certificates. The UR-GE

(Supporting the Development of International Competitiveness) support of the Ministry of Commerce has made a significant contribution to increase the quality of our companies and to attain this number. Thanks to them, our companies have reached this quality and the engineering capabilities of our companies have improved a lot. The international exports are fully dependent on

this certification and this increased our international reputation and recognition. Our cluster has been using URGE support successfully since 2012.

Defence Turkey: What is your evaluation of the OSSA's position in cluster in the sector since its establishment?

Mithat ERTUĞ: Public, University and SMEs form the basis of the sector. We felt the support of the Presidency Defence Industries. The decision to give a %30 share to SMEs in Defence Industry projects was implemented by the Presidency of Defence Industries. The fact that we have the Presidency of Defence Industries on our side strengthened our project. Today, the share of SMEs in the projects has increased to almost 50% even 60%. As a result of these important decisions, they realized the value of SMEs in our main contractor companies. Before bringing the ICDDA event to Turkey, we had the chance to observe the effectiveness of this cooperation in Mexico for the first time and we evaluated that it could be very successful if we do this event in Turkey, and we brought it to our country. This was already a part of our project.

Defence Turkey: Within the scope of R&D activities, what kind of support have you provided to your members as OSSA?

Mithat ERTUĞ: We try to express this in every platform thanks to the support of KOSGEB and TÜBİTAK, the number of R&D projects has increased. The embargos imposed on Turkey is one of the major factors which increases the number of R&D activities, this in turn, increased the demand. R&D has a great importance in all of the products and systems that are localized. Domestic and national products would not have emerged if R&D studies were not carried out. When demand came from the state, we forwarded it to our members and showed the feasibility of doing so, and thus increased R&D and improved our engineering staff.



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Defence Turkey: This, of course, brings along many success stories. Can you give us some examples?

Mithat ERTUĞ: There are many. The firing systems of armored vehicles, which were previously supplied from abroad, are produced here today. There are also those made by the main contractors, but many subsystems are made by SMEs. Development of these systems is carried out by our SMEs. Our members are working on a number of subsystems in the National Fighter Jet (TF-X) Project. We are working on the localization of valve systems supplied from abroad. We said we can do it and aspired to do it and applied for this project. Many localized parts and subsystems are included

in the helicopter project. Again, there are many parts localized by our members for the HÜRKUŞ project. Currently, we are focusing on producing the subsystems here. Today we have companies that can develop software and design smart chips. There was a significant gap in the middle of the pyramid where the main contractors were at the top and the SMEs were at the bottom. Today, here, we are filling that gap in the middle.

Two companies will make the Solenoid Valve together. The company that makes the Electric-Electronic part will join the company that makes the valve. A success story will emerge thanks to the two companies that make the Solenoid Valve, which will be used in the National Fighter Jet project.

Defence Turkey: What are the activities of the OSSA for the promotion of its members abroad? In this context, what activities have been planned for 2019?

Mithat ERTUĞ: We participate in almost 80% of the fairs abroad related to Defence and Aviation. We represent Turkey in almost all of the exhibitions abroad such as Farnborough Air Show, Eurosatory, Aeromart, DSEI, and the Paris Air Show. We do not only participate in fairs abroad but in bilateral negotiations as



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Mithat ERTUĞ - OSSA Chairman of the Board

well; we examine new markets such as Brazil, Morocco, Mexico, Pakistan, Ukraine; we attend events and promote our members' capabilities.

Defence Turkey: You hosted the fourth ICDDA event on October 23-25. In this context, what are your assessments about this year's conference?

Mithat ERTUĞ: 260 companies from 60 countries participated and 5,700 registered business meetings were held during the event. If you add the unregistered ones on top of this, we can say that many more B2B interviews were carried out. We only evaluate the registered ones, however, there were also as many as unregistered ones as well.

Defence Turkey: Are there any cooperation agreements signed as a result of B2B negotiations? What can you tell us about the feedback from the participants?

Mithat ERTUĞ: We haven't received any feedback from the participants yet, but we know that the meetings were very good. I visited all the stands individually and got the opinions of the companies and what I saw was 100% satisfaction.

Apart from the domestic and foreign companies at ICDDA; we were also pleased with the participation of our valuable institutions such as AFAD, MSB General Directorate of Military



Factories and Shipyards, Security Forces, Gendarmerie, Presidency of BTK, DMO, Turkish General Staff, Air - Land - Naval Forces Commands, TSKGV, and SaSaD. In addition, military participants from many countries such as the Ministry of Defence Industry of Azerbaijan, Qatar Armed Forces, Brazilian Air Force, Pakistan Air Force, United Arab Emirates, Qatar, and Kuwait evaluated fields of cooperation with Turkish companies during ICDDA.

Defence Turkey: Within the scope of ICDDA, what are your thoughts on the advantages of the B2B meetings for SMEs and Main Contractors? What are your assessments about the development of ICDDA following these four events?

Mithat ERTUĞ: In the beginning, our main contractors thought we were promoting our subcontractors to them and opposed it. We encountered such problems during our first event.

After that, they stated that these interviews were actually quite useful, and they added many subcontractors to their portfolios and as a result, they sponsored every single one of our activities.

Defence Turkey: What is the expected date for this event, which is planned to be held for the fifth time in 2020? Have you already decided on the concept of your next event?

Mithat ERTUĞ: After 2013, I declared the dates of all the three events in 2014 and set a definite date. But the date of this last event coincided with other important events abroad, also some similar activities came out in our country, so we changed our date for the event. We pay close attention not to coincide with the dates of international events. We are planning to hold our event on 13-15 October 2020.

Defence Turkey: Thank you very much for sharing your insight with us ■



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Nicomatic Turkey Brings Value Added Expertise to the Nicomatic Group

In an exclusive interview, Nicomatic Chairman of the Board Oliver NICOLLIN and Nicomatic Turkey Managing Director İdris DUMLU discuss the impressive performance of Nicomatic Turkey and the target in the next 5 years to produce world-known products designed and integrated in Turkey. By focusing on elements of speed, quality, cost and flexibility the company is the partner of choice for more than 500 leading companies all around the world

Defence Turkey: Dear Mr. NICOLLIN, Nicomatic is a French family SME business that was founded by Paul NICOLLIN in 1976 and the company has been manufacturing a wide range of connectors for use in the Aerospace & Defence Industry, Medical, Energy and Transportation markets since 1984. Could you please briefly inform us about your product range, solution partners, subsidiaries, the capacity and capability of your facility based in France?

Oliver NICOLLIN: For more than 40 years, Nicomatic Group has been designing and manufacturing creative interconnect solutions

for harsh environments such as Defence, Avionics, Space, Medical, Energy and Transportation markets.

Nicomatic Group is a recognized player in the connector field specializing in niche markets with easy to use miniaturized modular micro connectors solutions for harsh environments. Our product ranges have been designed and produced according to Military standards (MIL 55302 / MIL 83513 / EN4165) under the AS/EN 9100 aerospace and defence quality certificate to help customers to overtake new limits.

Thanks to our process, we offer more than 80 millions configurations to solve customers pain in a very short lead time (1 to 4 weeks)

From inside the electronic systems to the outside world, Nicomatic provides ITAR free, global interconnect solutions which help customers to meet their SWaP-C (Size, Weight, Performance and Cost) expectations.

Nicomatic Group is comprised of a total of ten subsidiaries in the following countries the US, China, India, UK, Germany, Turkey, South Korea, Japan, Singapore & Canada as well as a vast network of sales representatives, agents and distributors that provide a sales presence in over 50 countries worldwide. The Headquarter is based in France at the Bons-en-Chablais site (Haute-Savoie) which is located a few kilometers from Geneva.

Two years ago, we extended our facility by adding 2 500 m² to the existing 4 500 m².

Nicomatic is growing and so is the building that will integrate new equipments, and a reorganized space for everyone as part of 100% in-house integration of our manufacturing, processes and tech center.

Today, all products are manufactured in-house with special expertise in stamping, molding, screw-machining, milling, assembly and cabling.

Nicomatic is a global connector specialist considered the partner of choice for more than 500 leading companies all around the world.

Defence Turkey: Nicomatic Group's total turnover has reached €50 million and the total consolidated turnover 88% of this revenue came from export sales in 2018. What is your 2019 target for total turnover both for France and overseas sales?

Oliver NICOLLIN: 2018 was a great year for Nicomatic Group with some big projects won which mark the Nicomatic History. We target a long term growth by optimizing our current business positions and enlarging our activities (countries, markets, products) Engagement and innovation are key to sustain 2 digit growth and investment level for years to come. That's why we are looking for a 20% growth to reach a total turn over of 60 millions euros.

Defence Turkey: Nicomatic Group allocates at least 20% of total turnover to R&D activities each year. Furthermore, you possess over 20 patents in regard to your products. Can you provide some insight into your R&D activities?

Oliver NICOLLIN: R&D is key to our development, its first goal is to answer to customer problems with improved interconnect solutions. We are proud to achieve more than 30% of our turn over with products that did not exist 3 years ago. Customers want useful innovations that provide value. Thanks to this metric, it seems that they trust our capacity. From standard product modification to creative solution, we are able to accompany the customer into this more demanding market by providing the right solution at the right cost. Thanks to this process, Nicomatic is part of the innovative companies.



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Defence Turkey: Could you please inform us about your unique products utilized in military platforms and systems all over the world?

Oliver NICOLLIN: Our connectors can be found in many electronics platforms where reliability and speed of information are key. Every time, you need intelligence in your systems, Nicomatic connectors will deliver the right value. Space and airborne systems are the ones benefiting the most from our technology. Today we are working in a brand new technology (Smart Connector) partnered with the CEA List Institute to develop & integrate into connectors a device able to detect & localize soft, hard & intermittent defaults in a complex wire network.

This device is based on an innovative technology that puts together reflectometry & communication. It is called Orthogonal Multi-tone Time Domain Reflectometry (OMTDR).

The expected benefits are numerous. The OMTDR technology will allow you to:

- > do preventive maintenance

- > quickly detect breakdowns in an electrical network

By doing this, the OMTDR will also :

- > reduce the cost of ownership of aerial, ground or naval vehicles
- > increase the operational availability of these vehicles.

Applications on the ground are directly linked to MRO (Maintenance, Repair & Overhaul) phases, and to the FAL (Final Assembly Line). This technology mainly addresses military, avionics, missiles and space markets where complex electrical architectures are used.

In the meantime NICOMATIC and ECA Group (specialized in the design and integration of testing solutions for the aeronautics) are combining their know-how for the development of a new electrical testing solution for aerospace.

Defence Turkey: Nicomatic Group is comprised of a total of ten subsidiaries such as US, China, India, UK, Germany, South Korea, Japan, Singapore, Canada as well as Turkey. When you compare the total sales performance of your subsidiaries in 2018, which ones stand out?



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Injection Molding Machine

Oliver NICOLLIN: US and China subsidiaries have more than 20 years of experience in terms of design, manufacturing and sales. So they are on the top for performance. However, when you compare the performance vs the experience we can definitely say that Turkey Subsidiary sales performance stands out. Being one of the last opened subsidiaries (2014) Turkey has demonstrated very strong and fast growth.

2018 was a great year for Nicomatic Turkey in terms of sales, project and development.

More than a sales office, Nicomatic Turkey became a value-added subsidiary by doing cabling, connector assemblies, R&D, logistics, sales and marketing as well as technical support.

I'm always happy to see when subsidiaries like Nicomatic Turkey want to move forward by providing expertise to our existing product ranges and contribute to the growth of Nicomatic Group.

I take this opportunity to congratulate Nicomatic Turkey Managing Director Idris DUMLU for his vision and energy as well as the entire Nicomatic Turkey team without whom all this will not have been possible.

Defence Turkey: Dear Mr. DUMLU, How did Nicomatic Turkey performed operationally in 2018?

Idris DUMLU: First of all, I have to say that the Republic of Turkey has shown great feat during 2018. Since 24 August 2016, Turkish military forces deployed in Northern Syria in order to establish peace and protect civilians with Operation Euphrates Shield. This year, we witnessed Olive Branch Operation by which Turkey seemed to be consistent and persistent.

As Nicomatic Turkey, we performed relatively well. Since the creation of Nicomatic Turkey (2014), we increase our operational efficiency each year by improving all of our processes (assembly, hiring, sales and communications, R&D...) that help the company achieve a target and meet the group strategy.

We have identified 4 main operational performance objectives : speed (fast delivery), quality (conform to specifications), costs (volume and variety of the products) and flexibility (adjust the product lines quickly to new requirements).



Oliver NICOLLIN, Idris DUMLU and Paul NICOLLIN

Thanks to this strategy, in 2018, we increased our sales by 60% compared to the previous year.

We also achieved teaming up closely with Turkey's pioneers in the defence industry.

More than a sales offices, Nicomatic Turkey brings value added expertise to the group.

In the coming years, we hope to contribute to Turkey's self-sufficient by all means and ways.

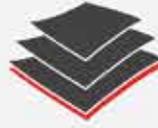
Defence Turkey: Can you describe the employment profile at Nicomatic Turkey? Would you like to share with us some aspects of your human resource strategy for the upcoming period?

Idris DUMLU: Nicomatic is recognized for its high-quality product and customer service. We act in a way that is socially, economically and environmentally responsible. Priority is placed on well-being, health and security for all personnel. Our processes and methods rely on freedom and

responsibility that allow employees to develop autonomy, self-direction and the creation of opportunities.

We value humans as human beings, not an asset that we can price. As you can see in our devise, "the human factor is key to success". Our first goal was to build up young and dynamic teams who embrace innovation and respect local values. In addition, we always consider harmony and teamwork. Hence, we hired bright and talent people not only by taking into consideration genuine, but also by stressing individual character which means lot more than genius. For the upcoming years, we're intending to hire intelligent and skilfull young engineers to be able to design new products which will be designed and produced in Turkey. The top management commitment is to apply a dynamic and innovative policy by involving the whole human, industrial and financial resources of the group.





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Defence Turkey: On November 28th, 2018, Nicomatic launched the unique 1mm connector that is planning to be assembled in the Nicomatic Turkey facility for use in military platforms and systems. An announcement was made in that launch meeting that the facility will be operational within January 2019. Did you start the assembly and integration of this connector in this facility?

İdris DUMLU: I have to say that we're proud to honor our words. Since the beginning of the year we extended our Ankara facility by adding 100 square meters in addition to the existing space in order to start the assembly and integration of the "national 1MM connector." Today we are glad to say that Turkey's first indigenous national 1 MM micro connector is 100% assembled in Turkey. We have now completed the first stage of our strategy and want to go to the next step which is to produce & design locally. As a matter of fact, we already have a lot of customers who benefit from the advantages of our 1MM connector in their projects.

Defence Turkey: Dear Mr.NICOLLIN, during the launch meeting, Nicomatic Turkey Office General Manager İdris DUMLU said "Our goal is to be producing 100% Turkish design and production patented micro connectors by focusing on R&D and then present it to the international market. Of course, it won't be easy to accomplish this ambitious goal as Nicomatic Turkey, but we believe that we will achieve our goal with the support of Nicomatic Group". Within the context of this statement, as it seems, Nicomatic group has placed importance on the potential of Nicomatic Turkey. Can you share your approach and vision about the activities in Turkey?

Oliver NICOLLIN: Turkey is one of the most interesting and fast evolving markets in the region in which we want to strengthen our local footprint to better serve our customers with our broad portfolio of solutions and best in class services.

Before sharing my vision about the future, we should remember what Turkey achieved in the defence



industry for more than 50 years. Turkey showed us to what extent it could make significant contributions in regional stability and international peace by its own capacity. Since that day, Turkey invested in the defence industry by collaborating with Europe and its regional partners. Today, Turkey has world-known firms in the defence industry and still shows its intention to be a regional power. As Nicomatic Turkey, we see Turkey as an important market and share same motivation with Turkish authorities. In the coming years, you will witness that Turkey will be one of the top countries in terms of the defence industry and Nicomatic Turkey will be one of Turkey's most reliable partners, not only in the defence industry but also in various other industries.

Since the beginning of this adventure, İdris DUMLU Managing Director of Nicomatic Turkey wanted to become a value added subsidiary by providing new know-how/expertise to our existing product ranges and contribute to the growth of Nicomatic Group.

Thanks to its vision, we are now entering a new stage as Nicomatic Turkey and Nicomatic Group.

As stated before we will transfer our accumulation to Turkey not only financially but also through technology transfer. We are ready to produce national products here with Nicomatic Turkey. We brought our 'Microflex' flexible harness product here which Nicomatic Turkey will present to all of Europe. We will take the first step here to offer this product not only to our Turkish business partners but also to international markets. As a result of our studies, we will introduce a 100% Turkish made product.

As Nicomatic Group we always support subsidiaries like Turkey who want to push and move forward in order to achieve their goals. Within 5 years, we hope to be able to produce world-known products which are designed and integrated in Turkey.

Defence Turkey: Dear Mr.DUMLU, Nicomatic Group 2mm and 1,27mm connectors have been procured for customers in the defence industry for a long time. Besides, the 1mm connector stands out to occupy 40% less space on the Printed Circuit Board and it is 60% lighter compared to other connectors with the same pin numbers. What comments can you make about the outstanding





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capability of this connector in comparison with similar products?

İdris DUMLU: The 1MM Connector stands out for its compact size, light-weight, low profile, high-quality performance, short delivery time and non ITAR product. We designed our product with this approach in Turkey and consider it as an effective solution for harsh environment design. We are talking about a technically compact MOTS (Military off-the-shelf) product. The size and height of a connector occupy on the Printed Circuit Board (PCB) are crucial. The 1MM Connector will provide the small size and height values requested by the customer. The second advantage is that it is light, especially in the case of embedded systems, weight is very important. The light-weight will result in less energy consumption. The Defence Industry has the most extreme conditions in the Aerospace Sector. You need to manufacture high temperature, vibration, shock, moisture, and radiation-resistant products. The 1MM Connector is designed and tested according to MIL-DLT-83513 military standards. We are also able to produce and deliver our products in a very short time. For example; We can deliver our CMM product within a period of five days. Our goal here is to deliver a 1MM connector within 24 hours after ordering.

Defence Turkey: There are no restrictions and end-user declaration for your products and both of the 1mm connectors are to be manufactured in Turkey. The other series are produced in France. Your products are entirely ITAR-Free. Would you like to make any comments about this, as far as advantages, challenges etc.?

İdris DUMLU: That's a really good point...Today if you want to export your products, you have to limit your dependence to the ITAR component. For instance, if a defence system contains at least one component under ITAR regulation, the United States has the power to prohibit its export sale to a third country. That's why more and more European countries want to reduce their dependence on ITAR components in Defence in order to not hinder the export of their programs. As you said, all Nicomatic products are manufactured in France and Turkey, they are not submitted to ITAR regulation which gives freedom to the



end user to export his program to a third country.

Defence Turkey: What is your vision for the next decade?

İdris DUMLU: Today, the world is on the edge of transformation. The world economy is structurally changing and becoming more and more digital. We perceive different challenges and significant signs that tomorrow's Defence and Aeronautics industries will be more demanding. So, as a global connector solution provider, we have to be ready for this digital transformation in order to be in line with customers and market expectations.

To prepare the future, we are planning our strategy according to 3 horizons (short, medium, long term) to optimize our current systems and to ensure our core skills in preparation for a future business model.

Our ambition is to target long term growth by optimizing our current business positions and enlarging our activities (countries, markets, products) by selling products and services too.

The world is changing we are too!

Defence Turkey: Lastly, would

you like to convey any further messages to our readers?

İdris DUMLU: First of all I would like to thank you the readers for the time they have invested in reading this interview. Then I want to sincerely and officially thank the Defence Turkey team for the opportunity you have given to us for sharing Nicomatic's ambition in the Turkish Defence market.

At Nicomatic we build high performance micro modular connectors for harsh environments. But more than that we provide trust, confidence and security to our customers.

Thanks to our continuous improvement quality culture, we work hard to develop creative solutions that improve signal integrity, speed, reliability and performance.

From deep waters to Mars our connector solutions deliver electronic devices electrical power, signals for data transmissions and high frequency for communications systems.

In brief, try the Nicomatic experience! ■



Oliver and Paul NICOLLIN with Nicomatic Turkey Team



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thyssenkrupp Marine Systems in Turkey

thyssenkrupp Marine Systems has world-market leadership in non-nuclear submarines, tailored solutions for frigates and corvettes based on the MEKO® concept, naval ship repairs and modernization, components' development and integration: whatever your needs in naval technology, thyssenkrupp Marine Systems can meet them.

Four OPERATING UNITS – Submarines, Surface Vessels, Naval Electronic Systems and Services– make up thyssenkrupp Marine Systems. Though each OPERATING UNIT is responsible for its own product management and projects, you benefit from the synergy effects derived from the bundling of resources, skills and capacities. Sales of all thyssenkrupp Marine Systems products are realized via a single centralized organization.



- › Yacht of Mustafa Kemal Atatürk (1937)
- › Built by ThyssenKrupp (Blohm+Voss) in 1931
- › The largest yacht of its time (124 m length o.a.)

thyssenkrupp and its predecessors have a longlasting partnership with Turkey, starting even much earlier than the first the official representation of the Company in 1914. Over the time, different shipyards have belonged to what is now known as "thyssenkrupp Marine Systems"; famous brands like Blohm+Voss (BV) or Howaldtswerke-Deutsche Werft (HDW) are known and relied on all over the world and especially in Turkey.

Upon entering World War-I as an ally with Germany, six navy officers along with other officers were sent to Germany. During the course that

started with the German submarine named "Vulkan", Turkish officers participated in various dives and trials with various submarines. At that time, it was planned to give 10 submarines to the Turkish Navy and even portrayed the Turkish flag on the ships. However, this promise could not be fulfilled when the war ended with defeat.

With first tries even starting earlier, the first two submarine ships of 674 tons with German design were ordered to the Netherlands in 1925. These submarines which were named "I. İnönü" and "II. İnönü", were brought to Turkey after the completion of the construction at Fijenoord Shipyard in Rotterdam (established by Krupp Germaniawerft) in 1928. In fact, these ships were submarines built on the basis of German UB-III design. Since it was prohibited to build submarines under the Treaty of Versailles in Germany, German design and know-how had been transferred to the Netherlands.

By 1935, some German submariners made on job training on board submarines of the Turkish Navy, when Germany accelerated the construction of submarines after being released from the Treaty of Versailles. After these submarines, when a German design submarine (Type 1A) was put on sale because of the Spanish Civil War in 1936 (Submarino E-1), Turkey has purchased the ship and she joined the Navy with the name TCG Gür. Same year, four more submarines were ordered to Krupp Germaniawerft. From these ships, the 1375-ton mine-laying submarine Batray and the 1210-ton attack submarine TCG Saldıray were built in Germany; TCG Atılay and TCG Yıldıray attack submarines of the same tonnage were built at the Taşkızak shipyard in İstanbul. However, TCG Batray was appropriated by Germany and not given. TCG Yıldıray was able to enter service only after the war because of the late arrival of the main engines.

In 1937, Turkey bought the motor yacht "Savarona" which was built by Blohm + Voss and acquired for Kemal Atatürk (until 2002 largest yacht worldwide).

TCG Atılay and TCG Saldıray entered service in 1939, however;



I. İnönü Submarine (1928)



TCG Saldıray (1939)

TCG Atılay was struck by a mine and sunk at the exit of the Çanakkale Strait (Dardanelles) on 14.7.1942. TCG Yıldırım and TCG Saldıray stayed in service until 1958.

While the military aid of the United States continued in terms of platforms, the other stage for the Turkish submarines began with the introduction of the AY class (Type 209) submarines (TCG ATILAY, TCG SALDIRAY, TCG BATIRAY, TCG YILDIRAY, TCG DOĞANAY, TCG DOLUNAY) built by (Howaldtswerke-Deutsche Werft (HDW) from 1975. Afterwards, a phase of building an upper model of the AY-classes at Gölcük Naval Shipyard began with the construction of Preveze class (TCG PREVEZE, TCG SAKARYA, TCG 18 MART, TCG ANAFARTALAR) in 1994. In addition to these, Gür class (TCG GÜR, TCG ÇANAKKALE, TCG BURAKREİS, TCG I. İNÖNÜ) submarines which were the Improved Preveze class have participated in the Navy from 2003.

In 1999, after the heavy earthquake effecting Gölcük area, Blohm+Voss provided 100 tents and thyssenkrupp Industries donated 1 mn EUR with which 42 earthquake-proof houses were constructed.

Between 1982 and 2000 a total



of eight MEKO 200TN class frigates (TCG YAVUZ, TCG TURGUTREİS, TCG FATİH, TCG YILDIRIM, TCG BARBAROS, TCG ORUÇREİS, TCG SALİHREİS, TCG KEMALREİS) were built together as well.

Finally, the construction of 6 Reis class submarines started at Gölcük Naval Shipyard within the scope of the German design (Type 214) state-of-the-art New Type Submarine Project with air

independent propulsion system.

thyssenkrupp Marine Systems has established longterm partnership with Turkish Navy, but with other Navies as well. Like previous brands Blohm+Voss as well as HDW, thyssenkrupp Marine Systems as leading player beneath and above the seas is available for future cooperation in all fields of naval business with navies all over the world

Overview of TKMS-involvement in Turkey

	Type	Σ	Class	Country of Construction	EDC	Commissioned	Type of participation
Current Projects							
	Sub	6	(Reis) (NTSP/1845)	Turkey (6)	(2009)/ 2011		Material Package
Past Projects							
	Sub	4	Gür (209/1400)	Turkey (4)	1998	2003 - 2008	Material Package
	Frg	4	Barbaros (Meko 200 TN II)	Germany (2), Turkey (2)	1990 (1+2), 1993 (3+4)	1995 - 2000	2 Built, 2 Material Packages
	Sub	4	Preveze (209/1400)	Turkey (4)	1987 (1+2), 1993 (3+4)	1994 - 1998	Material Package
	Frg	4	Yavuz (Meko 200 TN)	Germany (2), Turkey (2)	1982	1987 - 1989	2 Built, 2 Material Packages
	Sub	6	Ay (209/1200)	Germany (3), Turkey (3)	1971	1976 - 1990	3 Built, 3 Material Packages
	Sub	4	Ay (Type IA)	Germany (2), Turkey (2)	1936	1939-1944	2 Built (1 not given), 2 Material Packages
	Sub	2	UB-III	Netherlands (2)	1925	1925-1928	2 Built



Ribtech - Experts in Rigid Inflatable Boats

Today, Inflatable Boats and Rigid Inflatable Boats - RIBs, have become indispensable in many military and professional fields such as: Military Defence, Security, Search and Rescue, Coast Guard, Coastal Safety, Law Enforcement, Ambulance service and Fire-fighting due to their high-speed capability, maneuverability, navigation skills, low running costs and ability to be equipped for different tasks. In addition to its own brand Northstar, Marintek

Group has become the only manufacturer of the inflatable boat and RIBs in Turkey by buying all the assets of Asil Marine A.Ş. which has been known for its brand Joker since 1987. Following this development, the button was pushed for the production of high capacity and a high-tech featured boat. In this new and modern facility spanning an in-door area of 4500 m2, both Northstar and Joker brand pleasure boats are being produced as well as the

brand Ribtech which is carried out by merging these two brand's Military/Professional product line. The Ribtech inflatable boat product range has a variety of sizes and features, and also consists of RIBs up to 12 meters with hulls and decks produced by vacuum infusion or RTM (Resin Transfer Molding) technology. The company uses vinyl ester and epoxy resins as well as standard polyester resins in composite production.

All of Ribtech's inflatable tubes are produced either with CSM (Hypalon) which is known for its high durability or with polyurethane fabrics based on the customer's demands.

With the importance of military and professional demands, aluminum hull production for RIBs started as an alternative to composite in 2016. The first member of the Alupro product range, the Alupro 920 made its



debut at the International Istanbul Boat Show in 2017. Following the 920, the second member of the Alupro range named the Alupro 830 made its first debut in 2018 and is fully produced in the Ribtech Izmir facility from scratch to launch. Many other new models for the Alupro range are in the development stage. With this capacity, due to the short development processes compared to composite production, fewer or larger RIB projects can be completed.

The company, in addition to providing solutions for developing the standard product platform according to requirements, also provides customized solutions by developing projects together with the units needing the solutions. In addition to their engineering team, the company considers world-renowned design firms that are experts in Military and Professional RIB as our partners.

Production of the necessary molds are fully realized by Ribtech. Each of their products are delivered according to the superior operational characteristics as a result of a careful development and testing process of the overall design, hull design, complete with tube geometry and capacity.



© Ribtech

After many successful projects, in 2017, production of 15 units of 9.5 m open RHIBs with closed cell foam tubes were started for the Bangladesh Navy, and they were delivered in 2018 with full satisfaction. In addition, 10 units of their new inflatable model the G470 F was delivered to the Bangladesh Navy, and great feedback was received following delivery as well.

Ribtech is also a solution partner of STM, which is the executive company of MILGEM and the Pakistan Maritime Supply tanker projects at this time. Ribtech has undertaken the tasks of developing and producing the RIBs in both projects according

to user needs and requirements. Two 10-meter tender boats of the Pakistan Navy Fleet Tanker were successfully completed and delivered to Karachi Shipyard & Engineering Works Limited. The tender boats and the Fast Intervention Boats of the third and fourth ships of the MILGEM project were delivered successfully, and boats for the TVEG Project are still under construction at the Ribtech facility.

With seasoned experience spanning over 30 years, Ribtech is ready to be a solution partner with its dedicated and demonstrated effort in process improvement, product development and design quality.



The Future Tactical Communications Network Topology and Applications

by Cristi Damian, Vice President Business Development and Marketing, Advantech Wireless

Recent geopolitical developments fueled by both regional conflicts and an increased state of political instability have highlighted serious gaps in both technical capabilities and acquisition policies within several large NATO members' procurement agencies.

In the spring of 2018, at a major North American Joint Military / Industry Conference, the Army opening statements were quite blunt:

- › The procurement cycle has lengthened from 5 to 7 years to 10 to 15 years
- › Communication networks are ineffective and broken and help is needed from the industry to design new robust communication networks

If the telecom hardware procurement cycle is now 10 to 15 years, groups are planning from the start to purchase obsolete equipment. Consider the fact that, even before getting to tender, the industry needs as many as five years to design, test, validate, and certify products.

Add those five years to the 10 to 15 year buying cycle and now you see that the hardware technology being purchased can be 15 to 20 years old.

With today's rapid pace of technological change, few electronic components are available for that length of time. This reality places significant pressure on securing a massive inventory and burdens most military budgets. The challenges the U.S. Army faces today are vastly different from those 20 years ago.

With regard to the second statement about "ineffective networks" the military provided further clarification:

Current networks are...

- › Overly complex
- › Sluggish
- › Fragile and vulnerable
- › Easy to detect and jam
- › Difficult to secure
- › Not optimized



The repercussions are obvious. If we cannot communicate, we do not know where to move and where to shoot, i.e. the chain of command is down.

Our next generation of tactical networks need to be...

- › Mission Adaptable
- › Force Scalable
- › Joint Interopérable
- › Coalition Accessible

The new technological components of the tactical networks need to ensure:

- › Operation among populations within complex terrains including dense urban areas. This will force interoperability between Satcom terminals, with different access schemes, handheld radios, WiFi and Cellular networks.
- › Convergence for an Internet of Sensors and Shooters IoT (Internet of Things) is now part of modern warfare. SATCOM terminals will need to move further from just a standard data access pipe to an integrated intelligent wireless platform.
- › Resiliency and reliability We need the best technology with the highest reliability, for example Satcom GaN technology.
- › High bandwidth It is obvious today that the Army data throughput requirements are marginally met. The need for dynamic symmetric/asymmetric type of networks, at very high data rates, are a veritable challenge for VSAT TDMA networks.

- › Anti-Jamming, in a highly intense Electronic Warfare environment Simple GPS jamming with low cost off the shelf hardware, has exposed the vulnerabilities in SATCOM Networks, artillery firing and drone flight control. The ability to change traffic profile on the spot and find alternative secure ways of communication is needed.
- › Autonomy and Spectral Awareness A communication node needs to be autonomous not only in terms of energy, but also in terms of traffic security, spectral monitoring, terrain monitoring, geolocation and access to wireless complementary technology. A communication node should allow convergence of multiple sensors and radios on the same data backbone.

A careful review of all these requirements, will clearly position the SATCOM technology at the heart of any modern tactical network. The SATCOM terminal is the linchpin which will bring together convergence, autonomy, interoperability and scalability within the battle telecom infrastructure.

Advantech Wireless Technologies "Engage Class" Satcom Terminal is designed and built based on this overall Convergence concept. This is a state-of-the-art flyaway SATCOM terminal that reaches and integrates alternative technologies such as Military Grade WiFi and cellular capabilities.

The Engage Class

One of the major Army complaints was related to the high rate of hardware failure.

Active components are prone to failures more than passive ones and amplifiers are part of this chain. The vast majority of the 50,000 SATCOM terminals that NATO operates are still based on TWT technology. The Engage Class of SATCOM Terminals from Advantech Wireless has adopted an “All GaN Solid State Technology” for the power amplifier. MTBF numbers on the RF part itself have increased from a typical 60,000-hour value to over 200,000 hours due to the use of GaN technology.

GaN SSPA

With reflector size of up to 2.4 meters, the Engage Terminal can accommodate C-, X-, Ku-, or Ka-RF feeds and can guarantee data rates in excess of 50 Mbps.

The terminal can generate two independent carriers, all with Transec security incorporated, and it is agnostic to the modem type.

Today NATO operates several incompatible VSAT networks, all of them with their own proprietary standards. Joint Interoperability between coalition units is a never reaching target and even within national defense organizations it seems impossible to reach coordination and a common channel between Navy and Air Force, for example.

Autonomy, in this case, is hardly possible, as the need for a centralized point of communication is imperative.

With the ability to uplink two independent carriers, the Engage Terminal allows a more robust communication link, as well as direct communications to the chain of command as well as simultaneously pier to pier. At IP level the traffic can be split which will drastically decrease the risk of communication eavesdropping and decryption.

The terminal can accommodate either SCPC or TDMA modem technology and can fit within any existing operating network either

as an add on terminal or as a bridge to another incompatible SATCOM operating network.

In order to find the satellite, and to synchronize within a TDMA network, both the antenna and the VSAT modem need accurate GPS information. GPS information will provide accurate location, which defines the time delay to enter within a TDMA time slot, as well as look up angles for the antenna pointing.

Jamming the GPS signal, with relatively low cost off the shelf hardware, has proven to be highly efficient in disrupting the SATCOM links. Without GPS location, the antenna controller does not know where to point and the VSAT terminal has difficulty joining the network.

The Engage Class of antennas has an optional built in Anti-GPS Jamming capability and can cancel several GPS jammers that are within close proximity. Once the antenna has detected GPS jamming, it will actively generate nulling signals and cancel them. Today, this is typically more of a mandatory feature — the risk of not being able to setup the transmission link is to be avoided.

On these flyaway terminals, we are used to deploying heavy duty ruggedized laptops and tablets. These PCs contain a lot of critical intelligence data and should not be left in the field unattended, in case the SATCOM terminal is damaged, or the position needs to be abandoned.

2.4m Flyaway Engage Class
High Performance
Satcom Terminal

ADVANTECH
WIRELESS

Being ruggedized by design, they are difficult to destroy and able to avoid data extraction by unfriendly forces. Being heavy, they are also difficult to hand carry and the soldier will always face the dilemma of carrying enough water and supplies to allow a few days survival or to carry a heavy laptop. This is one of those dilemmas that nobody wants to be faced with.

The Engage Class antennas are moving into ultralight, credit card size PC technology. These plug-in PCs weigh only a few grams and can be plugged into miniature communication consoles that are designed to be carried by soldiers or as part of the flyaway terminal, or in the vehicle mount. These antennas consume a fraction of energy, typically 5W, which is a critical element in the field.

Miniature Plug-In PC Card

A typical console can accommodate several plug-in PCs, each of them running independent tasks.

One PC can run the operating system, one can do encryption, one video encoding, one act as a data router, and so on. They can all be removed and reinserted in the field, so no critical data is left abandoned. As an add-on function, the Engage Class terminal can also generate an independent local cellular area, called the ARTEMIS LTE Platform.

The ARTEMIS' objective is to deliver secure, high performance, instant communication capabilities to voice, data, text and chat.

The platform enables rapid establishment of a scalable and mobile secure wireless network for ad-hoc operations. It is Self-forming, Self-Healing and Path-Optimizing wireless network infrastructure for dynamic network environments and supports any 4G LTE enabled device with as many as 256 concurrent connected sessions.

The ARTEMIS LTE Platform

The network once connected over the SATCOM backbone to a cellular provider, or to an



identical point of presence, has the option to integrate different radio types (as used by local police, firefighters, medical services) and make them interoperable. This feature is critical to operations in heavy populated urban areas.

An optional Military Grade Radio network can also be deployed that is designed to be resilient in heavy cellular and WiFi use areas where typical cellular access is denied. This specialized Radio network is able to provide high data throughput, integrates easily with any existing city surveillance cameras and operates in underground networks. Drones can be integrated with these radios and they are setup to provide either simple video streams or network extensions.

Locating people in underground areas, where GPS networks are not available, is also an option on the Engage Terminal. It is a function that was designed to serve primarily in search and rescue situations.

Dedicated hardware can extend the GPS presence in tunnels, mines, or underground metro networks.

Based on this GPS extension, which is perfectly synchronized with the real external GPS network, a user can find his own location using either a simple Google Map application on his cell phone or a government user can be located with a Tetra phone.

Underground Locating Capabilities

Once again, this information is captured by the Engage SATCOM terminal and directed to a Tetra point of command center, or to a cellular provider that can correctly locate the user in distress.

Geolocation maps for underground areas can be developed and ported into user PCs for accurate position finding.

To conclude, the future communication terminal, and the future tactical network, need to be able to operate in a totally different environment.

The SATCOM terminal needs to provide robust links, while benefiting a large area of coverage. It also needs to extend its capabilities into complementary technologies.

We need to be able to extend the cellular network, while at the same time avoiding cellular congestion. We need to be aware of our surroundings and have access to video feeds. We need to be able to reach people in GPS denied environments — and we need to be able to make incompatible networks talk one with each other.

These are the fundamentals on which the Engage Class Satcom Terminal was designed and on which it will evolve.



About Cristi Damian, Vice President Business Development and Marketing, Advantech Wireless

Mr. Cristi Damian joined Advantech Wireless in 1995 where he held various positions in Operations, Manufacturing, Sales, Engineering and Customer Support. Prior to Advantech Wireless, he acquired experience as a hardware engineer in various high-tech companies. Mr. Damian holds a master's degree in Electrical Engineering from Concordia University.

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SIMUNITION® is the Leader in Non-Lethal Force-on-Force, Short Range Training

Since 1992, SIMUNITION® has been the pioneer and world leader in providing military and law enforcement members with the most realistic non-lethal training system for Reality Based Training.

The original idea for the SIMUNITION® product range can be traced back to the late 1980's. Following a training accident that resulted in the death of an Operator from a Tier 1 Counter Terrorism Unit, Bill Dietrich and David Luxton decided that there must be a better and safer way for elite Operators to train for the high-risk operations they were tasked to complete.

After a few years of continuous research and development, the first SIMUNITION® 9mm FX and .38 FX marking cartridges were released to the market. With safety as a primary focus, SIMUNITION® Protective Equipment was designed to ensure that End Users were safe from incurring any significant or serious injuries when using SIMUNITION® Products.

SIMUNITION® Conversion Kits were also developed in an ingenious way to convert real firearms to only fire the newly designed SIMUNITION® ammunition while at the same time preventing 'live lethal' ammunition from being fired. The first firearm conversion kits that were developed were for the Heckler & Koch MP5 sub machine gun and Browning Hi-Power and Beretta 92FS pistols. At the time these were the standard issue firearms for the Counter Terrorism Units that SIMUNITION® was originally intended for.

The early success and adoption of SIMUNITION® by the world's elite Counter Terrorism Units resulted in new conversion kits having to be rapidly developed for an ever-expanding list of firearms. The standard use of optics, weapon lights and lasers also resulted in the need for a SIMUNITION® 5.56 FX cartridge to be developed.



In 2003, SIMUNITION® introduced its 5.56 FX marking cartridges to an eagerly awaiting list of customers. The SIMUNITION® 5.56 cartridges also resulted in a range of new Conversion Kits being developed as 'drop-in bolts' that simply replaced the factory bolt carrier group and allowed End Users to use the optics, lights and lasers that they had mounted on their rifles.

The design of the SIMUNITION® 5.56 cartridges and the 'drop-in bolt' conversion kits also met the strict SIMUNITION® safety standards and were designed to prevent 'live lethal' ammunition from being fired in a rifle that was fitted with a SIMUNITION® 'drop-in bolt' conversion kit.

In 2007, SIMUNITION® introduced its range of SecuriBlank Loud ammunition that was designed to replace the use of conventional blank ammunition in most training activities. The SecuriBlank Loud ammunition worked with SIMUNITION® Conversion Kits and therefore prevented an End User from being able to fire 'live lethal'

ammunition in their firearm with a SIMUNITION® Conversion Kit installed. This meant that End Users no longer had to use a 'live firearm' in the training area to fire blank ammunition, significantly increasing the safety of End Users undergoing training.

In 2013, SIMUNITION® introduced another type of SecuriBlank ammunition called SecuriBlank Quiet. This ammunition was designed to ensure there was no discharge from the muzzle of the firearm and that the only noise being generated was the sound of the firearm cycling. As there was no discharge from the muzzle, SecuriBlank Quiet ammunition revolutionized the way instructors could teach close quarter defensive tactics or basic firearms training, including techniques and manipulations, in a classroom environment.

SIMUNITION® continues to innovate and adapt to customer requirements and later this year SIMUNITION® will be releasing a new product called SecuriBlank Extra Loud. The new Extra Loud range of blank ammunition will be louder than the current SecuriBlank Loud range of ammunition and will provide End Users of the SIMUNITION® Training System with increased versatility.

SIMUNITION®'s Sole Turkish Distributors, since 1999, ALA Uluslararası, are exhibiting at IDEF 2019 and will be on hand to answer attendee's questions about the full SIMUNITION® product range.





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Power Quality in a Tactical Application: What is PQ? Why is it Important?

It is generally accepted that power quality is critical to the reliability and efficiency of operational combat capability. However, relatively little is understood about the relationship and interaction of modern combat capability and the electrical systems they are dependent on. The failure of power and systems engineering to understand this relationship has resulted in increased cost and decreased capability in military systems in general.

In recent years there has been significant R&D investments made in advanced battery chemistries, technologies and renewable energy sources for the warfighter. With the anticipation these new technologies bring, the concern for clean, conditioned power, or "Power Quality", must remain as part of the discussion.

What is Power Quality?

Power Quality can be described as the amount of distortion in voltage, current or frequency from a power source. The power source can be an electrical utility grid, generator or any other energy generating source, on board a ship, on a tactical vehicle, at a radar station, or at a remote deployed operational environment.

The power provided to mission critical systems should be consistently maintained as a clean, conditioned, regulated signal, or sine wave regardless of the state of the power source. The power signal should maintain a constant voltage and frequency with no distortion of the waveform and no interruption of power to the mission critical system (during blackout/brownout). Common power anomalies can include, harmonic distortion, switching transients, line noise, frequency variations, power surges, power sags, high voltage spikes, brownouts and power failures (blackouts).

Benefits of improved power

quality include greatly reduced, or eliminated unplanned down time, increased life cycle/Mean Time Between Failure (MTBF) of mission critical systems and cost savings through reduced energy usage and cooling requirements.

Many Commercial Off the Shelf (COTS) Uninterruptible Power Supplies (UPS) will convert the output signal from a sinewave to a stepped AC wave when operating on battery power as shown in **Figure 1**. Many times, this output transition will create a switching transient shown in **Figure 2**. When this transient is supplied to the input of the mission critical system, it will cause damage to the internal components. As this event happens multiple times, it will cause catastrophic equipment failure in the mission critical system, which in turn, will cause unplanned down time for the mission, and at worst case, loss of life for the warfighter or the operational platform. Many of these COTS UPSs are currently deployed in many state of the art defence systems, because the initial cost is very inexpensive.

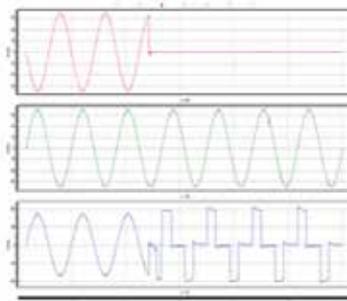


Figure 1: Stepped AC sinewave output of COTS UPS when operating on battery, shown in lower waveform

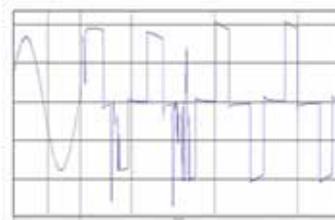


Figure 2: Switching transient on COTS UPS output caused by transfer to battery power

Only after there is a catastrophic system failure are these UPSs replaced with ruggedized power conditioners.

Many military applications use a generator as a power source. It is common that power produced from a generator will have fluctuating frequency and voltage output as seen in **Figure 3**. Any mission critical system must have a power conditioning element installed between the generator and the mission critical system (load) to correct or regulate any fluctuation or deviation in the power. Many COTS UPSs have a passive filtering circuit that provides very limited conditioning, and only under certain conditions. To properly correct these voltage and frequency fluctuations, and to protect the mission critical system a power conditioner, or UPS with an active filtering circuit must be utilized.

Many times, a utility power grid will produce line noise, or "dirty power" due to any number of circumstances. Line noise is characterized by "notching" in the

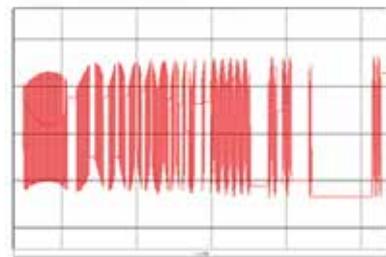


Figure 3: Generator output with frequency deviation and voltage fluctuation

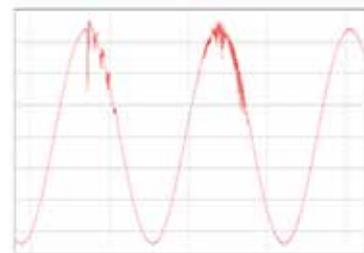


Figure 4: Line noise shown with notching of the waveform

waveform when measured with an oscilloscope as shown in **Figure 4**. This condition is very common in today's utility grids, because of poor equipment condition, overloading or poor connections, to name a few. Line noise can be especially detrimental to sensitive mission critical systems if not corrected. As described in the previous paragraph, a power conditioner with active filtering is necessary to correct this condition.

Another common power anomaly is harmonics. Harmonics are characterized by a distortion in the voltage, current or frequency waveform as shown in **Figure 5**. Harmonics are caused by non-linear loads such as switch mode power supplies, variable frequency drives or variable speed drives. These systems can be connected on the system load, or they can be "reflected" from other areas within the electrical distribution network. Active filtering within a power conditioner is required to correct any harmonic distortion.

Another common power anomaly is harmonics. Harmonics are characterized by a distortion in the voltage, current or frequency waveform as shown in **Figure 5**. Harmonics are caused by non-linear loads such as switch mode power supplies, variable frequency drives or variable speed drives. These systems can be connected on the system load, or they can be "reflected" from other areas within the electrical distribution network. Active filtering within a power conditioner is required to correct any harmonic distortion.

Why is Power Quality Important?

Clean power quality will ensure that the mission critical system will

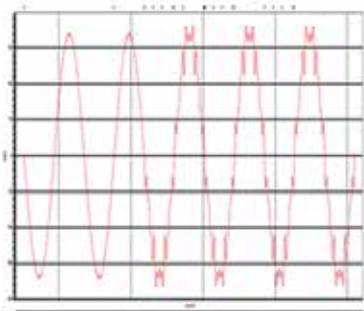


Figure 5: Common harmonic distortion caused by connected equipment in electrical distribution system



NOVA Power provides ruggedized power conditioners tailored to suit harsh maritime operating environments including submarines

operate efficiently and will protect the integrity of your data. The net effect of improved power quality is a reduction of maintenance costs and conversely, an increased life cycle of the mission critical systems.

Results of poor power quality are well documented. If the power supply in a mission critical system, for example, is repeatedly exposed to varying degrees of poor power quality, including line noise, transients or harmonic distortion, sensitive components such as transistors and IC chips on circuit boards and power supplies will suffer damage as shown in **Figure 6** and **Figure 7**.



Figure 6: Blown transistor caused by generator frequency deviation



Figure 7: 70% of electronic equipment failures are attributed to power quality issues.

What can be Done to Improve Power Quality?

There are many steps that can be taken to improve power quality, chief among them is to install a power conditioner that can isolate, correct and/or mitigate any power quality issues from affecting the mission critical system. Not all power conditioners are created equal. Many times, system engineers may believe all that is required to meet the specifications for an application is a system that can provide battery backup during a loss of input power (UPS). Most COTS UPS systems, however, do not have the active filtering, conditioning and isolation characteristics that are required to meet tough military standards.

About NOVA Power Solutions

NOVA Power Solutions provides true power quality as part of our equipment capability solution, which provides power conditioning 100% of the time. NOVA delivers award-winning technical support, customer service, and expert knowledge when providing unsurpassed power protection to mission-critical electronics throughout the world. NOVA Power's rack-mount rugged and ruggedized uninterruptible power supplies are designed to MIL-STD compliance and well suited to shipboard, tactical military and other harsh operating environments. While NOVA's power quality solutions are customizable, they include power conditioners, converters, and distribution and



battery backup solutions that provide customers a wide-range of power protection and backup alternatives.

Nova Power Solutions provides true power quality as part of our equipment capability solution, which provides power conditioning 100% of the time. All Nova Power systems are designed with double conversion technology which isolates the load from harmful input harmonics and frequency distortion. Isolation transformers can also be integrated, which will isolate the distribution system from faults and harmonic effects of the load. When input power falls out of tolerance, and the power conditioner/UPS transfers to battery power, Nova Power systems do not create a switching transient on the output from the battery transfer. This will help to increase the life cycle of the mission critical systems. Because Nova Power systems have a more tolerant rectifier input circuit, they will not transfer to battery power during minor input events, or fluctuations. This will increase the life cycle of the batteries within the system.

Nova Power Solutions offers power condition, conversion, backup and distribution systems. All Nova Power systems are ruggedized and tested to meet various military standards. Nova Power provides custom, scalable solutions to fit a wide range of applications. They are particularly suited for shipboard, tactical military and similar rugged environments. Nova Power has been providing systems for military and heavy industrial applications for over 30 years. With this experience we have a deep understanding of logistics

and supply chain management and support the product through its entire life cycle.

Since 1988 NOVA Power Solutions has been providing shipboard, rack-mount and bulk-head mount uninterruptible power supplies and battery backup modules to the US and allied militaries for use in mission-critical C4I and Combat systems. Additionally, the reliability and ruggedness of our power protection units and battery backup modules, also make it an ideal solution for non-military critical applications like, Urban Security and Public Safety Systems, Intelligent Transportation Systems and Critical Infrastructure Protection Systems.

NOVA Power Difference

NOVA Power Solutions is focused on solving problems encountered during the generation, distribution and use of electrical energy. Recent studies indicate that greater than 80% of electronic systems failures are power supply related. Furthermore, more than 95% of power supply failures are directly or indirectly related to the power quality of the primary electrical system.

NOVA Power Solutions power conditioning solutions eliminate 98% of distributed electrical system anomalies, increasing system reliability and electrical generation efficiency.

NOVA Power Solutions power conversion solutions optimize load side electrical efficiency further and thus enhance reliability and allow for the use of a wide spectrum of electronic solutions to meet your requirements.

NOVA Power has established itself as a premier provider of mission-critical rugged UPS, Power Conditioners, and Battery Backup Modules, with over 40,000 units presently deployed in the world's harshest environments. Our solutions protect mission critical systems worldwide for applications



Süleyman BAYRAMOĞLU - NOVA Power Solutions Business Development and Regional Manager for EMEA

where “up time” and reliability is absolute and unconditional.

Süleyman BAYRAMOĞLU NOVA Power Solutions Business Development and Regional Manager for EMEA, says “Based on our more than 30 years of success in the US, since 2013, we have been rather active in Europe, Turkey and the Middle East and have managed to raise awareness of the power quality concept. We have been collaborating with the many defence integrators and manufacturers in the US and Europe, contributing with them in the development of highly reliable defence systems starting from the very bottommost layer. Our mission is to provide reliable power protection solutions to mission-critical electronics throughout the world. We strive to offer our customers industry-leading customer service and peace of mind that they are protected with our high-quality power supplies. To prevent a power failure when it’s not an option, we continue to specialize in customizable, rugged power solutions designed to customer specified requirements and that are particularly suited to shipboard, tactical military and other harsh operating environments.”

NOVA Power is exhibiting at IDEF and the Naval Systems Seminar in October this year, both for the fourth time in a row. BAYRAMOĞLU continues “I must express my satisfaction and appreciation for the emerging opportunities and networking that resulted during previous IDEF shows and other small scale but effective events like the Naval Systems Seminar and the Land Systems Seminar. We consider those events as perfect venues that allow us to explain the importance of power quality in developing high performing and reliable applications to achieve higher operational availability.”

NOVA Power intends to come together with the engineering teams from system integrators and manufacturers, as well as representatives of the Presidency of Defence Industries, Turkish Army, Navy, Air Force, General Command of the Gendarmerie, Turkish Coast



Their products operate in the most extreme environmental conditions

Guard and the Turkish National Police, with a view to inform and raise awareness about the importance of power quality in the development of reliable, high-performing indigenous systems that will enhance the level of operational availability.

Contribution to Locally Developed Ingenious Systems

The number of systems delivered so far, worldwide exceeds 80.000, while the install base in Turkey is currently around 300.

Süleyman BAYRAMOĞLU adds, “When we set up our first International office in Turkey in March 2015, we positioned ourselves as ‘Collaborating with prominent defence companies and contributing in their ingenious

defence system development activities by providing the most reliable power solutions, thus promoting their ultimate goal of exporting Turkish made state of the art defence systems to regional countries and the world”. Now we see how right we were when in setting up this objective, and we managed to establish trusted relationships and close collaboration with a number of defence companies, particularly Aselsan, Havelsan and Vestel Defence in developing reliable indigenous defence systems. We are pleased and proud of observing the success of those state-of-the art defence systems designed, developed and integrated by the most talented Turkish engineers in operation” ■



Providing optimal power solutions for remote harsh field operations

Karel – Over 20 years of Expertise in Military Communication System Products and Solutions

Karel was established in 1986 as a telecommunication equipment manufacturer and designs PBX products and services for the Turkish market. The company led Turkey's transition from electro-mechanic communication systems to electronic communication systems. Karel has the proprietary right of ownership of its state-of-the-art technology products in the field of communication electronics in Turkey and also has an R&D department that is in compliance with international standards since the establishment of the company. Karel, as the market leader in Turkey, exports their products and solutions to more than 30 countries. Karel provides services to more than 700 thousand businesses with their PBX products only in Turkey and stands among the top 3 in Europe and the top 15 manufacturers in the world.

With over 2,050 employees, Karel has recently been providing solutions for the Turkish Armed Forces and Navy in respect to communication needs for more than 16 years. The Karel Military Product Family has a wide product range from durable communication switchboards to Public Address General Alarm (PAGA) systems designed for navy Military ships. For the last ten years, Karel has put PBX intercom systems and PAGA systems on the market for moderate-large Military ships in respect to the needs of the Turkish Naval Forces and shipyards.

In 2018, Karel has developed Gateway solutions with R&D activities. The Gateway device, which carries 7 analogue and E1 line to the IP port, can be used in satellite communication systems in military ships, has started to be utilized successfully. In the forthcoming months, Karel's AG102 model, which has 14 analogue + E1 IP converter, designed for Turkish land forces, will begin being used. Karel's Radio Over IP (ROIP) device has the capability of converting 4

radios and 14 analogue ports to the IP. 3 different 1U height products which are for Gateway applications will be exhibited at IDEF'19 fair. Karel is proud to develop the first national gateway product family with their genuine technology.

Company Objectives;

In the defence industry, the company's most significant objective is to extend their market to South Asia, the Middle-East and Turkish Republics, conducting exporting transactions in the long term. Additionally, the company aims to maintain an increase in turnover by developing cooperation with prime contractors in the domestic market. Karel provides service to the Azerbaijan and Bangladesh armies with their DS200T military PBXs. The DS200T is the best product in Europe in the field of military PBXs. It provides infrastructure which enables communication with wire connections all over the world. The DS200T, which is a Hybrid PBX including today's IP technology, provides connections with military IP radio link equipment (preferably with the 5220 IP Radio Link which is a brand of Aselsan) providing fast and portable, small and low-cost communication to armies worldwide.

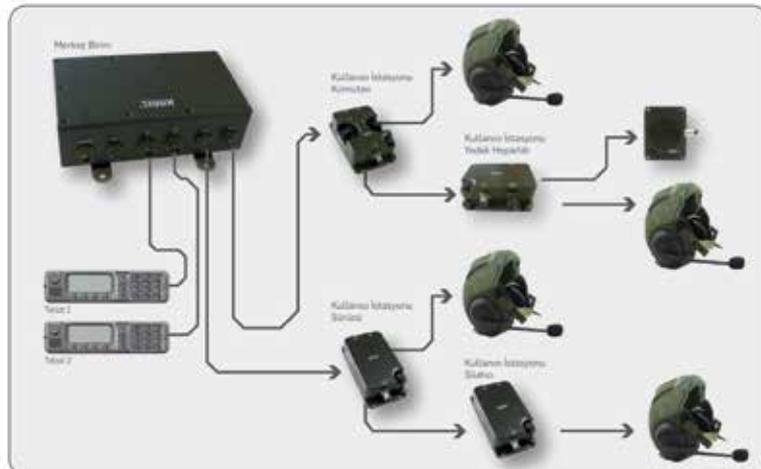


© Karel

The continuation of infrastructure investments in R&D activities in the defence industry will subsequently improve test capabilities. In doing so, test capabilities in this regard will gain advantages for the company in respect to the competition due to the intensity of environmental conditions and EMC/EMI necessities in military products. With standard and progress training which will support design work for aerial platforms, the skills of R&D personnel will be honed.

Product Portfolio;

Karel manufactures products and solutions in respect to the needs of the defence industry. The product range which started with military communication systems has expanded over the years to solid state discs, electronic control card and systems, manual military computers, inertial navigations devices under military standards. These products are still being utilized by the Turkish Armed Forces and foreign armies.





The DS200D/T series military communication systems, depending on the location of use, are differentiated from each other and customized according to land/naval uses.

The DS200T military Analogue switchboard is designed for tough field conditions and they are portable and durable against impact. The DS200T distinguishes itself from others with features such as its backlight broad display, backlight key set, receiver installed to cabinets and headset that provide ease of use and PC-based system management interface. It provides connectivity with devices such as Analogue/IP/ISDN terminals, answer phone, fax and modem interface.

With the IKT - Intercommunication system, they provide intercom solutions for naval platforms and land vehicles. IKT systems are waterproof and appropriate for use in challenging field conditions (vibrations, shock, exceptional weather conditions, excess temperature etc.) With flexible structure, IKT100 series provides intercommunication and wireless access to various numbers of users.

Particularly, Intercom systems developed for armored vehicles by KAREL have become ever more popular amongst vehicle manufacturers. Karel offers a cost-effective solution for internal and radio communication needs of the vehicle crew while fulfilling all military environmental and electromagnetic compatibility standards. The IKT systems provide send and receive access to two different radios and the commander can also control crew access permission. Different variations of KAREL IKT-Intercom systems offer a wide range of usage according to the needs of different vehicles.

At IDEF2019, Karel will showcase the communication switching system (MAS200) that supports 30 user stations and allows 4 different radios connections. Karel provides national solutions to military underwater demolition boats for internal communications. In addition, the MAS200 will provide a reliable solution for internal communication of large military vehicles.

Senih BAŞOL- Karel Defence Industry Solutions Director: "Karel will continue to develop products and projects for the defence industry with its experienced R&D infrastructure, and to play a major role as a subcontractor in both national and international defence projects. Our company culture allows us to easily collaborate with many different companies. We always work to accomplish projects on time."



The AD101 system, developed as a Military ship Alarm and Public Address System, meets the needs of alarm and announcement in military ships due to its developed features and integrated structure. With the Alarm and Address system, region-based alarms are given, announcements are made to selected regions and airplay is carried out over Radio-CD.

The AD101 Alarm and Address System enables alarm and announcement calls or airplay in bodies defined as military ship-wide or as grouped. The system operates integrated with Accounting Switching Fabrics (MAS) and military ship Switchboards. The system also has User Stations (KI) authorized over Accounting Switching Fabrics and an external

interface to alarm and announce with a handset over a telephone switchboard. Power supplies which will provide power needs of the devices that are located within the GKB unit. Telephone Repeater Units (amphitheatre) within the scope of the ASS are located on the amp modules on the General Control Units.

The AD101 Alarm and Address system is a modular structure created with the integrated operation of more than one product. Units are developed according to 19" rack cabinets. The system has a power supply with both AC-DC and DC-DC features, and which can be scaled to be compatible with different power needs. The system is controlled and managed over the amphitheatre unit central system. The system was designed for easy assembly and suitable for maintenance. Thanks to the modular structure, broken units are easily replaced without injuring integrity.

The MIL-STD 461E and MIL-STD- 810F were developed in compliance with military standards. By using military connectors in the system, measures were taken against corrosion, vibration and other excessive weather conditions. The power supply of the entire system is provided from a single point. Special filtering prevents noise in the power supply. With the management software, the entire system is easily configured, and error statuses are easily monitored.

AG101, AG102 and TAG101 Military Gateway devices are used to convert analogue telephone interfaces at FXS ports and E1 interface into Ethernet /IP networks. TAG101 Military Gateway also converts four port radio interfaces into Ethernet / IP network. Both devices are used to connect Radios, analogue ports, E1 ports to IP network in both directions. Karel's Gateway models fulfil Mil-Std 810 and also Mil-Std 461.



Virtual Training for Wherever the Fight Takes You

From first-person tactical gaming to simulating complex global military operations, BISim offers flexible and comprehensive simulation and training solutions

Virtual training provides military organizations with the means to train personnel on tactics, techniques and procedures, and enhance their operational readiness without risk to equipment, and without the high costs of fuel and ammunition expenditures. It also augments live training exercises by providing opportunities for repeated practice in highly realistic virtual environments and using highly accurate simulated representations of actual equipment. Because of these advantages, militaries have increasingly incorporated simulation software into their training programs.

Bohemia Interactive Simulations' flagship product, VBS3, is used by hundreds of thousands of defence personnel worldwide for virtual training and simulation. VBS3 provides an immersive virtual environment and a huge range of models and tools to facilitate highly impactful mission rehearsal and tactical training. With its After Action Review tool and extensive, detailed simulation, the software is designed to help defence personnel learn to think, make decisions and improve communications before undertaking live field exercises. VBS3 supports a broad range of international border security training tasks from finding and countering improvised explosive devices to observation and intelligence-gathering skills training to chemical, biological radiological and nuclear defence training.

Comprehensive, Cutting-Edge Technology

Founded in 2001, Bohemia Interactive Simulations (BISim) is a global developer of advanced military training and simulation software. Their mission is to harness the explosive potential



VBS3 includes 14,000 models. Shown above: A training scenario showing British Army infantry and custom Warrior vehicles in VBS3

of technology to revolutionize training and simulation. They use the latest game-based technology and a large, experienced in-house team of engineers to develop high-fidelity, cost-effective training and simulation software products and components for defence applications.

BISim has continuously enhanced and improved its VBS technology to craft simulation solutions uniquely suited to delivering on military training use cases. From desktop training and mission rehearsal to image generation and virtual reality, VBS3 has been written by engineers "with a subject matter expert looking over the shoulder" literally

thousands of small- and medium-sized capability improvements have been added to the software based on expert feedback to extend its training use cases, enhance realism and maximize training value.

"BISim offers a comprehensive, cutting-edge technology portfolio encompassing desktop training, simulation host, image generation, terrain editing and management, AI and software development tools, all integrated to provide superior workflow," said Craig Turner, BISim's Business Development Director. "Our open and modular commercial-off-the-shelf software products can be customized by users or enhanced by our large technical team who have broad and deep expertise in developing training and simulation solutions for military and defence organizations worldwide."

With over 18 years of BISim's own investment in research & development and support from customer funding, they've been able to continuously drive significant functionality, usability and performance improvements across their product portfolio. Their software is easy to use, so you can get right down to training.



BISim's main product lines includes desktop simulation, image generation and terrain editing software



BISim created a touch screen-enabled CV9040 part-task trainer for the Swedish Armed Forces.

Armored Vehicle Training

Between fuel, ammo, maintenance and personnel costs, live training with vehicles and crews can quickly add up. Simulation offers a cost-efficient way to augment live training exercises. VBS3 is used extensively for military vehicle simulation across many different use cases from tank driving skills to gunnery operations training to combined arms breach visualizations.

For the Swedish Armed Forces, BISim built a part-task trainer for the CV9040, the country's infantry fighting vehicle, with a level of fidelity usually required for flight sims, where every button, every switch is faithfully represented. BISim also created a similar part-task trainer for Swedish vehicles for training on the Kongsberg Protector RWS. BISim developed an HTML-based user interface that represents the panels in the vehicle. These are touch-enabled so the Swedish Armed Forces can use them on touchscreens. This is really what separates a simulator from a video game. Users need to know the procedures to power on the turret and calibrate it in the simulation.

This internal functionality of the CV9040 was only part of the project. BISim updated the ammunition simulation, so that air pressure and air temperature affect the trajectory of shots. BISim also modeled damage simulation more accurately, to show trainees what systems got damaged by a round penetrating the tank. Finally, functionality was added to the AAR that gives trainees a special report on their targeting performance and hardware has been integrated with the real-world control handle replicas the Swedes use from AFV Sim.

The touch-enabled control environment is a very powerful tool that gives BISim a new and unique opportunity to model and simulate, to the tiniest detail, any control panel or other internal systems of any vehicle, ship or aircraft; this way enables any kind of high-fidelity procedural training.

While this work was specific to the Swedish Armed Forces, it demonstrates the kind of complex simulation work that BISim developers are capable of accomplishing. The takeaway is this: If you're looking to build a tank or other vehicle in VBS3 to a high degree of fidelity -- it could be a T-72, a Challenger, an Abrams, Altay Tank -- BISim can produce the same high level of detail for any tank in the world.

Hitting the Mark with VBS3

For small arms marksmanship and tactical training, soldiers and law enforcement officers have only a few options: they can head out to ranges and expend ammo shooting at paper targets or they can engage in live fire training exercises, which can be risky. VBS3 has been incorporated into virtual firing ranges for a variety of training tasks by companies such as Meggitt Training Systems, Laser Shot and Savronik of Turkey.

VBS3 has also been integrated into simulators for training on air defence missile systems such as the RBS-70, used by the Australian Defence Force. BAE Systems, a global defence, aerospace and security company, engaged BISim to integrate its VBS3 and VBS IG products into the Advanced Air Defence Simulator (AADS) used by ADF personnel to train in a simulated RBS-70 platform (Ground to Air Missile System). An integration was also completed by Havelsan into their Parachuting Simulator as proof of concept.

The AADS trainer is displayed on a 5-meter dome via 27 projectors. The architecture involves using VBS3 as the host, scenario generator & IOS, and VBS IG (the predecessor to VBS Blue IG) to drive the dome and binoculars, allowing an operator to work with his team,

including at least one team member with a set of binoculars. The system helps the ADF save on the costs of live fire exercises, which can cost as much as \$200,000 per fire, according to BAE.

State-of-the-Art Virtual World Training

Since 2013, and drawing on feedback from and experience of working with both military and prime contractor partners, BISim has been re-architecting the VBS engine to be modular, easy to use and "future-proof" in accordance with emerging training requirements and advances in the game industry.

The work to re-architect the VBS engine involved the creation of BISim's Gears software development framework, an open and modular framework for building software applications. Gears has been presented to NATO and the U.S. Department of Defence for consideration as a modular gaming architecture standard. Gears Studio, a new integrated development environment based on this technology, is included with BISim's software developer kits to streamline the development of modular software products and components.

In 2015, BISim introduced VBS Blue, a new planetary



The ADF's AADS using BISim's VBS IG.

rendering engine that represents another key component of our modular approach to the future VBS framework. It represents an innovative new rendering engine that combines procedurally generated content with the ability to merge in geo-specific details like satellite textures. In 2018, BISim released VBS Blue IG, a high-performance, CIGI-compliant, 3D whole-earth image generator designed to support the full spectrum of land, sea, and air use cases for collective and individual training. VBS Blue IG is already in use for simulation projects ranging from JTAC, VR dismounted soldier training, gunner, VR/AR part-task training, full-motion driver simulation, and flight training devices across the land, sea and air domains.



VBS Blue IG offers a virtual 3D world from space down to blades of grass.



The VBS3 content library supports a wide range of simulated weapons like the Javelin

These new modular technologies have been developed in large part to support the U.S. Army's Synthetic Training Environment (STE) initiative, which aims to bring together virtual, constructive and gaming training environments into a single unified architecture. This ambitious project will enable simulation systems Army-wide to leverage a persistent virtual world for any imaginable training need.

Over the years, many of BISim's customers have benefited from improvements in the commercial

baseline versions of BISim's products. The work to develop virtual simulation technologies to support the U.S. Army's STE initiative will surely benefit NATO allies by providing them with new and innovative ways to train military personnel and enhance their operational readiness for wherever the fight takes them.

In 2019, BISim is pleased to announce that they are now working with multiple Turkish customers through their official partners, HSKO, companies include Havelsan, Savronik, SDT, Altay, Agena and Aselsan. They are also looking forward to working with Roketsan, Simsoft, BITES and others throughout the year. Some of these companies will also be

showing VBS3-based solutions at IDEF. BISim is currently working extensively in Qatar within the wargaming domain and has the ability to connect many CGF systems, like ONESAF, JCATS and MASA SWORD together to provide a tactical virtual environment for commanders. Academically, BISim provides many countries with an Academic Program and offers software solutions for many global universities, including ODTU TSK MODSIMMER in Turkey.

We thank SSB for their continued support and interest in BISim as a potential solution to some of their projects and look forward to working on many other projects for the Turkish Armed Forces in the future.

SAMPLE VBS USE CASES

IED training	Route clearance	Enemy mindset training	Vehicle identification	Vehicle check point	Vehicle and object search
Driver training	Crew training	Convoy training	Gunnery training	Crew served weapons	Aircraft mission simulation
UAS training	Surveillance systems	Sensor training	FO/FAC training	Engineer training	Vehicle recovery
Radio procedures	First aid training	Scuba training	Parachuting	Ship familiarization	Rules of engagement
Anti-piracy operations	Cultural awareness	Lessons learned	Aircraft part-task training	CBRN training	Sniper training
First response training	Mission rehearsal	Intel training	Ops room / staff training	CASEVAC training	Navigation training

CBRN Monitoring in the Context of Naval Vessels

Mrs. Katja Kiukas, MSc, BBA

In the current threat environments evolving worldwide, naval vessels and their crew are vulnerable to chemical, biological, radiological and nuclear (CBRN) threats in their offshore, littoral and harbor related activities. Although typically low in frequency and probability, the use of CBRN threat agents may lead to high consequences in the hands of well-trained and determined lone wolves, sympathizers or active members of terrorist groups. Furthermore, the recent war scenes have shown that it is not only CBRN terrorism we are dealing with. There are always risks for accidental CBRN releases to take place as a result of human activities, too.

In the worst CBRN threat scenarios, the whole fleet may become incapacitated. No matter if the threats emanate from other nations, non-state actors or accidents, or what forms they may take, improved protection and preparedness to detect and tackle CBRN threats at the early stage are vital among naval forces. On the road of getting prepared, understanding of CBRN threats, evaluating the vulnerabilities and considering the operational and instrumental needs for committing the intended missions is a good start. However, real assessment of the security measures and their effectiveness and implementation of reliable CBRN monitoring systems are the following essential steps. The needs for maintaining the selected CBRN instrumentation and competence of personnel by regular trainings shall be considered as well.

Elements of Maritime CBRN Defence

In general, effective CBRN defence in the naval context means combining of three distinct functions: monitoring and detection, protection and decontamination. Monitoring and detection are realized by implementing dedicated systems to detect the presence of and to identify the threat outside the ship

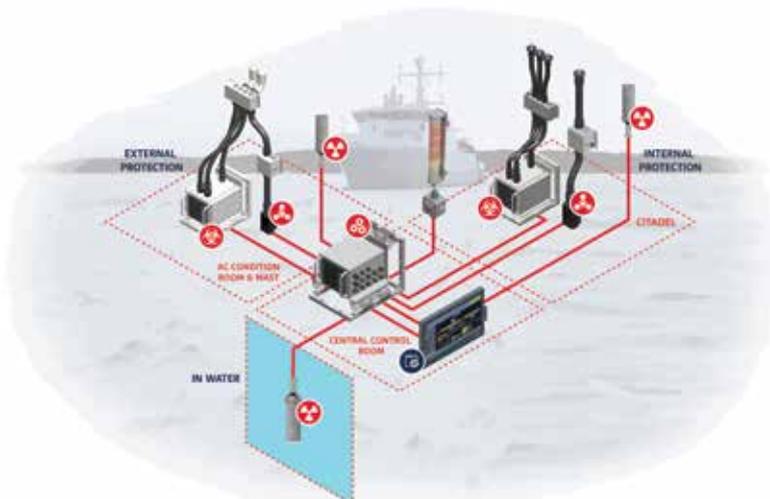


few means to protect the ship and its crew: pressurized citadels and zones with gas-tight boundaries and airlocks, and filtration of air drawn into the vessel and enclosing machinery intakes and exhausts. Decontamination of spaces within the ship is achieved by implementing suitable ventilation, filtration and pre-wetting systems. For decontamination of the crew and equipment, cleansing stations can be applied.

The modular structure of EnviScreen CBRN Monitoring Systems enables delivery of cost-effective and easily expandable solutions for customers' existing and future needs. Environics builds its Naval CBRN Monitoring Concept upon the general detection principles and recommendations for application related special equipment and systems. It aims 1)

to protect the personnel from CBRN threats and their hazardous effects by giving fast response and early-warning 2) to provide situational awareness and guidance and 3) to enable further analysis and timely and correct countermeasures at the time of threat events. Typical EnviScreen CBRN Monitoring Systems represent turnkey solutions that incorporate sensor integrations, data communication, databases, system services and user interfaces.

In Environics' naval concept, CBRN releases are typically monitored from outdoor air and/or indoor air with respective field proven system detectors. Measurement and event data from the integrated sensors is collected and harmonized by data processing units and eventually visualized in real-time on the control center computers by the dedicated system software. The proprietary software provides a graphical user interface for sensor management and for displaying event and measurement data and end user specified, event related guidance for the operators. In addition to the fixed installations, Environics supplies hand-held and portable instrumentation for CBRN detection and identification needs, as well as other system supporting components, personal protective equipment and devices and tools for decontamination.



Partner in CBRN System Design and Supply

Environics is a Finnish high technology company with solid experience in the field of CBRN detection. It has improved CBRN safety worldwide with its in-house technologies and system solutions for more than three decades. Organizations from civil defence to homeland security and military in over 50 countries have already selected Environics as their partner in CBRN threat detection.

Nowadays Environics focuses on application-based concept and product development and after sales services. Many of the success stories in CBRN system business relate especially to naval CBRN monitoring. Among other applications, Environics designs and supplies EnviScreen CBRN Monitoring Systems globally to wide range of vessel types, from environmental survey vessels and military vessels like frigates to mine hunters. To date, over 100 naval CBRN systems installations have been implemented in co-operation with leading shipbuilding companies. The recent progress in Environics' Naval CBRN Monitoring Systems include the fulfillment of the requirements of the International Association of Classification Society, proven in accredited laboratory tests.

The growing awareness of the risks caused by maritime CBRN threats and willingness to be prepared may offer new opportunities for Environics also in cargo and cruise ship industry and civil defence. Passenger ships can be considered highly vulnerable and easily accessible targets for terrorist activity or collisions involving other vessels carrying hazardous substances. When evaluating the seriousness and consequences of such maritime incidents for human life, it is worth to notice that one passenger ship can have even 10



000 persons onboard. In these types of incidents also property and environment are simultaneously under threat.

Application Oriented Product Portfolio

Naval operating environment sets demands for high quality, durability, tolerance and reliability of the system components. Uncompromised CBRN detection performance and completion of the intended missions have been taken into account by Environics in both its own application-based product development and selection of complementing products. As a part of this approach, Environics has developed rugged, tested military grade device versions applying the core technologies – the Rugged ENVI BioScout for detection of potentially harmful bioaerosols, ChemProDM for chemical (CWAs/TICs) detection and the Rugged Master Module for data processing to be implemented for Naval CBRN Monitoring. The importance of collecting representative air samples to the chemical and biological detectors has been emphasized by designing dedicated air sampling systems for different installation needs. The dedicated system software, EnviScreen Operix, has undergone intense modernization to deliver several new features for improving user experience by system operators. This key component provides real-time situational awareness and sensor management, CBRN event and measurement database and system services. The optional software modules are available for expanding the capabilities to CBRN reporting and hazard area plotting, integration to 3rd party systems like Ship Control and Automation Systems or Battle Management Systems and creating realistic training exercises to improve and maintains operators' skills and preparedness.

On top of the selected 3rd party solutions, Environics' own product portfolio offers several complementing products to fixed installed CBRN monitoring systems: ChemPro100i Chemical Detectors with optional accessories of the CBRN kit, ENVI Assay System Gold



rapid tests for provisional BWA identification and RavidPro200 backpacks and RavidPort portal solutions for radiation detection and identification. Maritime CBRN Monitoring relates also to other areas of applications provided by Environics. Tactical Area CBRN monitoring in the form of EnVision GOSSAMER can be adapted for temporary surveillance needs in the maritime context, e.g. in sea port facilities. Furthermore, the Border CBRN Monitoring Concept includes in-house solutions for screening of passengers, freight and trucks in sea ports.

Support for the Whole System Lifespan

EnviScreen CBRN monitoring systems are featured with low costs of ownership. Maintaining them operational requires timely technical support and comprehensive user, maintenance and tactical training available through the whole system life-cycle. To ensure uncompromised performance, Environics invests in the full life-cycle support and commits to adapting the CBRN monitoring systems to variable operating environments. Environics contributes to all parts of the customer journey, from the very first steps of identifying the needs to comprehensive support in design, deliveries and beyond.

Biography of the Writer

Mrs. Katja Kiukas, MSc, BBA, has gained over a decade's application, business and technology-oriented expertise in the field of Bio Detection and CBRN Monitoring Systems for naval vessels, land vehicles, area monitoring and critical infrastructure protection. In Environics Oy, she takes currently responsibilities as a Product Manager for Bio Detection and CBRN Systems and an Application Manager for Building CBRN Monitoring.



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TURKEY's Up-and-Coming Digital Defence Ecosystem: DAMISE

Yasemin OK- General Manager of Voytes discusses Voytes Defence's expertise in providing suppliers critical guidance on national and international sector-specific regulations. In this exclusive interview, the company's focus on innovative and profitable solutions in the defence and aerospace industries, and the challenges faced by suppliers and global firms are outlined

Defence Turkey: Can we please start with an update from you on Voytes Turkey? Why was it established and what has been accomplished so far?

Yasemin OK: Since 2010, Voytes Turkey has been helping its clients create financial solutions and funding through Government incentives and grants, making extensive use of joint projects with various Ministries, quasi-government organizations, industry associations, universities, local chambers of commerce and industrial zones. To its client base ranging from subsidiaries of global companies and domestic corporates down to SME's, Voytes has also been providing accounting, tax and financial regulatory consultancy and legal expert services.

In strategic sectors such as

defence and aerospace, satellite & space technologies, machinery, metal industries and fabricated metal products, robotics and digital automation technologies, Voytes Turkey used its expertise in the use of incentives and grants to formulate profitable and low-cost investment strategies, and put together complete feasibility studies, creating more sustainable investments in Turkey.

The 5th Clustering Conference was held at the Ministry of Trade. In the event, best practice examples within the framework of 2017-2018 cluster activities included in the scope of UR-GE (International Competitiveness Development Project) were presented by the project representatives. On behalf of our defense and aviation cluster Voytes Turkey, the project manager, presented to be awarded to

"Best Practice Reward" from Ruhsar Pekcan, Minister of Trade of Turkey. We had honored to receive this reward in exchange of our collaboration with this strategic sector.

Through our journey in the defence and aerospace sector, we saw an opportunity to create a company catering to the specific needs of the industry; hence Voytes Defence, as mentioned in the previous issue of Defence Turkey, was born.

Defence Turkey: Can you provide a concise overview of Voytes Defence as a provider of consulting services to the defence and aerospace industries?

Yasemin OK: As the VOYTES Defence team, we see our mission as encouraging domestic and national production in sectors such as Advanced Technologies, Defence,

VOYTES DEFENSE

An Innovation Company

Aviation, Satellite, Space Ship Industry and Industry 4.0. Voytes Defence creates new clustering and cooperation opportunities in these industries and aims to play an active role in Global Supply Chain Applications.

We provide consulting services for our clients, preparing them to become a supplier to national and international global manufacturers and enter the global supply chain. We help our clients locate where to target with sector related market research reports and Direct and Indirect Offset opportunities, perform a gap-analysis of their capabilities and skillset vs. the expectations of the Global Manufacturers making use of the specific criteria set by each Global Manufacturer targeted by our client, create a roadmap and a time and cost estimation to fulfill the identified gaps and work on a plan to facilitate the financing of this expenditure budget.

Focusing on the industry, we plan to facilitate technology transfer as well as talent sharing and technology development, which we identified as critical capabilities for surviving and thriving in this global arena.

Our mission is to provide our clients with innovative and profitable solutions in the defence and aerospace industries. In realizing this mission, our vision is to establish close friendships with our customers and be established as a global and respected solution partner.

Defence Turkey: What are your insights about the industry? What are there the challenges that suppliers or global companies are facing?

Yasemin OK: Advanced Technologies, Defence, Aviation, Satellite Space and Ship Industries are strictly regulated, posing many obligations on the suppliers with serious consequences when these are not met. Some of these regulations are national and international standards certifications, import and export licenses such as Facility safety certificate, AS9100 series, AQAP, EASA, FAA, NADCAP, End User Certificate, Nuclear Non-Proliferation Treaty, Chemical Weapons Convention with Biological and Toxin Weapons Convention, Wassenaar Arrangement, Nuclear Suppliers Group, Australian Group, Missile Technology Control Regime and

Zangger Committee contracts and agreements. Custom US 97 Codes, NACE codes, NCAGE Code, Duns Number, NAICS Code, NAPCS Code are used for coding and classification of products and systems. Finally, the list of Export Restricted Goods List, Export Preliminary List of Goods, 5201 numbered "Law on Warfare and Materials, and the Law on Inspection of Industrial Firms Producing Ammunition and Explosive Substances," are some examples of these binding rules.

It is absolutely critical that a supplier knows about and adheres to all the national and international regulations in order to work in these industry sectors. Getting hold of the right information, understanding the regulation and its requirements, figuring out where and how to apply, how to check and how to proceed are all administrative burdens which must be strictly followed. Each certification and system have their own structure and process, making this even more complicated.

Challenges faced by Suppliers:

- › Unique supplier procedures of each global company, not always fully documented, hence hard to implement correctly
- › Long time periods required to complete the bureaucratic procedures to become a supplier
- › The usually inadequate level of information shared by the global firm
- › Non-recognition and implementation challenges of Global Supplier Criteria
- › Difficulties in measuring and assessing its own readiness level and compliance with the requirements
- › National and international industry standards, strict and challenging certification requirements
- › National and international coding and lack of knowledge of the terms and difficulties of application
- › Difficulties in accessing detailed information on the sector-specific technical, innovative, academic, legal issues
- › The lack of experienced consulting firms knowledgeable and experienced in the industry, making it harder to reach correct information and advice

Challenges faced by Global Firms

- › Difficulties in reaching the companies that meet their criteria, as there is no database which allows for a search for specific requirements and technical capabilities
- › Understanding the local rules, procedures and processes in sectoral, academic and legal issues

DAMISE

- › Finding the right supplier complying with their criteria or at least a best fit, when they are required to work with domestic suppliers to comply with Offset regulations within the scope of localization policies

Defence Turkey: Last but not least, could you explain what DAMISE is?

Yasemin OK: The Defence, Aerospace and Marine Industrial Supplier Ecosystem: DAMISE, is a digital ecosystem incorporating companies showcasing their products, services and technical capabilities for the defence, aerospace, marine, satellite and space sectors, and industry giants, domestic and global, searching for the right supplier with the required products, services and capabilities.

DAMISE will be a dynamic platform also offering services, information and technical know-how and advice to companies that are already in the sector or planning to enter. Industry-specific certification and documentation providers, vendors of tests and lab equipment, and other companies providing specialized services like insurance companies, law firms, financial institutions will also be present with their tailor-made solutions.

The co-existence of all parties serving the industry will also be a great opportunity to show the capabilities of Turkey as an emerging global player in aerospace & defence. It will enable commercialization through the capabilities of innovation, R & D and design in the sector and the formation of the required technology transfer within the country. Finally, domestic and foreign investors interested in these industries will be able to find suitable targets for investment, which will in return strengthen the whole ecosystem.

Defence Turkey: Lastly, would you like to convey a message to our readers?

Yasemin OK: DAMISE will be officially launched in August 2019. We would like to mention that our companies who want to take place in the system as of the beginning can benefit from our special IDEF campaigns by reviewing the video explaining the system from www.damise.com and filling in the application forms ■

The Success Story of AKDAŞ Arms

Ömer AKDAŞ from Huğlu is the founder of AKDAŞ Arms. He started working in the gun-making business in 1948 with a few of the best Turkish gunsmiths of the time. After a while, he designed his first single barrel shotgun and in the following years began to run his own gun workshop. Thereafter, he became well-known for his skills and was the gun-maker beloved by many hunters. Ömer AKDAŞ was the only one ever to manufacture the very first side-by-side shotgun in Turkey.

Sadık AKDAŞ, his son, joined his father in 1975. Having learned all nuances of guns from his father, he had been repairing and maintaining all kinds of domestic and foreign made guns since the age of 13. He is the first Turkish gunsmith ever to produce an inertia operated semi-automatic



shotgun with the help his father. In 2004, he designed and produced the first and unique English style side-lock over-and-under and side-by-side shotguns, which have been made in Turkey ever since. Throughout his career, he has been revered by hunters/shooters and is the only Turkish gunsmith to service high-end shotguns from all over the world.

Selim AKDAŞ joined his brother Sadık in 1987 and the conversion from an old-school workshop to a modern factory started. AKDAŞ Arms has worked with some of the world's most famous shotgun manufacturing companies and has proven its quality over and over. Thanks to the rich machine park, AKDAŞ also produces high quality spare parts for industries like automotive and machinery since 2013. In addition, AKDAŞ



is a proud supplier for the defence industry for more than 20 years.

AKDAŞ Arms welcomes foreign hunters/shooters into the Turkish Shotgun World and has been the proud supplier for the Turkish Military Forces by manufacturing various parts for MKEK and offering the unique AKDAŞ AK-40GL Grenade Launcher compatible with Turkish Infantry Rifles (MPT-76 and MPT-55).

Exporting its products to more than 20 countries, AKDAŞ has been a global player in the market for the last 10 years.

The stunning development of technology, the decrease in market, the growing number of competitors, and selective customers make manufacturers produce high quality products with affordable prices. This is only possible through the Research Development work that AKDAŞ always considers to be a top priority.

The Research Development department of AKDAŞ Arms, which consists of gun specialists, engineers and technicians are performing at their best for the satisfaction of the final customers in cooperation with the sales team.



With experience that spans over half a century, there is no doubt that AKDAŞ Arms is accomplished and ready to pursue new projects properly with precision.



Vaneda Makes Difference ...

Vaneda is a Turkish company grounded in Istanbul in 2014 and continuing its production in technical boot-making industry with constant focus on innovative technology. With the significance placed on product quality, we participated with Turkish Armed Forces in boot projects dedicated to modern technology and design. Our priority is not only making the most comfortable footwear and also providing high wear resistance and superior performance under the most challenging weather conditions.

Vaneda would like to proudly announce that we supply the Turkish Armed Forces with our New Generation Waterproof Shoes and Boots designed with Breathable Technology which was developed due to long time of hard work and successfully passed the laboratory tests.

This new technology prevents moisture from entering the footwear and remain it durably waterproof and highly breathable in rainy or snowy weather without getting heavier. Even in case of wearing our shoes and boots for long periods of time, the technology is designed to dry them rapidly and thanks to its innovative breathable construction,



© Vaneda

provides effective protection against fungal infection of the feet. The technology with a specially constructed thermal insulation up to -25 °C for cold weather conditions offers reliable protection from the cold by optimizing warmth. This will put an end to the problems suffered by our soldiers for years due to boots designed with outdated technology.

With a commitment to dynamic development, our company continues to maintain mass production making over 500.000

pairs of technical boots and shoes per year at its new 5000 m² factory by having international certifications such as ISO 9001:2008, ISO 14001 and OHSAS 18001.

It is obvious that our soldiers are in need of advanced equipment and superior mobility, particularly in these rough times that our country is going through. Vaneda would also wish for other suppliers to support such projects and aim to increase the mobility of our army to the highest level.



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Simplify your MIL-STD-1553 Design Implementation...with a fast Serial Peripheral Interface (SPI) Controller

The migration towards a System on Chip (SoC) approach to electronics systems is a growing trend within the military aerospace industry, driven primarily by a desire to reduce size, weight and power (SWaP), and to accommodate the requirements of complex avionics systems, which typically require a myriad of unique I/O interfaces between embedded computing resources, sensors, and effectors. Today's latest generation FPGA's offer a combination of computing cores, with large amounts of programmable logic, therefore it may seem tempting to implement a MIL-STD-1553 SoC solution utilizing an FPGA. But is an FPGA implementation of the 1553 controller the best approach? As an alternative, and simplified option, we will explore the use of a MIL-STD-1553 ASIC controller, with a Serial Peripheral Interface (SPI), as a highly efficient interface between SoC processors and a MIL-STD-1553 bus.

Overview of a MIL-STD-1553 Interface

A typical implementation of a MIL-STD-1553 interface consists of a digital section (which can be implemented within an FPGA) and an analog section (which cannot be implemented within an FPGA) – refer to Figure 1. The analog section consists of a transceiver and an isolation transformer for each connection to a 1553 bus. The use of an isolation transformer is mandated by the MIL-STD-1553 standard. The transceiver is required to convert digital signals into analog signals that meet the input and output requirements of MIL-STD-1553.

The digital section of a 1553 interface consists of several major functional blocks. The protocol section is responsible for encoding

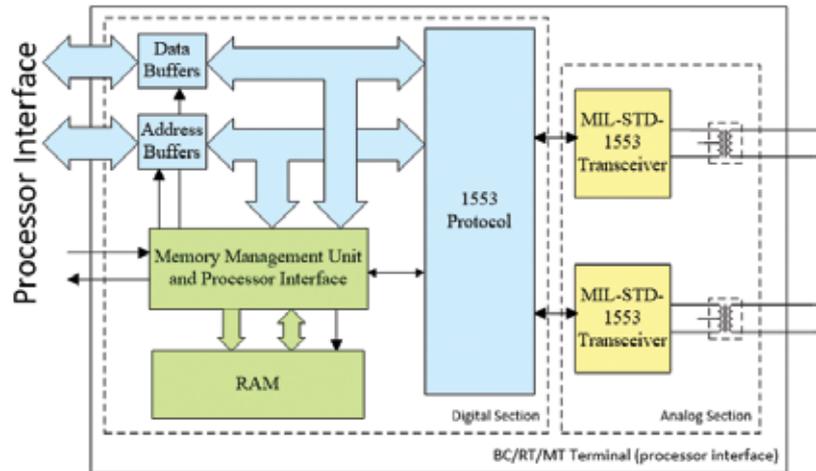


Figure 1 Block Diagram of a Typical MIL-STD-1553 Interface

and decoding the serial data stream to/from the transceiver and responding to the commands contained within that data stream. A 1553 interface to a processor typically includes a rather complex memory management unit (MMU) that controls the flow of data between a buffer memory and the 1553 bus as well as the flow of data between the buffer memory and the host processor. The MMU provides the host processor with a software interface that maintains data consistency on blocks of data exchanged in 1553 commands.

Implementations of a MIL-STD-1553 interface

ASIC Component Solutions

The most common approach to implementing a MIL-STD-1553

interface to a processor is through the use of an integrated "MIL-STD-1553 Terminal" component. These components are chip-level solutions that incorporate the required electronic circuitry in a single package. Package options for the components include a variety of form factors including ceramic, military grade packages and plastic encapsulated packages. The plastic encapsulated components tend to provide the most cost competitive solutions.

The most recent addition to DDC's MIL-STD-1553 product offering is the Nano-ACE™, which is shown in Figure 2 along with one of the required isolation transformers. The Nano-ACE is the latest evolution in the highly successful Enhanced Mini-ACE® series, which has been in

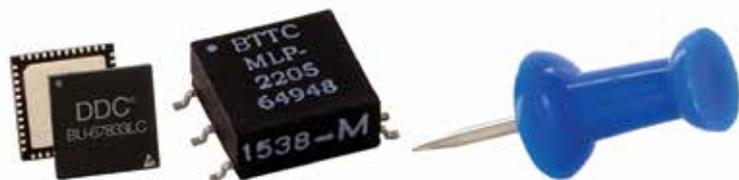


Figure 2 Nano-ACE and Separate Isolation Transformer

operation since 1999 with more than 800 million hours of in-service history. The Nano-ACE implements a dual redundant interface to a 1553 bus consisting of a pair of transceivers, 1553 RT protocol, memory management unit and buffer RAM in a very small 7mm x 7mm QFN package. One of the features of the Nano-ACE that allows the package to be so small is the use of a serial "SPI" interface to the host processor. The SPI interface consists of four signals as opposed to a traditional parallel interface that typically includes over 40 signals. The reduction in pin count combined with additional integration enables the use of this chip scale QFN packaging technology.

The size of the Nano-ACE seems compelling, but can the SPI interface handle the I/O requirements of a 1553 controller interface? DDC conducted a performance analysis of various MIL-STD-1553 implementations. DDC published a summary of

this analysis in application note AN/B-59 (available on DDC's website). The results of the analysis revealed that the 50 MHz SPI interface on the Nano-ACE provides reasonable bandwidth (6.25 Mbytes/sec) and latency (< 1µs) for a fully functioning interface between a processor and a MIL-STD-1553 bus. The App Note also estimates the host interface utilization to be less than 6% for a 1553 bus operating at 100% capacity.

FPGA + Transceivers Solutions

An alternative to the traditional component solution is to utilize an FPGA with a 1553 IP core to implement the digital portion of the 1553 interface. This solution requires the use of a dual 1553 transceiver and two isolation transformers in addition to the FPGA component since the FPGA is not capable of directly meeting the input/output characteristics of MIL-STD-1553.

An IP-based 1553 solution will occupy the exact same amount of board space (excluding the area required for the FPGA) as a component solution because the Nano-ACE and the dual transceiver are packaged in the same size QFN package.

MIL-STD-1553 SPI System on a Chip Implementation

As seen above, a MIL-STD-1553 controller ASIC with a SPI interface provides an ideal MIL-STD-1553 interface to processor solution, including SoC applications. Additionally, the use of the industry standardized SPI interface significantly reduces development and integration costs as compared to an FPGA/IP solution. Furthermore, the serial SPI signals are relatively straightforward to route (unlike high-speed serial interfaces such as PCI Express that require controlled impedances and meticulous attention to routing).

AeroGDT - Talented Engineers Transforming Our Communities

AeroGDT was established in September 2018 as the subsidiary design & test company of ER MAKİNA Disli Sanayi A.Ş. With over 40 years of experience, ER MAKİNA is the first and only SME that can manufacture high quality and precision gears & gearboxes for the aerospace and defence industry. Furthermore, it has built strategic partnerships for gear production with some of the most prominent foundation companies that are involved in strategic defence projects. With a close collaborative partnership with ER MAKİNA Disli Sanayi A.Ş., AeroGDT continues its activities to design and test precision gears & gearboxes for the strategically important aerospace and defence industries.

With experienced academic

and engineering staff, AeroGDT offers end-to-end design, consultancy, and testing services according to customer-specific requirements for gears & gearboxes. Additionally, AeroGDT utilizes the manufacturing capabilities of ER MAKİNA company to provide turnkey solutions for our customers including precision gear & gearbox design and testing solutions for land, air and sea vehicles.

Both in the national and international sector, lighter gearboxes with higher torque capacity has become the preferred solutions for aerospace, defence, and robotic applications. Companies in the international arena now focus on maximizing the power density of gearboxes with new and different design

techniques. New design methodologies and new materials help to reduce both gear stress and gearbox weight. Some of the new design techniques AeroGDT has accomplished with expert staff include both individual and combined asymmetrical gear tooth flank and asymmetric gear tooth root designs. This design reduces the gear stresses by 5% to 15% and consequently maximizes the power density of the gear unit. AeroGDT's skilled engineering staff has successfully developed a new patented high contact-ratio (HCR) gear design to be used in aircraft engine gearboxes.

With experienced engineering and product development teams, AeroGDT is ready to help their clients achieve their goals.

Briefly NANOBIZ Technology

NANOBIZ Technology Inc., established in September 2006, is located at ODTÜ Teknokent in Ankara, Turkey. The vision of NANOBIZ is to be a globally recognized technology and product developer in the field of homeland security and in the field of CBRN. The company is experienced in biological sensing, biosensors, decontamination and early warning systems. NANOBIZ has various patents, utility models and trademarks in the above-mentioned fields.

NANOBIZ has collaborations in other countries and is taking part in EU projects. The company is also an active member of the EU Working Group Industrial Mission Group of Security: IMG-S TA6 CBRNE and an active participant in R&D projects financed by the EU.

For a while now NANOBIZ has also been the exclusive representative of HOTZONE SOLUTIONS GROUP in Turkey, the world's most practice oriented and realistic CBRNE training provider and consultant service Provider Company.

NANOBIZ is certified with ISO 9001:2008 and ISO 17025 general requirements for the competence of testing and calibration laboratories. The company also has NATIONAL and NATO Secret Level Facility Clearance Certificates as well as a Facility Operation Certificate issued by the Ministry of Defence, in order to conduct R&D and prototyping for the field of CBRN.

CBRN Research of NANOBIZ

NANOBIZ is originally a biotech company and conducts various R&D projects regarding the use of biotechnology combined with nanotechnology in different industrial areas like health, environment and agriculture. However, during the last 10 years the company has been more focused on biological detection & decontamination technologies, which are the main subjects of CBRN.



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The company participated in the EU 7th Frame Project called GIFT-CBRN which was held by an international consortium of 21 members, as the sub work package leader for developing a portable easy to use biological detection unit at CBRN crime scenes.

NANOBIZ signed a contract with the SSB in 2017 in order to develop a portable hybrid system for detection & identification of biological warfare agents (BIOSENS Project).

Accredited Service Lab

Besides ongoing CBRN research activities, NANOBIZ has a fully equipped infrastructure to conduct environmental tests related to MIL-STD810. To utilize this infrastructure and know-how in CBRN, NANOBIZ established a service lab in 2013 which is operated within ISO-17025 standards.

NANOBIZ is the sole regional accredited service lab based on ISO-17025 accreditation of TURKAK - the Turkish Accreditation Agency which has both local and international recognition around the world. The company offers Fungus Test services which are performed according to MIL-STD 810, RCTA/DO-160G ASTM G21, TS4348 Environmental Test Standards.

Besides the Fungus tests, NANOBIZ started providing test services for decontamination according to NATO-AEP 58. This is an important test used to evaluate biological decontamination capability of decontaminants.

Fungus Tests are one of the most important environmental tests in the defence sector. Fungi are resistant organisms to environmental conditions and because of their structure, they can grow on many materials from

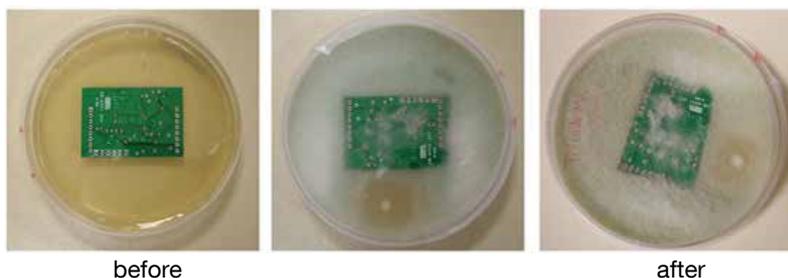


Figure 1: Growth of Tricoderma fungus species on a PCB card (Nanobiz 2014©).

fabrics to electronic components, plastics, rubber that we use in everyday life, as well as to more important mechanical parts, which can endanger human life in the case of operational dysfunction. Fungal growth on materials has very different effects. These effects can range from the appearance and bad odor to the loss of function (conductivity, insulation, etc.) due to fungal growth on the material, or the erosion of the material by growing fungal colonies on the material. A sample of fungal growth on an electronic component is given in Figure-1.

Collaboration with TRTEST

NANOBIZ signed a contract with TRTEST for fungal/antibacterial tests at the end of 2018. Therefore, according to the contract, NANOBIZ is the solution partner of TRTEST and carries out said tests in-collaboration with TRTEST.

Thanks to the agreement, defence and aerospace companies that need to test their products will be able to benefit from the test services of NANOBIZ by applying to TRTEST. NANOBIZ, which adopts the principle of impartiality, will provide services to these companies as an independent test organization.

The NANOBIZ service lab



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Prof. Hüseyin Avni ÖKTEM- Founder & CTO of NANOBIZ Technology INC.; Bilal AKTAŞ- TRTEST General Manager and Zeynep ÖKTEM - Founder & CEO of NANOBIZ Technology INC

has accreditation from TURKAK (Turkish Accreditation Agency) (accreditation no AB-0863-T) which is recognized by both local and international agencies in specifically Fungus Test Method 508.7 in MIL-STD 810 , Fungus Resistance for Aviation in DO-160 Environmental Test Standards and Fungus Resistance Test which is performed according to ASTM G21-15 Standards. Fungus tests are important tests in the defence sector; these tests are applied in order to evaluate the extent by which the material will support

fungal growth and how that growth may affect performance or use of the material. The NANOBIZ Lab has test chambers that accommodate versions that require diurnal temperature and relative humidity cycles. The surface of the test pieces are sprayed with a fine mist of the fungal spore mixture, and then incubated for 28 days or longer according to the demand of the customer. Tests can be conducted with a wide selection of certified fungus species including both American and European collections.

The Synergy Center of Defence Industry

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Turkish Defence Industry News

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Turkey's Center of Innovation - Teknopark Istanbul

Teknopark Istanbul is a technology development zone established next to the Sabiha Gökçen International Airport, under the consolidated partnership of the Presidency of Defence Industries (SSB) and the Istanbul Chamber of Commerce (ITO) for enabling both local and international entrepreneurs to contribute to Turkey's technology development capacity. Teknopark Istanbul is one of the most critical stages of the Advanced Technology and Industrialization Park (ITEP) Project founded over an area of 1,300 hectares also containing the Sabiha Gökçen International Airport. Turkey's Innovation Center Teknopark Istanbul involves local and international high technology companies and hosts local and national companies taking part in leading R&D projects of the defence industry such as the ALTAY Tank, ANKA UAV, ATAK Helicopter and especially in the maritime sector the MILGEM Corvette, LHD Amphibious Assault Ship.

Teknopark Istanbul to Take Part in IDEF with 6 Defence Industry Companies

Teknopark Istanbul is preparing to attend the 14th IDEF International Defence Industry Fair which will take place on 30 April – 3 May 2019 at the Istanbul TÜYAP Congress and Event Center with its leading high technology and engineering companies such as Asartech, Avikon, Electra, Inores, Milpower and SEFT.

We've examined the aforementioned six companies performing activities under the auspices of Istanbul Teknopark for you.

SEFT - Design and Engineering Contribution to Military Vessel Projects in Various Classes and Sizes

Conducting its activities under the auspices of Teknopark Istanbul, SEFT was established in 2001 to provide "Design and Engineering Services" in the Maritime Sector. The company is directed by four founding



partners and has a dynamic staff of 50 people composed of engineers and technicians who are experts in their fields. With this team SEFT is capable of providing design and engineering services to its customers in merchant, special – purpose and military vessels, in all stages starting from "concept design" to the final delivery of the vessel. SEFT is able to meet the vessel demands of various classes and capabilities, ranging from the 17-meter Boat class to 200-meter Command Control Vessel or the 90-meter Open Sea Service Ship.

Until 2008 since its establishment in 2001, SEFT has accomplished the design of many Merchant Vessels in various types and tonnage in parallel with the development of the Ship Construction Industry. Presently, over 100 merchant and special- purpose vessels designed by SEFT are continuing to operate at sea, across the world.

Having decided to take part in defence industry projects toward increasing domestic participation in addition to designing merchant ships since 2008, SEFT initially designed

five Fast Patrol Boats in 2009 and then completed the construction of these vessels in 2010 and delivered them to the government of Romania.

SEFT Assumes Design and Engineering Services for TCG ALEMDAR, TCG IŞIN and TCG AKIN

SEFT-designed projects won the tender for the Submarine Rescue Main Vessel and the Search and Rescue Ship launched regarding the demands of our Naval Forces by the Presidency of Defence Industries in June 2010. All design and engineering activities of the ships were accomplished by SEFT and they were named as TCG ALEMDAR, TCG IŞIN and TCG AKIN. The acceptance of the vessels was completed, and they were included in the inventory of the Naval Forces Command. Meanwhile, a SEFT-designed project also won the tender launched for Turkey's first three-dimensional Seismic Research Ship in 2011. All design and engineering activities of the MTA Oruç Reis Ship



MTA Oruç Reis Ship



Under the Management and
Responsibility of
Turkish Armed Forces Foundation

Eurasian Meeting



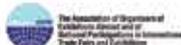
IDEF'19

14th International Defence Industry Fair

April 30 - May 3, 2019

www.idef.com.tr

TUYAP
www.tuyap.com.tr



THIS FAIR IS ORGANIZED WITH THE AUDIT OF TOBB (THE UNION OF CHAMBERS AND COMMODITY EXCHANGES OF TURKEY)
IN ACCORDANCE WITH THE LAW NO.5174.

was conducted by SEFT as well and MTA Oruç Reis was delivered to MTA (General Directorate of Mineral Research and Exploration) last year. Moreover, the design and engineering services as part of the modernization of five SAR33 Class Boats of our Coast Guard Command was also accomplished by SEFT.

SEFT, focusing on export activities to maintain the sustainability of the companies active especially in the Defence Industry played a crucial role in the "HTMS Matra" – Fleet Replenishment Vessel built in Thailand and it was delivered to the Thailand Navy in 2014.

SEFT also assumes critical responsibilities in the supply project of the Fleet Replenishment Vessel (DIMDEG) planned to be delivered to the Naval Forces Command within 58 months in line with the contract signed on 28 June 2018 regarding the Defence Industry. Within the scope of the Half Life Modernization Project of the BARBAROS Class Frigate, the contract of which was signed this year, SEFT will be conducting the design, analysis and 3D Modelling activities.

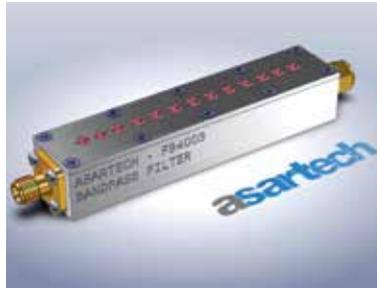
SEFT - Powership Floating Power Plant Design and Engineering

In addition to the aforementioned projects, one of the most critical brands generated by our country is the Floating Power Plant known as "Powership". The design and engineering activities of the 2 Floating Power Plant projects that are the world's greatest power ships with a generation capacity of 450MWs are being conducted by SEFT as well. Including these two power ships, SEFT has a total of 11 Floating Power Plants in its portfolio. Besides the maritime industry, the company is providing engineering services to its customers in the Power Plant project expected to be completed this year in Guinea.

Aiming to increase its exports with its technologic experiences, qualified staff and R&D activities as well as the value added products it develops in the medium and long term, SEFT also provides consultancy and support on

various areas and concept designs to the TAIS Consortium performing activities in the military ship building sector particularly in the defence industry and heading towards the international market, to the foundation companies and governmental institutions to this end.

Asartech Executes RF and Microwave Module and System Design



Asartech will participate in the IDEF event under the auspices of Teknopark Istanbul and is conducting production in embedded sensor technologies capable of transmitting numerous data ranging from location information to personal life data, even to developments regarding the operation conducted, to the control and decision centers via wireless communication. 6 Engineers, 1 Technician are employed at Asartech's Headquarters at Teknopark Istanbul and R&D Design Laboratory, 4 Engineers and 2 Technicians are employed at the R&D Design Laboratory of the company at Hacettepe Teknokent. The company has consultants composed of academicians from METU, ITU, Sabancı University and Aegean University and a highly qualified team proceeding with cooperation in the areas of Hardware Testing (Print, Typesetting, and Mechanics), Remote Controlled and Autonomous Platforms, Software (Simulation Modeling).

In addition to the Identification of Additional Requirements regarding Naval Platform Dynamic Positioning System Error Proofing and Accident Preventing, Development of Micro Tools – Filter Design and Frequency Programming Software Modules, the company is active in Maritime Transportation Vehicles and Open Sea Structures in addition to other Transportation and Defence

Platforms. The Multi Frequency Wireless Micro Sensor Network monitoring, tracking and reporting the individuals and equipment such as staff, passengers, loads, devices and equipment was indigenously designed with its hardware and software as a security communication system. The platform tests of the two prototypes are composed of one military shipyard and one small scaled Defence Platform continue.

MilPower Defence Systems Manufactures the Cooling Fans of the Power Packs

One of the companies of Teknopark Istanbul active in the defence industry, Milpower, mainly executes the project of the indigenous design and production of the cooling fans of the high horsepower power packs used in military vehicles. The aforementioned cooling fans are currently being imported. Conducting its activities at two different centers - Istanbul Teknopark and Bilkent Cyberpark - Milpower Defence Systems is executing the assembly and test activities at the facilities located in Tuzla, Istanbul. The company is capable of conducting the fan performance test in line with the "Air Movement and Control Association" (AMCA) 210 standard at this facility as well. In addition to its activities with companies such as BMC Power, TUSAŞ and FNSS, having successfully completed all the verification tests of the TAYFUN and KASIRGA fans in accordance with the MIL-STD-810 standard, Milpower Defence Systems launched the mass production process within the scope of the SSB projects. The company is carrying out the new generation fan project that it has been developing as part of the Main Battle Tank's serial production as well.





Electra Providing Air Electronics Equipment - DO-254 Compatibility Design and Verification Services to Customers

Established in 2014, Electra currently conducts its activities with 20 employees both at its headquarters in Istanbul Teknopark and at the branch office at Ankara Hacettepe Teknokent. The company works for the development of the project for the establishment UVM/ SystemVerilog based test system to be used for testing the data bus communication protocols use in avionic electronic systems as part of the critical components list of the Presidency of Defence Industries. Electra also provides the design security guide that identifies the methods to be followed by the companies developing electronic hardware for avionic equipment and design and verification services regarding DO-254 to its local and international customers.

Electra also provides training for ASIC/FPGA via its solution partners. The training is organized at customer premises or as public training. The training areas are Xilinx, Altera, VHDL, Verilog, SystemVerilog, UVM, SystemC, UVM, OSVVM, ARM, Embedded Linux.

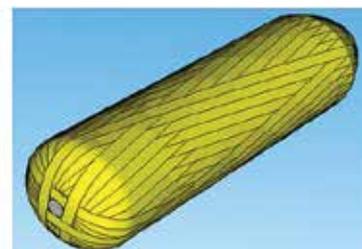
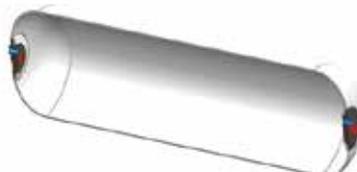
Avikon - The Certified Supplier of Aselsan and Havelsan in Defence Software

Established in 2012, as an advanced electronics company working on Smart Transport Systems and Defence software,

Avikon continues its activities under the auspices of Teknopark Istanbul. This company is actualizing the passenger information systems and tracking systems of Izmir, Kayseri and Kocaeli Municipalities which started to provide defence development services to the defence industry as of 2016, in line with the contract signed with Aselsan. As a sub-contractor of



Aselsan, Avikon started to become involved in the following projects since 2016; the radar interface simulator to be utilized as part of the integration activities and training purposes by the Naval Forces Command, real time data recorder and playback software for the VxWorks platform, control monitoring and test software development enabling the tracking of the system status



and the maintenance of a radar system to be delivered to the Air Forces Command. Moreover, by successfully completing the administrative, quality and technical assessments of Aselsan and Havelsan companies under the title of software design, the company became the certified supplier of both companies.

Providing services in the defence industry, Inores, also from Teknopark Istanbul, is a company that offers extensive engineering solutions for advanced level engineering applications in renewable energy. Inores has been providing comprehensive engineering solutions in Wind Power Engineering and Composite Structure Engineering and offers component and system design, analysis and optimization services to its customers.

INORES - Specialized in Lightweight, Efficient and Low Power Mechanical Design and Renewable Energy

Founded in 2010, INORES continues its activities in Teknopark Istanbul and provides lightweight, efficient and low power mechanical design and renewable energy solutions to its customers with many years of professional experience in Computer Aided Engineering (CAE). While the company mainly focuses on CAE and Composite Structural Engineering, it also offers component & system design, analysis, and optimization services to its customers as part of product development activities.

SaSaD - The Competitive Power of Turkish Defence and Aerospace Industries

The Defence and Aerospace Industry Manufacturers Association (SASAD) was established in 1990 in Ankara by 12 major companies active in the defence industry, with the encouragement and support of the Ministry of National Defence. In line with the amendment to its statute in 2012, the SaSaD added the civil aviation and space industries to the sectors it represented and adopted the title "SASAD Defence and Aerospace Manufacturers Association".

SASAD has been conducting its activities with the mission of fulfilling the demands of the Turkish Armed Forces with indigenous products, enabling the development of sector players in defence and aerospace and contributing to their competitive power in the global markets.

The number of members in the association has reached 197 as of April 2019 and SASAD provided support for the establishment of clusters and cluster associations by gathering together small and medium scaled companies that are the keystones of the technological infrastructure according to their regions and capabilities, gathering them under its umbrella.

SASAD acts as an interface between manufacturer companies, users and procurement authorities. It is the nongovernmental organization representing the industry in our country and foreign countries.

The international defence industry fair IDEF is a market where the products of our country's prestigious defence and aerospace industry products are displayed. Since 1995, this event was being held biannually in Ankara, but due to the lack of convenient facilities for a fair and since Ankara is not available for the demonstration of naval platforms, and in addition to its attraction the event has been organized in Istanbul since 2009.



Without doubt, Istanbul being selected for IDEF has especially attracted foreign companies and increased the participation of companies from Istanbul and the regions surrounding the city. On the other hand, this creates a problem particularly for the small and medium scaled companies with insufficient financial structures. Therefore, increasing incentives and support of IDEF and similar fairs in an internal sense and support for similar international events would be beneficial. At minimum, a provision of support for stands and transportation fees would spark an increase in participation.

We assess the exclusion of the industrialists in the planning of the fair organization as a major deficiency. Taking into consideration the fair output report, prepared at the end of every fair by the planners and the timely execution of required regulations would also increase participation.

2018 Turkish defence and aerospace industries data was collected and evaluated by SASAD. As a result of these assessments, the consolidated data of the member institutions and associations and the industry's

performance of 2018 were reported and published to public and private authorities.

The collected data includes the topics of turnover, export, import, orders received, product development – technology development and employment. The total figures are summarized in the table below based on the increases and percentages.

With a turnover of US\$ 8.7 billion in 2018, exports of US\$ 2.188 billion and the orders received, which amounts to US\$ 12 billion and the budget spent from its own resources on R&D and technology, the Turkish Defence and Aerospace Industry's competitive power increases every year and the industry gives the impression that it will continue to develop.

The Defence and Aerospace Awards of 2018 were delivered to the companies selected amongst major companies, small and medium scaled companies at the plenary session held on 19 April 2019. The decisions were made according to the individual performance of the companies, institutions and associations assessed based on accumulated data.

› Total Turnover of Year 2018	US\$ 8.761.477.287
› Turnover of Year 2017	US\$ 6.693.282.813
CHANGE	Increase by 30.90%
› Total Foreign Sales Revenues of 2018	US\$ 2.188.550.843
› Total Foreign Sales Revenues of 2017	US\$ 1.823.547.734
CHANGE	20.02% Increase
› Total Employment in 2018	67.239 People
› Employment in 2017	44.740 People
CHANGE	50.29% Increase
› Total Turnover per Capita in 2018	US\$ 130.304
› Total Turnover per Capita in 2017	US\$ 149.604
CHANGE	2.90% Decrease
› Total Imports in 2018	US\$ 2.448.951.989
› Total Imports in 2017	US\$ 1.544.470.115
CHANGE	58.56% Increase
› Total Amount of New Orders Received in 2018	US\$ 12.204.189.920
› Total Amount of Orders Received in 2017	US\$ 8.054.847.300
CHANGE	51.51% Increase
› Total Product and Technology Development in 2018	US\$ 1.448.439.213
› Total Product and Technology Development in 2017	US\$ 1.236.599.649
CHANGE	17.13% Increase
› Total Expenses on Product Development (P&D) in 2018	US\$ 1.299.345.168
› Total Expenses on Product Development in 2017	US\$ 995.286.620
CHANGE	Increase by 30.55%
› Total Expenses of Technology Development (T&D) in 2018	US\$ 149.094.046
› Total Expenses on Technology Development in 2017	US\$ 241.313.029
CHANGE	Decrease by 38.21%
› Total Expenses over Equities in 2018	US\$ 288.860.860
› Total of Expenses from Equities in 2017	US\$ 295.077.114
CHANGE	Decrease by 2.11%
› Total Expenses on Projects – Incentives of 2018	US\$ 1.159.578.354
› Total Expenses on Projects – Incentives for year 2017	US\$ 941.522.535
CHANGE	Increase by 23.16%

TOBB Defence Industry Assembly Gathered in Ankara on April 9th

The 40th TOBB Defence Industry Sector Assembly Meeting was held at the TOBB Twin Towers in Ankara on April 9, 2019 with the participation of Vice President of Defence Industries Celal Sami TÜFEKÇİ, TOBB Board Member Mehmet BÜYÜKSİMİTÇİ, TOBB Deputy Secretary General Cengiz DELİBAŞ, TÜBİTAK President Hasan MANDAL and the representatives of the defence industry sector assembly members. In the meeting, the brief about sectoral problems was presented by ministries, sectoral economy councils and employment campaign, new incentives and support for 2019 were announced and the outputs of the TOBB defence industry assembly meetings were discussed. The President of the Defence Industries Prof. İsmail DEMİR attended the final session of the meeting and addressed the sector assembly members.

Taking the floor at the opening of the Defence Industry Sector Assembly meeting, TOBB Member of the Board Mehmet BÜYÜKSİMİTÇİ saluted the members of the defence industry sector assembly and expressed his best wishes to all sector members by adding that the defence industry sector assembly has been one of the most hardworking sector assemblies.

In his speech, Vice President of Defence Industries Celal Sami TÜFEKÇİ underlined that the TOBB defence industry sector assembly meetings held under the guidance of the Presidency of Defence Industries led to quite effective outputs and added, "By gathering a minimum of twice a year, at these sector assembly meetings, we seize the opportunity to exchange our views on various issues. As you know, here we built the Defence Industry Eco-System Platform. We gather bi-weekly with our shareholders in this platform. Participants from the Ministry of Industry and Technology and TÜBİTAK take part in this platform as well. So far, we completed our ninth meeting. Soon, we will be conducting our executive council meeting with the participation of our President of Defence Industries".



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Stating that the leading companies of the defence industry such as Aselsan, Havelsan, Roketsan, TUSAŞ, STM collaborated with rather small scaled SME companies within the scope of the eco-system built under the guidance of the Presidency of Defence Industries, TÜFEKÇİ added, "

Here, we aim to make SMEs, which we define as the sub-layer, the second layer of the pyramid, provide value-added subsystems as part of this eco-system. In this platform, we endeavor to reveal new methods to enrich this structure with the feedback we received from the clusters, other relevant foundations and associations".

TÜFEKÇİ: "We launched the implementation of the Industry Product and Technology Acquisition concept"



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Dr. Celal Sami TÜFEKÇİ - Presidency of Defence Industries, Vice President

Noting that they currently have 650 projects in their portfolio and that the total size of the signed and to-be-signed projects approach a value of US\$ 80 million, TÜFEKÇİ added that they assessed that a standard industrialization model would not be compatible for launching such projects, adding that they launched the implementation of different mechanisms to this end. TÜFEKÇİ: "According to the former method, we used to say that there would be for instance a 70% contribution to industrialization. We still have not quit doing this. We used to receive guarantees in the old days, we forced the companies which could result in a difficult process experienced by the contractors in the aftermath. In our sectoral strategic document which we prepared in the previous period, we stated the following to all of our departments until the end of the strategic planning period. We told them to own a minimum of three sub systems in their own fields and to assign them to indigenize these sub systems. We cannot assign just the department of industrialization to handle the process".

Underlining that they decided upon a change in the SK/O (Industrial Participation/Offset) contracts signed at the Industrialization Department, TÜFEKÇİ said, "We will include these in the contracts of our main project departments. In line with the directive of our Presidency of Defence Industries introducing a

change in this area, and we made a change. We started to implement the Industry Product and Technology Acquisition concept within this scope”.

TÜFEKÇİ expressed that there were many non-sector companies wishing to invest in the Defence Industry and added that they aimed to form a structure to gather the investors and industrialists to this end. TÜFEKÇİ said, “There are many non-sector companies wishing to invest in the Defence Industry. Within this scope, we will establish an investment evaluation council and we are building a structure to gather the investors and you with a different type of cooperation model. On the other hand, we are focusing on EYDEP activities as well. We launched an inventory study to form the Defence Industry Capability Inventory but it will not be a standard inventory. We will register the capabilities of our Large and Small scaled companies, yet it will not be a static inventory. We have a defence industry taxonomy which we publish under the guidance of the R&D and Technology Department. We launched a taxonomy study nearly two years ago in order to generate a common language in these categories. We completed this activity a year ago. We should use this taxonomy to classify the technological competence and build a human resources inventory as well. In our inventory we will be able to see the taxonomy classes that each company skill/ class is categorized in and their levels of expertise”.

TÜFEKÇİ: “We built a credit support system of TL 150 million for our Small Scaled SMEs based upon the Defence Industry Executive Committee’s Decree”

Stating that they recently formed TL 150 million in credit mechanism geared towards the SMEs active in the Defence Industry, TÜFEKÇİ said, “We established a credit mechanism in line with a Decree of the Defence Industry Executive Committee (SSIK) and with the support of the President of the Republic of Turkey. Commissions, required for this credit support of TL 150 million from which our small scaled companies will benefit more, were established and our colleagues are working on the assessment process”.

Pointing out that there is a council

for indigenization, which includes the Commanders-in-chief of the armed forces and the relevant ministries, and it is focused on resolving the issues faced in the sustainment of the products in the inventory of the Turkish Armed Forces Command, TÜFEKÇİ added that the efforts of the aforementioned council for the indigenization of these required products continue. TÜFEKÇİ underlined that a resource of TL 300 million was allocated to R&D in Turkey and he then concluded his speech by adding that they aim to increase this figure further in the upcoming period.

Following the opening remarks, Defence Industry Sector Assembly President Yılmaz KÜÇÜKSEYHAN informed the sector assembly members on the views submitted to the ministries regarding the period in review by the sector assembly member companies, the activities conducted and presentations made at the Sectoral Economy Council that occurred on February 25 with the participation of many ministers.

KÜÇÜKSEYHAN stated that the notified authorities and shared their solution suggestions with the relevant ministries regarding the problems faced; issues especially regarding the high interest rates of bank credit, the fall in markets experienced in the Middle East, Far East and Africa, the challenge of Brain Drain and the insufficiency of the support given to Defence and Aerospace Industry events. KÜÇÜKSEYHAN expressed that they introduced their following solution suggestions to the relevant authorities as follows: Regarding the high interest rates of bank credit, if an arrangement can be made for contracts so that there is need for credit, such as payment plans that are balanced with advance payments and stage payments. Regarding the market decline in the Middle East, Far East and Africa, visiting the procurement authorities in these target markets, execution of implementation for intergovernmental sales. Regarding ‘brain drain’ problems, supporting the Presidency of Defence Industry Eco-System Coordination platform activities, and regarding the insufficiency of defence and Aerospace Industry event support, the identification of fees associated with renting a stand for SMEs at



Defence Turkey Yılmaz KÜÇÜKSEYHAN - TOBB Defence Industry Sector Assembly President

IDEF 2021 and also increasing the incentives for the participation in international fairs.

Following the address of the TOBB Defence Industry Sector Assembly President Yılmaz KÜÇÜKSEYHAN, TOBB Deputy Secretary General Cengiz DELİBAŞ made a presentation on the ‘Employment Campaign of 2019’. Within the scope of the employment campaign of 2019, DELİBAŞ mentioned that they launched the implementation of incentives under 8 main titles: New employment wage support (3 months) (until May 2019), New employment Social Security Institution Premium tax support (minimum 12 months), Short – term working allowance, Minimum Wage Support, Support for Regular Payment, Additional support to Development, First on-the-job support then Employment support and Full support for training qualified manpower in line with requirements and shared the details with the sector assembly members.

After the networking break, another topic of the meeting’s agenda was the final status of the



Cengiz DELİBAŞ - TOBB Deputy Secretary General

activities conducted within the scope of topics of the agendas of the Ministry of National Defence (MSB) Kırıkkale Defence Industry Assembly Meeting held on 30 October 2018 and the MSB/ Presidency of Defence Industries Eskişehir Defence Industry Assembly Meeting on 28 January 2019, the resolved and ongoing issues were shared with the sector assembly members with a briefing from Defence Industry Sector Assembly by President Yılmaz KÜÇÜKSEYHAN.

KÜÇÜKSEYHAN stated that the problem with guarantee letters continued, adding that the credit interest rates were still too high and underlined the negative effect over the costs shouldered by the industrialists. KÜÇÜKSEYHAN: "At the meeting held on October 30th, our sector assembly members made various presentations and certain issues were introduced to our dear Minister at that meeting. Unfortunately, the support provided to the SMEs for the IDEF event is insufficient. Therefore, our small scaled companies have failed to appear in such events. Personnel expenses, stand rentals, logistical expenses altogether cause a great burden for our companies. This high value add sector needs to receive more support".

Moreover, KÜÇÜKSEYHAN said in the meeting that they presented the following issues to the Ministry of National Defence: SMEs active in the defence industry making contracts with foreign currency, facilitating access to STANAGs, facilitating the acquisition of facility security clearance, the requirement for technical staff with international certificates who are trained with hands-on training, organizing the tender specifications in a way to enable competition, implementation of legal filters enabling the exceptional application of urgent procurement method, insufficiency of the staff related with the defence industry's intellectual property rights and the patent violations emerging with the increase of technological competence. KÜÇÜKSEYHAN also shared with the sector assembly members that STANAGs regarding these headlines started to be published on the official website of the Ministry of National Defence, and he added that they

launched the activities related to indigenization, the facility security clearance and production license processes were also facilitated and the products that do not require production license were removed from the list subject to control.

Yılmaz KÜÇÜKSEYHAN also informed the audience on the issues discussed within the scope of the agenda of 39th Turkish Defence Industry Assembly Meeting held on 28 January 2019 with the participation of the Minister of Defence Hulusi AKAR. KÜÇÜKSEYHAN also mentioned various issues in the presentation, introducing these topics to Minister of National Defence Hulusi AKAR. Issues such as the collection of companies capable of manufacturing main systems, sub systems, parts and equipment that may be employed in civil aviation vehicle projects within an inventory, providing incentives for investments and certification, structuring of the special incentive implementations for investments for companies to be identified/ selected in space/ satellite areas through consolidation of the requirements stated in the space road map and future projections, participation of industry representatives in the Turkish Space Agency and its councils, Turkey's establishment of its own PMA, encouraging the domestic production of highly qualified machine tools, acquisition of the capacity to manufacture the raw material required in Defence and Aerospace. KÜÇÜKSEYHAN also added that they received instruction to arrange a more extensive meeting in line with the instructions of the Minister of National Defence.

Upon the completion of the presentations, President of the Defence Industries Prof. İsmail DEMİR attended the final part of the program and delivered a speech addressing the sector assembly members. Prof. DEMİR stated that critical issues were examined at the TOBB Defence Industry Sector Meetings previously held with the participation of the Minister of National Defence for discussing the sector's problems and said, "Our Minister of National Defence is closely concerned with the problems of the sector. Launching the instructions of the executives may take time due to



Prof. İsmail DEMİR - President of Defence Industries

the bureaucratic circumstances. Bureaucracy creates obstacles. At this point, we have to talk about the feedback, to what extent they were actualized, the changes required to resolve problematic areas with your contribution. Because I believe that awareness needs to be created in order to launch the well-intentioned approaches and initiatives".

Mentioning that they expected the support of the sector's shareholders for the execution of the Industrial Competence Assessment Program (EYDEP), Prof. DEMİR said, "The feedback from your party is quite critical at this point, training was provided, the companies were audited by our auditors. Certain expectations were created in the audited companies. The steps required regarding the actual expectations from the projects should be completed. We need to take rapid steps regarding support, training and cooperation. We believe that this project will clear the way for Turkish companies on a global scale".

Stating that they also attached great importance to the inventory studies supporting the EYDEP program, Prof. DEMİR added that they aimed to benefit from the defence industry capabilities to the maximum extent.

Prof. DEMİR underlined that they planned to make maximum use of military factories and the capabilities of the shipyards and added, "The correct analysis of these capabilities and this structure, reaching their actual potential, identification of idle capacities and activities to improve these should be conducted. Our advice to our colleagues working here is to initially focus on these improvement activities".

DİTAŞ R&D Center Contributes to the Defence Industry

DİTAŞ R&D activities focus on Technological Development and Sustainability. Considering that an R&D Center is needed to carry out studies systematically to achieve this aim and to prepare a foundation for innovative efforts in the context of a Project Management Office, DİTAŞ lodged an application to the Ministry of Science, Industry and Technology in 2017 to establish an R&D Center in the scope of the Law on Supporting Research, Development and Design Activities, numbered 5746. Its application having been approved, DİTAŞ was awarded the 571st R&D Center Certificate by the Ministry and obtained the right to benefit from the incentives and exemptions granted to R&D Centers pursuant to the provisions of the law. Officially inaugurated in 2017, the DİTAŞ R&D Center continues its efforts to contribute to the development of industry in Anatolia and to help Turkey achieve its targets of reducing the current account deficit.

Combining its deep-rooted design experience with the advantages of being an Integrated Production Facility, the DİTAŞ R&D team has long been utilizing a research and development infrastructure that will serve innovative products in the automotive industry. With its know-how and experience, it serves both the key industry and independent aftermarket in steering and suspension system components. Having set its company strategy for 2017 as **"Being a Part of the Transportation Industry and a Business Partner"**, by not limiting its activities solely to the automotive industry with its key players and independent aftermarket companies serving globally, in light of this strategy the DİTAŞ R&D Center has concentrated its R&D efforts on 4 main industry groups, including Automotive, Railway Systems, Agriculture and Defence & Aviation. Approximately 4.5% of the company's turnover is allocated to the expenses of their R&D center in order to carry out activities in these areas.

Working with the biggest

companies of the defence industry, the company increasingly continues its efforts to attain its targets in the defence and aviation industry. The products to be manufactured are intended for national projects and strategic areas in Turkey. Furthermore, developing the infrastructure and know-how of the company will bring new technologies to Turkey and will ensure that all the aluminum parts used in the defence and aviation industry are met by DİTAŞ.

In the Defence Industry, where the DİTAŞ R&D Strategy began, efforts are focused in three main branches: Land Vehicles, Aircraft, Special Purpose Military Vehicles

In the area of **Tie Rod** designs, one of the most important parts of the steering suspension system, DİTAŞ works with the major industrial companies that manufacture parts for the land vehicles in the Defence Industry. The steering tie rod, which the company worked on for the vehicle used in challenging terrain and climatic conditions, has proven itself with its high endurance and high maneuverability. Imported parts are redesigned by DİTAŞ acting as co-designer in the scope of localization, and computer-aided FEA and life tests and design validations are carried out with their own means. Sample production is carried out with rapid prototyping facilities, while onboard tests are continued in the main industries. Then, the parts are localized by providing support during the production stages.

It has been decided that the production of the rods used in the flight control systems in the Turkish aviation industry will be carried out in Turkey, and DİTAŞ has started its efforts for the design of these parts. As a result of R&D activities, the design, development and mass production of new types of products can be achieved. DİTAŞ designs products at low cost, with an aim for an economic service life, which also meets the military requirements. First and foremost, the company's goal is to supply the parts produced/to be produced for use in the defence &



Selim BAYBAŞ - Vice Chairman of the Board of DİTAŞ
civil aviation industry from domestic sources, and then to perform production for overseas markets.

Due to the high standards and requirements necessitated by industrial products, a special Rubber Bushing and Ball Joint, which transfers motion from the steering wheel to the tie rods and axial joints for Wheeled Armored Personnel Carriers, is planned to be manufactured by the main industrial companies in Turkey. While several R&D activities are currently in progress for this new required product; rubber bushing and ball joints are also being developed for use in wheeled armored personnel carriers.

Thus, critical information and know-how relating to the Turkish defence industry, which is an issue concerning national security, will remain in Turkey. It is considered that especially NATO member states could prefer these products in the future, due to the advantage of production costs in Turkey.

With the strength of its R&D center, DİTAŞ will continue to move forward with confident steps toward becoming a global brand and will stand out as a solution provider for global brands as it provides services in all areas of the transportation industry.

Eskişehir Aviation Cluster

The “Eskişehir Aviation Cluster Association” (ESAC) was established in March 2011 as a result of the studies initiated by the pioneering effort of the Eskişehir Chamber of Industry (ESO) to shape the future of the aviation sector, which is among the vital industrial points of Eskişehir, and to direct the studies in this field.

The founding members of the association include the leading industrial companies of Eskişehir such as; Eskişehir Chamber of Industry, Anadolu University, TUSAŞ Engine Industries, Alp Aviation, Savronik Electronics, Coşkunöz Defecse and Aerospace, AYCAN Aviation, EJS Eskişehir Wheel & Machinery, and Nümerik Makina. A total of 25 aviation companies are part of the association which has 31 members.

The main objective within the scope of cluster structuring, where the number of our members is increasing every day, is to carry the Eskişehir aviation industry to the level where it can compete in the international arena by developing it in terms of quality, systems, technological infrastructure with the focus on gaining more business share from the aviation sector. We are planning to create synergy with awareness created in this direction by taking mutual actions with similar aviation



clusters in Turkey, promote the country’s industry, Eskişehir, and the Eskişehir Aviation Cluster and to increase business development potential by cooperating with other clusters in the world.

ESAC member companies provide services in structural parts, machining, lathe, milling, critical engine parts, avionics systems, design, consulting, cutting tools and logistics. There are many ESAC companies and they operate in particular fields such as;

- > 10 companies on structural parts
- > 11 companies on lathing
- > 9 companies on milling
- > 4 companies on avionic systems
- > 2 companies on cutting tools
- > 4 companies on design.

The ESAC also participates in various national and international support projects. One of these projects is the Ministry of Trade’s “Development of the International Competition” project. The project prepared by the ESAC has been accepted by the ministry and a total of nearly 1 million TL in resources has been allocated to the project for the last 3 years. At the same time, as the ESAC is in the database of KOSGEB and BEBKA (Bursa Eskişehir Bilecik Development Agency) in March 2015, with the support of BEBKA, opened the CMM Precise Measurement Center for the common use of our aviation companies.





© US Navy

USNS Spearhead was the first T-EPF (then known as the Joint High Speed Vessel) produced for the US Navy, delivered 2012

Expeditionary Fast Transport (T-EPF)

An Extraordinary Capability for a Growing Number of Expeditionary Missions

Austal's successful Expeditionary Fast Transport (T-EPF) program - part of the company's High Speed Support Vessel portfolio - has recently been awarded an additional two (2) vessel contract by the US Navy, taking the total number of vessels contracted to fourteen (14). The contract award extends the T-EPF program to CY2022, with construction of T-EPF 13 to commence in late 2019 and T-EPF 14 to follow in the middle of 2020.

The 103 metre T-EPF's were designed by Austal Australia and are manufactured at the company's USA shipyard in Mobile, Alabama.

Austal has delivered ten T-EPF's to the US Navy since 2012, with all ten vessels deployed and operated by US Military Sealift Command (USMSC).

The T-EPF is an expeditionary sealift platform that provides fast, intra-theatre sea transport of embarked troops, vehicles and cargo for a variety of missions



© US Navy

T-EPF's can self-load/unload with an aft slewing ramp, enabling fast transfer of troops, vehicles and equipment at austere ports

including military exercises, special joint forces operations and humanitarian and disaster relief (HADR) response. The T-EPF platform is an effective 'high speed connector' that complements and enhances the capability of both amphibious and larger, support vessels.

Based on Austal's proven commercial high-speed open-sea ferry designs and technology, the T-EPF is an all-aluminium catamaran design that provides naval fleets with additional, fast sea lift capability at a lower cost than traditional (slower, monohull) naval support vessels.

The T-EPF has a large 1,800 m² roll-on/roll-off vehicle (cargo) deck that can accept 630 metric tonnes (including tracked armoured vehicles such as the M1A2 Abrams Main Battle Tanks). Vehicles can drive on/off over via an aft slewing ramp that can be used at austere port facilities. Its passenger deck has airline style seating for 312 troops and berthing for 140. The ship can sustain 312 embarked personnel plus the crew for four days or 104 personnel for 14 days without re-supply. There is a large helicopter flight deck and aviation support facilities that supports most US Navy and Marine helicopters, including the CH-53E heavy lift.

As more T-EPF's have been delivered, the US Navy has increased deployments and application of the vessel for various missions, including Special

Operations, Marine Security Rapid Response and military assistance operations. Its unique capabilities have been seen utilised for a many different missions including counter drug-trafficking, medical response, offshore logistical support, and in support of larger amphibious and expeditionary platforms.

The T-EPF's key points of difference over traditional supply or support vessels include weight-saving aluminium construction, an optimised catamaran hull form that provides greater carrying capacity and maximum fuel efficiency, a shallow 3.92m draft that allows the vessel to get close to shore, navigate larger rivers and bays, and dock in austere ports - plus four powerful waterjets that deliver outstanding speed and manoeuvrability.

Speed is a key feature, with the vessels able to reach between 35 and 45 knots - depending on payload - with a range of greater than 1,200 nautical miles at speed. The vessels can operate effectively



High Speed Support Vessel 72 - designed and constructed by Austal Australia for the Royal Navy of Oman, delivered 2016



© US Navy

T-EPF-6 USNS Brunswick was the mission command vessel for Pacific Partnership 2018

in up to Sea State 7 conditions and is also capable of at-sea refuelling and underway vertical (airborne) replenishment.

Austal's T-EPF is part of a greater High Speed Support Vessel (HSSV) portfolio that has seen a number of customised designs developed for customers around the world.

These include the Theatre Support Vessel (TSV) Westpac Express, a 101 metre high speed catamaran chartered by the US Marine Corps in Japan for over 16 years (achieving 99% availability), the High Speed Support Vessel (HSSV) 72 designed and constructed for the Royal Navy of Oman (RNO). Two HSSV 72's were constructed by Austal Australia and delivered to Oman in 2016.

The T-EPF has proven successful, not only because of the enhanced capability it is offering naval operators, but also from the reduced risk to operators drawing upon the proven, in-service commercial designs and construction processes (developed over 30 years of manufacturing) that offer lower development, acquisition and operating costs.

At Pacific Partnership 2019, conducted in the Marshall Islands in March, two US Navy T-EPF's – USNS Fall River (T-EPF 4) and USNS Brunswick (T-EPF 6) participated, following Brunswick's success as the command vessel during Pacific Partnership 2018.

"USNS Brunswick proved to be an incredibly valuable platform for Pacific Partnership. The versatility of the ship allowed us to transit shallow waters and visit ports like Yap and Palau, places that wouldn't be able to accommodate (USNS) Mercy."

- Royal Navy Capt. Peter Olive, Pacific Partnership 2018 Deputy Mission Command

Pacific Partnership is the largest annual multi-national humanitarian assistance and disaster relief preparedness mission conducted in the Indo-Pacific. Each year, the mission team works collectively with host and partner nations to enhance regional interoperability and disaster response capabilities, increase stability and security in the region, and foster new and enduring friendships in the Indo Pacific.

Military personnel from the U.S., Australia, Canada, Japan, Peru and the United Kingdom took part in a variety of projects to include disaster response seminars and training to improve overall disaster preparedness, sports games and band concerts with local schools, installation of rain water catchment and filtration and community-wide

health fairs.

Based on the success of the T-EPF's in Pacific Partnership 2019 and in previous years, there is now a proposal by Austal USA to develop a dedicated 'hospital' variant that will have greater medical and surgical capabilities on board to deliver rapid response, in-theatre support for troops and civilians.

Redefining Capability

With vessels now deployed throughout the world, including the United States, South East Asia, the Middle East, Africa and Europe, the T-EPF continues to impress the US Navy and effectively support operator USMSC, while truly redefining naval capability.

More information;

<https://www.austal.com/ships/expeditionary-fast-transport-t-t-EPF>

US Navy's T-EPF Fleet, operated by US Military Sealift Command

T-EPF	USNS	Status / Delivered
T-EPF-1	Spearhead	6-Dec-12
T-EPF-2	Choctaw County	6-Jun-13
T-EPF-3	Millinocket	21-Mar-14
T-EPF-4	Fall River	16-Sep-14
T-EPF-5	Trenton	12-Apr-15
T-EPF-6	Brunswick	14-Jan-16
T-EPF-7	Carson City	24-Jun-16
T-EPF-8	Yuma	21-Apr-17
T-EPF-9	City of Bismarck	20-Dec-17
T-EPF-10	Burlington	15-Nov-18
T-EPF-11	Puerto Rico	Under construction
T-EPF-12	Newport	Under construction
T-EPF-13	To be named	Contract announced 26 March 2019
T-EPF-14	To be named	Contract announced 26 March 2019

NERO Industries - The Largest Sub-System Producer of Turkish Land Platform Manufacturers

Founded in 2009, NERO Industries serves the defence and aviation industry in the design, production, and qualification of sub-systems for land, sea and air platforms. Today, NERO Industries has become a globally competitive company that exports to more than 20 countries abroad with its steady growth in the last 10 years.

NERO Industries is continuing its activities with its 12 thousand m2 production and R&D facility in Ankara and its 60 thousand m2 production facility in Sakarya. The amount of investment made by the company in Turkey has exceeded TR25 Million. With the completion of the semiconductor serial production lines, which are being installed at the Sakarya plant, the company's investment in the country is expected to exceed TR100 Million. The company also has business development offices in Istanbul, Bulgaria, and Saudi Arabia. Nero Industries is making new investments to establish facilities in Bulgaria and Orlando, Florida USA as part of its overseas business development activities. In order to expand into new markets, the company plans to invest a total of US\$23 Million by the end of 2019 including US\$5 Million for the factory in Sakarya, US\$15 Million for the facility in Ankara, US\$2.5 Million for the factory in Orlando, and 500 thousand dollars for the facility in Bulgaria.

NERO Industries specializes in niche areas such as power and power distribution systems (Military Generators, Auxiliary Power Units, AC/DC Converters), explosion detection and fire suppression systems, Chemical Biological Radiological and Nuclear (CBRN) detection and filtration systems and Smoke Launchers and Laser Detection Systems. NERO Industries, with a total of 185-200 employees including 90 engineers, is an approved supplier of the Turkish Armed Forces and



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various domestic land vehicle manufacturers as well as major international defence companies. With its 6 thousand sub-systems and turnover of TR150 Million in 2018, the company has become the biggest sub-system supplier of Turkey in the field of land vehicles and aims to add value to the Turkish economy with its unique and national systems. The total amount of orders received by the company has reached TR450 Million.

NERO Industries Chairman of the Board Alican ÖKÇÜN and STANDART Test General Manager Öznür ÖKÇÜN met with the members of the press on March 15, at the Bilkent Hotel in Ankara to share information about the company's unique subsystem solutions, activities and future targets.

NERO Industries Chairman of the Board Alican ÖKÇÜN: "In Explosion Detection and Fire Suppression systems, we are growing by taking the markets of major producers."

Speaking at the press breakfast, NERO Industries Chairman of the Board Alican ÖKÇÜN stated that they continue their efforts with a motivated and dedicated team to meet the needs of the Turkish Armed Forces. Stating that NERO Industries has three different product families, ARES Explosion Detection and Fire Suppression Systems, ARMA Power Systems, and MARS CBRN (Chemical Biological Radioactive and Nuclear) and Air Filtration Systems, Mr. ÖKÇÜN said that they reached a



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NERO Industries Chairman of the Board Alican ÖKÇÜN

turnover of TR150 Million in 2018 thanks to the ARES product group.

Explosion detection and Fire Suppression Systems are produced only by manufacturers in Israel and Germany. Thanks to the ARES system developed and produced by NERO Industries, Turkey became the third country in the world that produces products in this niche area. Underlining that they are aiming to become one of the biggest producers in the world, Mr. ÖKÇÜN stated that they have grown by gaining market shares in these countries.

ARES systems protect more than 2,000 vehicles in the inventory of the Turkish Armed Forces, Gendarmerie General Command and the General Directorate of Security. Having a 95% market share in Turkey, these products also serve in the vehicles of the security forces of 20 different countries. The sub-systems of NERO Industries are used in the various armored vehicles of BMC, FNSS, Otokar, and Katmerciiler as well as M60A3 tank, M113 APC and Aselsan's M60T Tank modernization projects.

ARES systems also come to the fore with the added value it provides to the industry. Emphasizing that the localization rate of these systems reached 92%, Mr. ÖKÇÜN said: "When we started this business, the Presidency of Defence Industries directed us to work together with the local industry in Ankara. Almost 85% of this product is produced by the local manufacturers and we make the final assembly in our facilities."

ÖKÇÜN: "We continue our development work for the use of ARES systems in Air and Sea platforms."

Stating that they continue the development work for the use of domestic ARES systems in Air and Sea platforms, Mr. ÖKÇÜN said: "We are working closely with TAI, I believe our system will be ready next year. There are also requests from the users for the Sea Platforms. So far, we are tasked with localization of the systems on 3 ships. This year we aim to use these domestic systems on 10 vessels."



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ARES Explosion Detection and Fire Suppression Systems - Detects Threats in 3 Milliseconds - Suppress in 250 Milliseconds

ARES Explosion Detection and Fire Suppression system, developed indigenously by NERO Industries, protects the military vehicles against fires and shoulder-fired rocket (RPG) threats.

ARES systems consist of control units, sensors, and extinguishers. The system detects explosions or fires inside the vehicle caused by an attack or an accident with the UV IR infrared optical detectors, developed by Nero Industries, and decides whether the heat or light source is a real fire. If the detector detects a fire or explosion inside the vehicle, it transmits it to the control unit. The control unit discharges the appropriate extinguishers inside the vehicle and eliminates the fire and explosion before the personnel or subsystems inside the vehicle are damaged. During this process, the ARES system detects the explosion in 3 milliseconds and eliminate the threat in less than 250 milliseconds. Detecting the explosion in only 3 milliseconds, the ARES system

activates when the fire inside the vehicle is at the size of a golf ball and eliminates further spread. ARES systems are also effective against Molotov cocktails, which are frequently used during riots. The system can activate the extinguishers outside the vehicle against the fires caused by such weapons.

NERO Laser Warning and Smoke Grenade Launcher System will be Exhibited at IDEF'19

The company is also preparing to add a new product to its product family with the knowledge gained from the ARES Explosion Detection and Fire Suppression System project. The cost-effective NERO Laser Warning and Smoke Grenade Launcher system that can be used in Tactical Wheeled and Tracked vehicles will be exhibited at the IDEF 2019 Fair. The system, which provides protection against laser-guided anti-tank missiles, consists of two 180-degree and one 360-degree Laser Warning Receiver and 8 Smoke Grenade Launchers on both sides of the vehicle. NERO Industries is very ambitious about this product, ÖKÇÜN notes that this product will be about one-fifth of the



price compared to their counterparts in the market and the system can be applied to all Tactical Wheeled Armored Vehicles, especially the ones in the inventory.

ARMA Power Systems, which is part of NERO Industries' product family, consist of Auxiliary Power Unit (APU), Power Distribution Unit and Power Switching Unit. Domestically produced silent generators of NERO are currently used by Aselsan, Havelsan, Roketsan. The 2x1000KW power-generating tactical military silent generator works at 65db at 7 meters.

Being part of the same group with NERO Industries, Standart Test General Manager Öznur ÖKÇÜN also provided valuable information to the press members about the activities they carried out on test infrastructures which are important for the development and certification of indigenous and domestic products.

NERO Industries - Standart Test Activities

One of the other activity areas of the company is testing. In this context, Standart Test was established in 2017 within the same group as NERO Industries with an investment of €5 million for the purpose of carrying out impartial test activities required by the Turkish defence and aviation industry. Standart Test, located in Anadolu OIZ in Ankara, offers various test services within the scope of MIL-STD 810, MIL-STD 461 and MIL-STD 1275 standards with its 2.000 square meter infrastructure.

In the facilities of Standart Test, various tests which cannot be performed in our country before



can be carried out now. Thanks to this test infrastructure, the Turkish defence & aviation industry can eliminate foreign dependence and receive services from a completely local establishment as soon as possible.

Turkey's Largest Test Infrastructure in Volume and Capacity

The facilities of Standart Test have the infrastructure to carry out various important tests. One of these is the 22.5-meters long, 4.9-meters wide and 4 meters high test room with Turkey's largest volume and the highest heating and cooling capacity. The room enables Standart Test to conduct MIL-STD 810G Standart Tests on military vehicles. This room has a cooling capacity of 180 kW/h and a heating capacity of 200 kW/h. Thanks to its investments, Standart Test has acquired the necessary infrastructure to perform MIL-STD 810G standard shock vibration tests and MIL-STD 461F standard EMI/EMC tests. Standart Test conducts EMI/EMC tests for vehicles with a weight up to 16 tonnes with its 13 x 10 x 6-meter room and carries out shock vibration test for systems weighing from 1.5 tonnes to 22

tonnes in a 200 kN room. Standart Test also has two separate 1 cubic meter test chambers. In one of these chambers, sprinkler and drip tests are carried out and salt fog tests are performed in the other. The facility also conducts MIL-STD 1275D Standart Tests.

Standart Test to Offer its Capabilities to Turkish Defence and Aviation Industry with TRTEST Cooperation

On January 11, Standart Test and TRTEST signed an exclusivity agreement for the use of test infrastructures. Standart Test has become the first company to present its test infrastructure under the coordination of TRTEST. Thus, for the first time, the Turkish Defence and Aviation sector acquired an infrastructure which allows MIL-STD 810G standard solar radiation tests to be carried out on a tactical wheeled armored vehicle.

Thanks to the agreement, the defence and aerospace companies that need to test their products will be able to benefit from the test infrastructures of Standart Test by applying to TRTEST. Standart Test, which adopts the principle of impartiality, will provide services to these companies as an independent organization. With this facility, which has the largest test infrastructure in terms of volume and capacity in Turkey, the tests that could not be performed before could also be carried out for the first time in our country. In this sense, the Turkish Defence and Aviation industry will break loose from foreign dependency. With its highly automated test infrastructure, Standart Test also aims to make very fast returns to the test demands of the companies and to eliminate the long waiting periods in the sector.



World-Leading Aerospace Company Marshall ADG to Showcase its Capabilities at IDEF

Marshall Aerospace and Defence Group specializes in the conversion and modification of military, civil and business aircraft; and defence vehicle engineering and shelter manufacture. Its capabilities include engineering design, manufacture and test; and the provision of personnel, training, and advice while providing maintenance, integration, manufacture and product support.

Since 1909 Marshall Aerospace and Defence Group has been valued for its integrity, performance and customer focus which has been demonstrated through its innovative solutions and ability to deliver on-time and to-cost.

With its over 80 years of aviation experience, Marshall Aerospace and Defence Group has completed more than 1500 aircraft modifications in 35 countries; and designed, manufactured, delivered and supported more than 5000 tactical shelters in over 200 different configurations.

The company provides avionics upgrades, structural refurbishment, cabin interiors, IFE connectivity solutions, cargo conversion, project management, and special mission aircraft services; as well as engineering services such as ground testing, modification–design and certification. It also provides citation MRO, air operators certificates and jet services including aircraft charter, management, and consulting.

Marshall Aerospace and Defence Group will attend IDEF 2019, 14th International Defence Industry Fair between April 30 - May 3, 2019. IDEF is considered as one of the most important international defence industry promotion platforms in the world showcasing state-of-the-art equipment, and systems produced in the defence and aerospace industries. This four-day event will be organized under the supervision of the Turkish Armed Forces Foundation and hosted by the Ministry of National Defence.

Marshall Aerospace and Defence Group is part of the Marshall Group, which employs more than 6,000 worldwide and which has a turnover in excess of £2.6 billion.

Spanish Government Approves the Construction of Five F-110 Frigates

On 29 March the Cabinet has approved the contract for the construction of five F-110 frigates for the Spanish Navy that will be built in Navantia, with an estimated value of 4.317 million euros. The first unit is expected to be delivered by 2026 and the last one by 2031.

Currently, the Spanish Navy has two types of frigates: five (5) F-100 “Álvaro de Bazán” class and six (6) “Santa María” class. The F110 frigates will replace the current Santa Maria class frigates, operational from 1986, so that the current capabilities of the Navy can be maintained and meet future needs arising from new operational scenarios with different threats and missions

Navantia will build five (5) frigates, including related materiel (life jackets, internal security equipment, mooring posts, etc.) and first installation spare parts for each ship, necessary to ensure the safety of navigation without external support

It is a multi-mission design with variety of capabilities from the submarine and surface war to asymmetric war and anti-air defence. The F110 will have a more reduced crew, a sensitively lower life cycle cost and a high level of survival.

Navantia Sistemas, the state-of-the-art center in Navantia, will also develop the most complex systems and integrate them on board.

Navantia will be exhibiting in FEINDEF 2019 in Madrid and will be showcasing the F-110 frigate as the star product.



SASAD's 30th Ordinary Meeting of the General Assembly and Defence Industry Award Ceremony Held in Ankara

The 30th Ordinary General Assembly of the Defence and Aviation Industry Manufacturers Association (SASAD) was held in Ankara on April 19, 2019, Friday, with the honoring participation of the President of Defence Industries, Prof. Dr. İsmail DEMİR

In addition to the representatives of SaSaD member companies; Vice Presidents of Defence Industries Dr.Celal Sami TÜFEKÇİ and Mr. Mustafa Murat ŞEKER, TÜBİTAK President Prof. Dr. Hasan MANDAL, Secretary General of ASO Dr. Yavuz CABBAR, heads of related MSB and SSB departments, and managers of other related institutions and organizations participated in the meeting.

The first part of the meeting started with the keynote speech of SaSaD Chairman of the Board Mr.Öner TEKİN.

Emphasizing that one of the main duties of each State/Government is to defend the country and ensure the safety of its citizens, TEKİN said: "The armed forces and independent defence industry are two powers that stand out the most on this matter. In order to coordinate these two powers in a proper way, we should improve the performance of the defence procurement process. Otherwise, the capabilities of the Turkish Defence Industry will gradually diminish, and important future projects will be procured from foreign sources."

Stating that our country has already strengthened Defence Procurement Management successfully to prevent such a development, TEKİN continued: "The Presidency of Defence Industries (SSB), which is directly responsible for the defence procurements and the development of the defence industry, and the Defence Industry Executive Committee (SSİK) was established to manage the defence industry programs. Thanks to these institutions, we have many privileges that other sectors do not have."



Regarding the export figures of the Turkish defence and aviation sector, Mr. TEKİN shared the following information: "According to the Defence and Aerospace Exporters' Association data, defence industry exports increased by 17% compared to the previous year and reached US\$2.035 Billion. This figure indicates a positive picture in sector performance data, particularly Total Sales Amount, Product-Technology Development and Employment considering the steady increase of 3-4% for two years before 2018. We believe that this positive development will continue in 2019."

Stating that SaSaD started to act as a single body for

joint procurements and make agreements with the suppliers to create new opportunities for the members of the association, TEKİN indicated that the e-PTT cooperation protocol with the PTT was the first example of this.

Following the speech of SaSaD Chairman of the Board Öner TEKİN, SaSaD Secretary General Hüseyin BAYSAK provided information on the 2018 work plan and budget. After voting for regulation changes and discussing the Aerospace and Defence Industries Association of Europe (ASD) membership, the Board of Directors and the Supervisory Board were absolved, and the meeting was recessed.

Taking the floor at the second

	Önceki Dönem (2017) TL	Cari Dönem (2018) TL
Net Satışlar (Prim ve Aidat Gelirleri)	1.621.250	1.318.1
Faaliyet Giderleri	1.745.408	1.418.4
Faaliyet Karı veya Zararı	(124.158)	(100.3
Diğer Faaliyetlerden Olagan Gelir ve Zararlar (Net Gelirleri)	256.319	437.0
Net Karı veya Zararı	132.160	327.2

session of the meeting again, SaSaD Chairman of the Board Öner TEKİN stated that defining the defence industry policy and strategies is a very significant issue which is directly related to the development of the defence industry. "In order to define the defence related priorities of the country, the Defence Industry Policy and Strategy Document was published in 1998 with a decision of the Council of Ministers. According to this decree, the Ministry of National Defence will prepare a list of Critical Technologies & Products and update it every year. Sharing this study with the relevant industrialist is a highly important factor for us."

President of Defence Industries Prof. Dr. İsmail DEMİR, in his speech at the Defence Industry Award Ceremony after the Ordinary General Assembly Meeting, stated that the SaSaD carried out the first cluster activities in the Turkish Defence Industry. Emphasizing the importance of manufacturing indigenous products, DEMİR said: "The SaSaD made significant contributions to the Turkish Defence Industry since its establishment. It acts as a guide for the sector and takes an active role in both domestic and international activities. The defence industry clusters are a highly connected family. It is quite necessary for this family to work together because the will to produce indigenous products in our country will always be one of the foundations of our independence and future."

Emphasizing that the Turkish Defence Industry has achieved successes exemplified for other sectors and public structures, DEMİR said: "The threats against our country's defence purchases made by our own free will clearly show that a foreign dependent defence industry does not provide any guarantee. Foreign dependency in the defence industry will be an obstacle for us in the future. Thus,



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when we talked about the national and domestic industry, we aimed to form the basis of trust in our own power."

Sharing information about the 2018 performance of the defence sector, DEMİR pointed out that the turnover of the defence and aviation industry was realized as US\$ 8.761 Billion with a 31% increase compared to the previous year. "Our defence industry exports increased by 20% compared to the previous year and reached US\$ 2.188 Billion. Last year, we spent US\$ 1.448 Billion on R&D. The defence industry allocates the highest amount of resources to R&D activities when compared among other sectors. Currently, the Turkish Defence Industry provides jobs for 67 thousand 239 people." Underlining the importance of the domestic and national defence industry for strengthening Turkey's security, DEMİR stated that they will continue their efforts to expand the sector with the Industrial Competency Assessment and Support Program (EYDEP) and the Capability Inventory (YETEN) portal, which will bring new players to the sector.

Following the speeches, awards were presented to the industrialists based on their 2018 performance in two categories as Large Enterprise and SME by the President of Defence Industries Prof. Dr. İsmail Demir, and Vice Presidents of Defence Industries Mustafa Murat ŞEKER and Dr.Celal Sami TÜFEKÇİ.

The following awards were presented at the SaSaD Defense Industry Award Ceremony;

- › Highest Total Sales Awards (Large Enterprise) 1st prize Aselsan

- › Highest Total Sales Awards (Large Enterprise) 2nd prize TUSAŞ/TAI
- › Highest Total Sales Awards (Large Enterprise) 3rd prize Turkish Technic
- › Successful R&D Output Awards Meteksan Defence
- › Successful R&D Output Awards Gür Metal
- › Successful R&D Output Awards TEI
- › Successful R&D Output Awards NANObiz
- › Highest Subcontractor Order Awards 1st prize Aselsan
- › Highest Subcontractor Order Awards 2nd prize Havelsan
- › Highest Subcontractor Order Awards 3rd prize Nurol Makina
- › Highest Foreign Sales Awards (Large Enterprise) 1st prize TUSAŞ
- › Highest Foreign Sales Awards (Large Enterprise) 2nd prize TEI
- › Highest Foreign Sales Awards (Large Enterprise) 3rd prize FNSS
- › Export Achievement Awards Baykar
- › Export Achievement Awards Roketsan
- › Highest Foreign Sales Awards (SME) 1st prize Vestel Defence
- › Highest Foreign Sales Awards (SME) 2nd prize Ata Arms
- › Highest Foreign Sales Awards (SME) 3rd prize ESEN
- › Highest Total Sales Awards (SME) 1st prize ATEL
- › Highest Total Sales Awards (SME) 2nd prize SDT
- › Highest Total Sales Awards (SME) 3rd prize CES Advanced Composite
- › Highest Sales Per Capita Awards (Value Added Product, SME) 1st prize ATEL
- › Highest Sales Per Capita Awards (Value Added Product, SME) 2nd prize ETA Electronic
- › Highest Sales Per Capita Awards (Value Added Product, SME) 3rd prize Turmaks

LAPIS – Expertise in Versatile Unmanned Aerial Systems

Lapis Aerospace Technologies Inc. was established in 2015 by experts in their fields. The Lapis Team, with 8 years of technical infrastructure in Unmanned Systems and Electric Vehicles sectors, started working on their first multirotor prototype in 2013 and proceeded successfully with the aim of becoming leaders in countrywide unmanned systems and electric vehicles industries with the completely indigenous design, software and production.

Lapis Aerospace Technologies Inc. has been conducting its operations with a total of 23 staff (7 R&D Engineers, 2 Administrative employees, 5 production employees, 6 Integration employees, 1 Quality employee and 2 Support Services employees) at their premises.

Their existing products consist of Rotary wing / Fixed Wing and Hybrid / VTOL Unmanned Aerial Vehicles which are of indigenous design and production. Their indigenous Auto-Pilot and Ground Control Station is used for all systems.

Lapis Capabilities:

- › All types of aircraft design
- › Aerodynamic design and analysis
- › Modeling and simulation
- › Design of flight control and navigation algorithms
- › Solid modeling and structural analysis
- › Machining and composite technologies
- › Embedded hardware design and software
- › Image processing algorithm and design
- › Windows / Linux based interface design
- › Mechanical design, production, installation of fixed-wing, rotary vane, multi-rotor aerial vehicle
- › Flight tests and trainings

Products and R&D Work

Lapis Provides engineering solutions with a multi-disciplinary infrastructure to the Civil and Defence Aviation Sectors:



- › **LAPIS VTL-02 ULAK** which is a hybrid of the Multicopter and Fixed Wing platform, has completely unique hardware and software and was designed and developed to accomplish fully autonomous missions. The LAPIS VTL-02 ULAK with a high payload capacity was developed to accomplish missions under difficult conditions, and it can be used day and night with its 30x EO and 35 mm IR integrated payload. The VTOL-02 does not require an airfield for take-off or landing. This feature is one of the most desirable needs among the civil and defence sectors.



- › **LAPIS CR-01 TROGON** is being widely used in surveillance, defence and security applications, aerial mapping, border security, oil and natural gas pipe line safety and agricultural applications and can be equipped with different payloads for each specific application. The LAPIS CR-01 TROGON which has completely unique hardware and software was designed and developed to accomplish fully autonomous missions. The LAPIS CR-01 TROGON with a high payload capacity was developed to accomplish missions under hard conditions and it can function day and night with its 12X EO and plug/play IR payloads.
- › **LAPIS CR-02 LAP60** is completely indigenous hardware and software that can be equipped with payloads in various fields in different areas such as discovery, surveillance



and intelligence, road safety, border security, oil-gas pipeline safety, mapping, forest areas, agricultural holdings and disaster management. The LAP60 has the capability of long endurance and flight time.

Turkcell, Huawei Turkey and Lapis, as first in the world, have completed domestic drone trial flights, which are controlled by 5G and capable of transferring 360-degree 4K live images to their glasses in a virtual environment. "10. Technology Summit by Turkcell"

PAYLOAD SYSTEMS

Lapis Payload Systems can be used on UAV systems for military reconnaissance, police surveillance and evidence collection, disaster prevention and mitigation, emergency monitoring and rescue etc.

› LAPIS Autopilot System

- › Indigenous software and hardware design
- › Integrated precision INS system
- › Integrated wireless modem for both video and telemetry support
- › Accurate navigation with GPS support
- › Full autonomous mission capability
- › Support for +100 waypoints
- › SD card data logging feature
- › Situation awareness through use of advanced sensors
- › Smart Battery Management System

› LAPIS Ground Control Station

- › Turkish and English (any other language operator interface on request)
- › Instant monitoring of flight and sensor information
- › Online / offline map support
- › Height analysis in route
- › Support for various types of maps
- › Follow-me flight mode feature
- › Auto mission hand-over capability
- › Auto-landing capability with <1 m precision
- › Emergency landing
- › Path planning algorithm, no-fly zone support
- › Multiple UAV and multiple payload

FY-01 3-axis 30x Gimbal / FY-02 3-axis Thermal Gimbal	
Main Features:	Technical Specifications:
<ul style="list-style-type: none"> ✓ Compact and Light-Weight System ✓ Quick connect/disconnect mechanism ✓ Uncooled IR Camera ✓ Zoom TV Camera ✓ Laser Pointer (Optional) ✓ Advanced Image Processing ✓ 3-Axis Gyro-Stabilization 	<ul style="list-style-type: none"> ✓ System type : Gyro-stabilized ✓ Gimbal size : 15 cm dia x 16.5 cm h ✓ Gimbal weight : <650 gr (w/o options) ✓ Stabilization : <10 mrad / <2 mrad (opt.) ✓ Ethernet H.264 Video Encoding

control by single GCS

- › Multi-video stream support and digital image stabilization algorithm
- › Emergency measures (GPS loss, link break, etc.)

› **LPT-01 LAPIS**

Pan and Tilt System is a specially developed platform to position



various payloads such as area surveying radars, multi-spectrum cameras, thermal cameras, infra-red and visible illuminators, and laser rangefinders. LPT-01 is designed to withstand harsh environmental conditions such as encountered at border security applications, coastal areas with high humidity levels, and other various land and weather conditions. LPT-01 facilitates the user to carry many custom signals to the payload via its sliprings.

An integrated embedded controller allows to remotely control the pan-tilt system via an RS-422 interface. It is also possible to remotely interrogate system parameters (e.g. speed, position, temperature) via a computer.

LPT-01 other features:

- › Custom serial communication protocol for remote control and parameter interrogation
- › Programmable and interrogable parameters: position (angle), angular speed, system temperature, motor currents etc.
- › Fast and accurate feedback control algorithms running on 32-bit microcontroller
- › Highly accurate encoders on both axes
- › Serial communications interface RS-422 default (RS-232 or Ethernet upon request)
- › Integrated power supply for customer payload use (upon request)

National and International Projects Underway

Lapis is involved in national and international projects: Supported by the Ministry of Commerce and conducted with Technopark leadership the “Competitiveness Improvement of Unmanned Aerial Vehicles Sector” project, “Improvement of Gimbal Systems Project” at Technopark Ankara, a “VTOL SYTEMS Project 1511” at TUBITAK and a European Union Project, Horizon the 2020 ROB-INS “Aerial Robots for Real Time Monitoring and Predictive Maintenance of Energy Sector”

Certified Expertise

Lapis has received the necessary certificates such as the “Facility Safety Clearance Certificate (2108/165)”. ISO 9001 (K-QM-4710) and Sub-Contractor Certificate, Aselsan (AS185-2018-0346),

Lapis draws upon all their resources and power to shape



the architecture of the future. All R&D activities are carried out in cooperation with local and international universities. All mechanical designs and analysis, embedded software developments, electronic hardware designs, interface software’s, production and R&D activities are carried out in-house.

As the Lapis family they convey a maximum focus on an “inventive”, “national” and “indigenous” thinking structure for their and R&D activities. Their love of technology and fuels their path beyond the best of humanity for the future.

System Features:	
<ul style="list-style-type: none"> ✓ Weight :6.5 kg ✓ Dimensions :372x263x155 mm ✓ Permissible max. payload :12 kg ✓ Power :24-36 VDC (max 50W) ✓ Max. Torque : Each axis 36 N.m ✓ Pan range :360° ✓ Pan slew rate :3-24 °/s ✓ Tilt range :-25° to +25° (max. -32° to +32°) 	<ul style="list-style-type: none"> ✓ Tilt slew rate :3-8 °/s ✓ Repeatability : Each axis ±0.1 degree ✓ Resolution :0.05 degree ✓ Operating temperature range : -30 °C to +55 °C ✓ Storage temperature range : -40 °C to +60 °C ✓ Electrical interface :RS232/485/422, 10/100 Base-T Ethernet ✓ Enclosure Environmental : IP 65, Mil-STD-461E, MIL-STD-810G

Awards to the Export Stars of the Defence Industry

The 2018 Ordinary General Meeting of the Defence and Aerospace Industry Exporters Association was held in Ankara on April 15th. The companies that achieved the most exports in the Defence and Aerospace industry in 2018 received awards in the meeting as well. Turkish Aerospace Industries, Inc. received the award for the company with the most exports, which was followed by TEI, FNSS, Aselsan and Alp Aviation

The Defence and Aerospace Industry Exporters Association (SSI) awarded the companies with the most exports in 2018. Turkish Aerospace Industries, Inc. has been the export champion of the sector in 2018. The awards to Turkish Aerospace Industries, Inc. and other successful companies were delivered by the President of Defence Industries Prof. İsmail DEMİR and Chairman of the SSI Latif Aral ALIŞ at the award ceremony which was held before the SSI's General Meeting.

In his speech, SSI Chairman of the Board Latif Aral ALIŞ stated that



Latif Aral ALIŞ - SSI Chairman of the Board

the sector has been making its mark with a new success story every day and said, "The success of our sector means a secure and peaceful future for our existence, and for a fully independent Turkey. We are extremely happy to observe all the segments of our society adopting the importance of our Turkish Defence and Aerospace Industry. Instead of following, we are now manufacturing the technology and products that are being followed".

Stating that the stability in the export figures is the most crucial



indicator of this development, ALIŞ continued, "We increased our exports by 130 percent since our establishment. In 2018, our exports exceeded US\$ 2 billion. We are the sector that increased the most in its exports in the first three months of 2019. Moreover, our export per kilogram reached US\$ 46.59. Turkey's average is US\$ 1.32. Our contribution to the economy is almost 45 times more compared to other sectors".

Emphasizing that they have been continuing their activities uninterrupted in order to increase the sector's effectiveness in the regional and global markets, ALIŞ added, "We will be hosting the IDEF fair which will take place in two weeks in Istanbul. We will be hosting

the critical representatives of the sector and country delegations and work toward launching projects that will develop our industry in the short and medium term".

In his speech, President of Defence Industries Prof. İsmail DEMİR stated that President Recep Tayyip ERDOĞAN attached great importance to the defence industry and said that the President constantly brought the topic of the defence industry to the agenda during his contacts with the leaders of foreign countries.

A total of 15 awards in various categories were delivered in the ceremony. Turkish Aerospace Industries, Inc. was the first company on the list of the most exports, TEI remained at the second



rank followed by the third company FNSS, Aselsan was the fourth company while Alp Havacılık Sanayi Ticaret was the fifth company to receive the award. FNSS received the award for increasing its exports the most, while Bahtiyar Av Malzemeleri Pazarlama İnşaat Tekstil Sanayi ve Ticaret LTD received the award for exporting to the highest number of countries.

Other companies that received awards according to product groups were; "Mechanical and Chemical Industry Corporation (Ammunition), Derya Silah Sanayi ve Ticaret Ltd. Şti. (Shotguns), Turaç Dış Ticaret Ltd. Şti, (Cartridges), Feda Pazarlama ve Ticaret Ltd.Şti (Other weapons), ASELSAN Elektronik Sanayi ve Ticaret A.Ş. (Defence Electronics), Turkish Aerospace Industries, Inc. (Air Vehicles and Parts), Yonca-Onuk Adi Ortaklığı (Vessels and Parts), FNSS Dış Ticaret A.Ş. (Land Vehicles and Parts)".

Defence Industry Exports Reached US\$ 715 Million in the first 105 Days of 2019

Data on the export performance of the Turkish Defence and Aerospace Sector in 2018 was also shared with the public at the Ordinary General Meeting of the SSI.

In line with the data shared by the SSI, the Turkish Defence and Aerospace Industry achieved exports worth US\$ 2.035 in 2018 - representing an increase by 17.1% compared with 2017 exports with an amount of US\$ 1.738 Billion.

The sector achieved an export of US\$ 715 Million during the period 1 January 2019 – 14 April 2019, the total exports of the last 12 months from 1 April 2018 to 14 April 2019 was reported to reach US\$ 2.235 Billion. The Turkish Defence and Aerospace Sector achieved an export total of US\$ 174.808 Million in January 2019, US\$ 171.626 Million in February and US\$ 289.225 Million in March. The total of the first three months was US\$ 635.659 Million.

According to the data provided by the SSI, the top 10 products exported in 2018 were listed as follows:



Other Components and Parts of Aircrafts and Helicopters (US\$ 554.3 Million, 27%), Turbojets for Other Vehicles and Components and Parts of Turboprop Engines (US\$ 338.7 Million, 17%), Tanks and Other Armored Battle Vehicles (US\$ 309.7 Million, 15%), Turbojet Engines for Civil Air Vehicles (US\$ 216.7 Million, 11%), Single-Barreled Shotguns (US\$ 89.4 Million), Others (Defence Purposes US\$ 72.3 Million), Other Components and Parts of Tanks and Other Battle Vehicles (US\$ 42.1 Million), Smoothbore Hunting Rifles for Hunting or Targets (US\$ 35.8 Million), Hunting Rifle Cases (US\$ 32.4 Million), Revolvers and Pistols (US\$ 26.4 Million) and Others (US\$ 317.7 Million).

During 2018, according to the data presented regarding the export markets in the meeting, based on country groups, NAFTA Countries received the lion's share (36.6%) in exports made by the Turkish Defence and Aerospace

Sector which provides products and services to the world, EU Countries followed the first group with 27% and with US\$ 549.4 Million, with US\$ 310.5 Million Middle East Countries (15,3%) became the third group and were followed by Other Asian Countries with US\$ 120.5 Million (5.9%). In line with the SSI's data, the top 15 countries that realized defence exports in the year 2018 were as follows: USA (US\$ 726.1 Million), Germany (US\$ 226.1 Million), Oman (US\$ 153.4 Million), Qatar (US\$ 83.5 Million), Netherlands, India, United Kingdom, Poland, France, UAE, Ukraine, Spain, Senegal and Bangladesh (US 24.1 Million).

Members of the Association were informed on the 2018 activity report and targets for the year 2019 at the Ordinary General Meeting held after the award ceremony and data was shared following the ceremony.



Turkish Aerospace Management Summit Held in Ankara

The Turkish Aerospace Industries (TUSAŞ) Management Summit was held in Kızılcahamam, Ankara with the participation of Vice President of Turkey Fuat OKTAY, President of Defence Industries Dr. İsmail DEMİR, senior management and employees of TUSAŞ

In his speech at the summit, Vice President of Turkey, Fuat OKTAY stated that they are not satisfied with the 65 percent domestic and national production rate in the defence industry. OKTAY said, "The number of national projects carried out in the field of defence technologies has exceeded 600 and indicated that the current situation regarding the production capability as well as indigenous product development and design is worthy of praise. Pointing out that the export breakthrough in the defence industry is an important turning point for Turkey, OKTAY emphasized that now Turkey can design, produce and export products in this area instead of importing them and added that the record-breaking export figures of over US\$ 168 Billion continue with increasing momentum with a 5.9 percent increase compared to last year.

Underlining that the defence and aerospace exports in 2002 valued at US\$ 248 Million, increased by more than 8 times in 2018 and reached around US\$ 2.35 billion; OKTAY said: "Is that enough? Never. I believe that with your efforts, we will increase it to even further levels. TUSAŞ made an enormous contribution to Turkey's current position, by ramping up our defence industry with the development of national synergy. We did not have a single defence company among the world's largest defence companies in 2002, yet today, we have TUSAŞ in the 64th place."

Stating that TUSAŞ is the source of pride for everyone regarding the most strategic projects which advance the national technology of the country such as aircraft, helicopters, unmanned aerial vehicles and



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space systems, OKTAY shared the following information: "Our satellite GÖKTÜRK-1, which provides high-resolution images from any region on the world without geographical restrictions and our first national observation satellite produced by TUSAŞ, GÖKTÜRK-2, continue to perform their duties. We have products that make us proud such as the T129 ATAK helicopter and the ANKA Unmanned Aerial Vehicle System. With the completion of the Turkish Fighter Jet Project, Turkey will become one of the countries that can produce a fifth-generation combat aircraft after the United

States, Russia, and China. We're not even talking about a distant future, in 2023, we will roll out our national aircraft from the hangar, and in 2026 it will be in the skies. It will enter into service in 2031."

OKTAY also expressed his best wishes for the signing of the contract between the Presidency of Defence Industries and TUSAŞ for the "Heavy Class Attack Helicopter" ATAK-2 project which will carry the experience gained from the ATAK helicopter to the next level.

OKTAY said that the target drone systems named ŞİMŞEK and TURNA meet the training



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Fuat OKTAY - Vice President of Turkey

requirements of the air defence units of Turkish Armed Forces in the best way possible. "TUSAŞ's support for the private sector, including SMEs concerning the development of our domestic production and subsidiary industry, is also praiseworthy. We have to create sub-systems related to the products we design and produce and develop sub-sectors. Strengthening our human capital with domestic and national projects and the encouraging success stories of our engineers will accelerate the Turkey's rise. In line with our 2053 and 2071 strategic visions and our national technology movement, our top priority should be the training of qualified personnel for the indigenous design and production capabilities of our country. We support our young people to grow and produce in the best way possible with effective training programs, techno-entrepreneurship support, and R&D incentives. In this respect, I would like to encourage you to further increase your university-industry collaboration activities. I follow your trainee engineer program with great appreciation. In addition to programs for young engineers like this, I expect you to extend R&D studies that will provide added value to technology. I strongly believe that you will increase the number of your partners and affiliates and expand your product range further by increasing your business volume. Hopefully, there will be days when we have no dependence on foreign countries for defence industry products."

Stating that it is not possible for Turkey to be solely a user of technology due to its regional and global position, OKTAY continued as follows: "Today, the countries that cannot produce their own technologies, particularly defence systems, are open targets for global powers. We are aware of the fact that if we acquire critical technologies from other countries, we may face the risk of failure to use those systems at the most required time. We

have not forgotten and will always remember the days when we could not fly the UAVs we bought in the past. We still remember the arms embargo during the Cyprus Operation as clear as yesterday. Under the leadership of our President, we place a great emphasis on fulfilling the defence and security requirements of our country with domestic and national resources and work day and night to ensure our technological independence. Our goal for our country is not only to become self-sufficient in the defence industry but also to meet the needs of friendly and allied countries. In this context, we continue our initiatives in the public and private sectors and diversify our multidimensional incentives and investments."

OKTAY emphasized that they meet defence industry requirements, from design to production, mostly through the domestic and national resources and the nation's own engineers. OKTAY said: "We have to use our resources in an effective and efficient way to make progress in the defence industry. This is one of the main reasons why the Presidency of Defence Industries is directly under the Presidency of the Republic of Turkey in the new system. It is to benefit from all the swiftness, flexibility and dynamism of the Presidential System. With the new system, our national product range with high added value technology that we offer to our nation will expand much faster. We will transform into a society that produces technology with your contribution and, together, we will bring our national technology movement to success."

OKTAY emphasized that the state has the capability and history to prevail against all sorts of challenges and with this understanding, the defence industry achieved significant progress in the last 17 years regarding localization, nationalization and global activity.

Stating that Turkey was unable to produce even the most basic

equipment for our soldiers but, today, we can manufacture our national combat aircraft and unmanned aerial vehicles including all the parts, OKTAY made the following assessment: "We raised locality rate in the defence industry from 15 percent to 65 percent. You know how we got to 65 percent. Taking the experience from ATAK helicopter one step further, we opened a new page with the Heavy Class Attack Helicopter. Designed and produced by Turkish engineers, our indigenous helicopter GÖKBEY successfully performed its first test flight and made us proud. In recent months, one of our ANKA unmanned aerial vehicles successfully conducted a flight test with TEI's domestically and nationally developed PD170 engine. By rapidly increasing our domestic production and design capabilities thanks to this momentum, I believe we will accomplish various significant projects for Turkey such as national Combat Aircraft and our first national communication satellite TURKSAT 6A. We are not satisfied with the 65 percent domestic and national production rate in the defence industry."

President of Defence Industries Prof. İsmail DEMİR: "We will give our full support"



Prof. İsmail DEMİR - President of Defence Industries

Presidency of the Republic of Turkey President of Defence Industries Prof. İsmail DEMİR stated that one of the most important indicators of development in the defence industry is the progress made in the aerospace industry.

Emphasizing that unconditional cooperation between TUSAŞ and Turkey's other aviation giant Turkish Airlines should be discussed as well, Prof. DEMİR, pointed out the importance of evaluating the extent of cooperation with other organizations within the framework of various incorporations and partnerships.

Expressing his hope that the meeting will act as an important milestone for determining the vision towards the future, Prof. DEMİR stated that, as Presidency, they will give their full support to TUSAŞ in this process.

Chairman of the Board of TUSAŞ Prof. Oğuz BORAT: "Our goal is to create 15 thousand jobs in 10 years"

Chairman of the Board of TUSAŞ, Prof. Oğuz BORAT stated that during the 2-day event they will discuss how to position their company regarding the developments and changes in the sector, as well as how to act strategically in the next 10 years. Prof. BORAT underlined that as TUSAŞ, their objective is to become an integrator company, develop subsidiary industry, introduce significant progress, development, and innovation at a global scale and become a pioneer in the international conjuncture. BORAT said that they employ over 8 thousand personnel currently and they will increase this number to 15 thousand in the next 10 years with an engineer-based growth plan.

KOTİL: "ATAK-2 Heavy Class Attack Helicopter to make its first flight in 2024"

In his speech, President & CEO of TUSAŞ Temel KOTİL shared information about the projects carried out by the company.



KOTİL indicated that HürJet, which is still in the prototype phase, will make its first flight in 2023. He also stated that National Combat Aircraft will roll out from the hangar in 2023, fly in 2026 and will be delivered in 2029.

Expressing that they are on their way to becoming a significant player regarding helicopters, KOTİL stated that export activities for the T129 ATAK helicopter are continuing and the T70 helicopter will begin to fly in 2020. KOTİL also said that the delivery of the GÖKBAY helicopter will start in 2020 and the ATAK-2 helicopter will make its maiden flight in 2024. In addition, KOTİL noted that they submitted their offer to the

Presidency of Defence Industries for the GökTürk replacement satellite.

Indicating that they realized around half a billion dollars of export in aircraft platforms, KOTİL said: "Our goal is to raise this figure to US\$ 2 billion. We are targeting for a turnover of US\$ 2.6 Billion this year and intend to increase this figure up to US\$ 11 Billion in future. Our aim is to become a company that does not only meet the needs of the Turkish Armed Forces but also secures successful exports. We are the 64th largest defence company among the top 100 in the world, and hopefully, we will reach the 15th place in 10 years."



Temel KOTİL - President & CEO of Turkish Aerospace

Meteksan Defence Primed to Integrate YAKAMOS Sonar to I-Class Frigates

Meteksan Defence General Manager Selçuk ALPARSLAN: “Behind our efforts, we have more than 10 years of experience, qualified engineering strength and a great infrastructure. We have acquired profound expertise from materials to systems. We consider all our assets and know-how in this field as critical and strategic investments for Turkey. One of the projects that this investment will benefit from is undoubtedly the I-Class frigates, which is the continuation of MİLGEM.”

With the guidance and support of the Presidency of Defence Industries (SSB) and Naval Forces Command, Meteksan Defence has assumed important roles for the industrialization, development and production of the YAKAMOS, which is the sonar of Turkey’s first indigenous warship design ADA (MİLGEM) Class frigates. Within the scope of these efforts, Meteksan Defence, which has reached an advanced level of experience in the field of sonar, is preparing to become the sonar supplier of the I-Class frigates built after the ADA Class. Currently, YAKAMOS sonars have entered the inventory of 3 ADA Class Corvettes (TCG Heybeliada (F-511), TCG Büyükkada (F-512) and TCG Burgazada (F-513)) and been serving operationally. Sonar has fulfilled many tasks in global seas with these ships.

Making assessments on the infrastructure investments they made in the development process of YAKAMOS sonar, which has become one of the critical systems of ADA class MİLGEM corvettes, Meteksan Defence General Manager Selçuk ALPARSLAN said, “We have been performing activities in the field of underwater acoustics since the establishment of Meteksan Defence. In this context, we progressed by working with the SSB and Naval Forces Command. With the technology transfer through ARMERKOM, we have accumulated know-how covering the entire sonar system comprising the electronic systems and algorithms. Regarding the 3rd and 4th vessels of the MİLGEM project, we carried forward the torch that we took over with the developments and improvements that we realized.



We also incorporated these developments and improvements in the first 2 vessels of the Project. Behind our efforts, we have more than 10 years of experience, qualified manpower, important infrastructure and competent collaborations. From materials to systems, we accumulated profound expertise. We consider all our assets and know-how in this field as critical and strategic investments for Turkey. One of the projects for which this investment will pay back is undoubtedly the I-Class frigates, which is the continuation of MİLGEM. We are ready to serve the I-Class frigates sonars with YAKAMOS which we have renewed and further developed in light of our experience. Today, Meteksan Defence has reached a point where it can compete with the world in the field of underwater acoustics. Our target is to become a worldwide sonar company in the next 10 years. In order to achieve this goal, we

would like to see the great support of the SSB, Naval Forces Command and our shipyards, and we are sure to receive it”.

ALPARSLAN also emphasized that they are aware of the fact that they are also responsible for the ecosystem due to the SSB’s assignment of Meteksan Defence with the approach of the Center of Excellence in Underwater Acoustics and said, “All institutions and organizations that create value in the field of underwater acoustics, including universities, research institutions, the private sector and Naval Forces Command should be coordinated under a single roof and get a share of the cake. They should come together in collaboration to create the Meteksan Defence ecosystem, as Meteksan Defence is Turkey’s sonar company. Thus, we can add value to each other instead of competing in the country and we can achieve the export target of US\$ 200 million abroad. If we fail to unite with this common mind today, then pressure of sustainability will bring us to this point sooner or later; but it will be a more challenging process than today. So, I believe the right approach is to compete abroad but to proactively create synergy within the country now”.



Defence Cluster Companies Coalesced at the TSSK 6th Project Market

The 6th “TSSK Project Market” was held in Ankara under the auspices of the Presidency of Defence Industries, in cooperation with ODTÜ, ODTÜ TEKNOKENT, Teknokent Defence Industry Cluster (TSSK), Ministry of Trade, TÜBİTAK, Ankara Chamber of Industry (ASO) and the Defence Industry Manufacturers Association (SaSaD), hosting more than 900 visitors

Teknokent Defence Industry (TSSK), the leading cluster of defence, homeland security, aviation and the cybersecurity sector in the field of engineering and design, focused on “export” and “localization” issues during the Project Market event organized for the 6th time this year.

Taking the floor at the opening ceremony of the event, TSSK Chairman of the Board Zeynep ÖKTEM pointed out the contributions of both cluster companies and the defence sector in the context of localization. Stating that they are aiming to contribute to the sustainability of the sector and to eliminate the problems caused by the monopoly of foreign suppliers, ÖKTEM emphasized that localization is the only way to achieve independence in the defence industry.

Referring to the indigenous platforms developed by the Turkish defence industry, Vice President of Defence Industries Mustafa ŞEKER said, “Localization is one of the most important issues. Many sub-systems used on these platforms are of foreign origin. This causes a critical problem for our export activities. We have to focus on localization to provide indigenous solutions.” Mr. ŞEKER stated that the relationship between the main contractor and sub-contractor defence industry companies should be established in a healthy way. In addition, he underlined that they are working on a solution which will improve the capabilities of SMEs to meet the high standard product needs of the sector.

Noting the importance of exports to meet the financing needs in the sector, Mr. ŞEKER



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made the following assessment: “The global defence export market has an estimated value of US\$100 Billion. Around 15 countries generate this figure. The US and Russia are in the first league with the highest market share while countries like Germany, England, and France are in the second league. Turkey is currently in the third league and we are aiming to increase our exports in the long term.” Indicating the exports of the sector have increased continuously in 10 years, Mr. ŞEKER stressed that the defence sector should aim higher and spend more time and effort to increase this number.

Ankara Chamber of Industry (ASO) Chairman Nurettin ÖZDEBİR stated that the world is rapidly changing and the surrounding geography of Turkey will be at the center of the new world. Mr. ÖZDEBİR emphasized that the activities of the sector companies are highly vital for the survival of our country. “We need to master these changes by producing higher technologies.” Pointing out

that defence industry companies made a significant contribution to Ankara’s ecosystem, Mr. ÖZDEBİR stated that 20% of the national high-tech products are produced in Ankara.

ODTÜ Vice President Prof. Dr. Mehmet ZEYREK also stated that TSSK is continuing its efforts to develop domestic and national technologies that will reduce foreign dependence in the defence industry. Underlining that TSSK members undertake important tasks in large-scale projects such as ANKA, MİLGEM, ATAK, HÜRKUŞ, ALTAY, and GÖKTÜRK, Mr. ZEYREK said, “Moreover,



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Fatih ÜNAL

various products developed by our members have started to be used in the defence industries of neighboring countries”.

Following the opening speeches, the program continued with panels and booth visits. “The Future of the Turkish Defence and Aviation Sector”, “Export” and “Localization” issues were discussed in the panels attended by prominent names of the sector.

Moderated by SDT Space and Defence Managing Director Fatih ÜNAL, the Future of the Turkish Defence and Aviation Sector Panel took place before the lunch break with the participation of the following panelists; Head of Fixed-Wing Platforms Department Abdurrahman Şeref CAN, Secretary-General of SaSaD Hüseyin BAYSAK, and STM Deputy General Manager Ömer KORKUT.

Head of Fixed-Wing Platforms Department Abdurrahman Şeref CAN, as the initial speaker of the panel, expressed his views on the issues that the Turkish defence sector should focus on in the upcoming years. CAN also presented brief information about the history of Turkish aviation regarding the importance of the TF-X Project for Turkey. “Our aviation adventure begins in the 1910s with the Balkan War. The Turkish Air Force was among the first aircraft users. Following the establishment of the Turkish Aeronautical Association in 1925, we started to manufacture fixed-wing platforms in different places of Turkey such as Kayseri, Ankara, and Istanbul. In 20-25 years, we produced around four hundred aircraft. However, after 1950 we started to buy existing platforms from foreign countries. This situation continued until the 1974 Cyprus embargo.”

Stating that there are three main issues regarding air platforms, CAN emphasized Turkey’s advantages on these issues. “We approach the air platform from three main points. Design, production, and maintenance. Both the civilian and defence sector have excellent capabilities when it comes to maintenance. We provide services not only for our own platforms but



Nurettin ÖZDEBİR and Prof. Mehmet ZEYREK

for other countries as well. We have Turkish Technic, an association of Turkish Airlines, working in commercial aviation with around 7,000 personnel and a turnover of US\$1 Billion. There is this concept called MRO (Maintenance Repair & Overhaul) particularly in commercial aviation. Turkish Technic is the biggest MRO center in Turkey. There are also other MROs in our region, in the Gulf and in Europe, we live in an extremely competitive world.”

Emphasizing that Turkey has a labor advantage in production, CAN also indicated that Turkey has a remarkable talent in delivery and quality. “When we talk about production, our country has the capability to deliver both platforms and sub-components. Turkish companies, especially TAI, are producing parts for two major aircraft manufacturers. The main reason why our companies are preferred in the international market is the man-hour capacity. We’re very competitive in this field and made significant progress in the last 10-15 years. It is not possible for European and American companies to compete against our prices especially in airframe construction. Turkish companies also have a remarkable talent in on-time delivery and product quality.”

In his speech, CAN also pointed out that the Turkish defence industry has the capability to design its own products. “Our country is capable of designing its own platforms. These are mostly sub-sonic platforms such as UAVs, helicopters, and training aircraft (HÜRKUŞ). We have really improved ourselves in the last 10

years. Almost all our companies started to export products. However, when it comes to transonic and supersonic, we still have a long way to go.”

While discussing the TF-X project, CAN stated that they receive design support from a foreign aircraft company. “The TF-X program is an enormous project. Even the US is developing the F-35 project, which is currently the biggest defence and aerospace program in the world’s history, with the joint support (financial and production contribution) of eight countries. We cannot manufacture and sell TF-X on our own, so it should be and will be a joint program. Therefore, we chose BAE Systems as a sub-contractor of TAI. We describe this concept as Foreign Collaboration Company (FCC). Currently, around 70-80 British engineers are working on TF-X design at TAI. Additionally, the engine is one of the problems that must be solved. We established a company called TR Motor to provide a solution for the engine issue. Moreover, exporting our product is very important for us. We do not accept any restrictions while working with a foreign partner.”

In his speech, SaSaD Secretary General Hüseyin BAYSAK mentioned SaSaD’s suggestions for improving the main contractor and sub-contractor relationship to establish an efficient Ecosystem in the defence sector. Explaining the overall structure of the ecosystem, BAYSAK stated that they are facing a complex network. “We can define the ecosystem as a complex



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Abdurrahman Şeref CAN



Hüseyin BAYSAK

network or interconnected system. In this context, it is evident that we are facing a complex network in the defence sector ecosystem with relevant State Institutions, Ministries, Armed Forces, Procurement Authorities, Sector players (domestic/foreign), and Industrial Assets. Therefore, the procurement process has a very critical role in the sustainability of the main contractor and sub-contractor relationship in this complex network.”

Emphasizing that one of the main duties of each State/Government is to defend the country and ensure the safety of its citizens, BAYSAK said, “The armed forces and independent defence industry are two powers that stand out the most on this matter. In order to coordinate these two powers in a proper way, we should improve the performance of the defence procurement process. Otherwise, the capabilities of the Turkish Defence Industry will gradually diminish, and the important future projects will be procured from foreign sources.”

BAYSAK stated that they focus on three main suggestions to prevent this situation. “As SaSaD, we have three suggestions to improve the defence procurement process. Defining and implementing defence industry policy, improving the procurement process, and strengthening defence procurement management.”

Expressing his views on the definition and implementation of defence industry policy, BAYSAK said, “The Defence Industry

Policy and Strategy Document was published in 1998 with a decision of the Council of Ministers in order to define the defence-related priorities of the country. According to this decree, the Ministry of National Defence will prepare a list of Critical Technologies & Products and update it every year. Consequently, the industrialists can create an investment road map to develop new products and technologies, acquire new skills, build a workforce and start business partnerships. These strategies and policies will provide national and critical defence industry capabilities to strengthen the sovereignty, security and economy of our country.”

BAYSAK also made assessments on the issues of improving the procurement process and strengthening defence procurement management. “Procurement authorities and industrialists should not only follow the contractual process but manage risk sharing between the state and the industrialist and reflect it in the contracts. Authorities should announce the annual procurement programs (with a deadline and budget) for transparency and contact the industrialists both before and during the program.” BAYSAK emphasized that the procurement management needs to be strengthened to meet the requirements of the Armed Forces in a timely, cost-effective and ingenious way, “A Defence Industry Advisory Council should be established to develop the defence industry and manage the procurement process by providing recommendations and annual reports to the president and the parliament.”

Regarding the export figures of the Turkish defence and aviation sector, BAYSAK shared the following information, “According to the Defence and Aerospace Exporters’ Association data, defence industry exports increased by 17% compared to the previous year and reached US\$2.035 Billion. This figure indicates a positive picture in sector performance data, particularly Total Sales Amount,

Product-Technology Development and Employment considering the steady increase of 3-4% for two years before 2018.”

The last speaker of the panel, STM Deputy General Manager Ömer KORKUT stated that they contribute to the future of the sector by providing creative and sustainable solutions with STM Thinktech. “STM Thinktech was actually established to fill a gap in Turkey. We aim to shape the future of the civilian sector by introducing new technologies with our 28 years of experience in the defence industry. Since November 2017, we organized three seminars.”

Continuing his speech, KORKUT elaborated STM’s vision and future activities on autonomous systems, artificial intelligence and cybersecurity. Noting that the autonomous systems are used extensively in the world, KORKUT indicated that they have already started to replace conventional platforms. “The platforms are now gradually evolving from manned to unmanned platforms they are getting smaller and more effective. While this is more evident in air platforms, the technology that developing countries now begin to build are smaller unmanned submarines. The land platforms are also shifting towards more agile, smaller, and lethal unmanned systems. This is since robotic technologies with artificial intelligence will replace these conventional platforms. Because they want robots to perform tasks defined as “3D” (Dangerous, Dirty and Dull).”



Dr. Ömer KORKUT

KORKUT addressed the importance of localization concerning the sub-systems and engines and pointed out solutions in the energy issue. “We have made significant investments in autonomous systems, in the last three years. Our attack drone KARGU has already entered the inventory of the Turkish Armed Forces and National Police. Since we could not buy these attack drones from our allied countries when we needed them, we developed a solution with our own resources. The system entered the inventory in a short period of two and a half years. Our studies on fixed-wing platforms are still ongoing.”

Noting the importance of localization for the sub-systems and particularly the engine, KORKUT emphasized that power supply is another issue to be solved. “The engine is the biggest challenge. Although they may seem like simple components, we still buy the engines that meet our performance specs from foreign countries. The same situation applies to batteries as well. When considering the swarm capability (more than 40 drones), we need sub-components to power these systems. We should acquire the ability to mass-produce platforms locally in high numbers.”

Emphasizing that Turkey needs to be proactive in cybersecurity, KORKUT said, “NATO defines the cybersecurity as the 5th domain after the sea, air, land, and space. If we analyze both world wars, these conflicts always occurred as a result of economic disputes. We are witnessing the manifestations of this in cyberspace now. For example, Australia was hit by an overwhelming cyber campaign in the last month. Cyberwarfare is asymmetrical in its core; thus, we must be proactive against it. We can predict and prevent events in the cyber environment with threat intelligence. So far, we have always considered cybersecurity as cyber defence. However, with the introduction of the hack-back concept (counter-attacking against cyber-attackers), we need to think of the offensive measures as much



as the defensive when necessary.

Discussing artificial intelligence in the last part of his speech, KORKUT advised that Teknokent companies should focus on sub-technologies in these three areas with innovative approaches. “Artificial intelligence is indispensable for autonomous systems and unmanned vehicles. It is also a new area of expertise in cybersecurity. There is a severe lack of manpower not only in our country but also in the world. We implement artificial intelligence in our cybersecurity activities to close the workforce gap with innovative solutions and approaches. There is significant business potential in this area. Therefore, we recommend that all cluster members, especially Teknokent companies, should

focus on these fields.”

Unlike the previous Project Market events, a special section with a guest speaker was held this year. Attending the 6th Project Market as a guest speaker, historian Prof. Dr. İlber ORTAYLI delivered a speech on the “History of the Turkish Defence Industry.” Thus, the participants had the opportunity to listen to Prof. Dr. İlber ORTAYLI for the first time at a defence industry event.

The project markets allowed more than 200 companies to exhibit their products, and hosted over 4 thousand visitors and prepared the ground for nearly two thousand B2B-meetings so far. This year’s event took place with the participation of 55 companies and more than 900 visitors, holding over 300 meetings.



Defence Industry Vocational Education to be Provided

The Protocol regarding the Development of Vocational and Technical Education was signed between the Ministry of National Education and the Presidency of Defence Industries. Through this protocol, workshop and laboratory teachers will be given theoretical and practical vocational training in line with current technology. The aim is to train the trainers by 2023

The Ministry of National Education and the Presidency of Defence Industries signed a protocol on the Development of Vocational and Technical Education. The Minister of National Education Ziya SELÇUK, President of Defence Industries Prof. İsmail DEMİR, representatives of the Ministry and SSB, as well as officials from defence companies such as Aselsan, Turkish Aerospace (TUSAŞ), Roketsan, Havelsan, STM and TEI attended the signature ceremony.

The protocol covers training in the fields of big data, artificial intelligence, cyber security, aircraft technology, avionics systems, information technology, electrical-electronic technology, industrial automation technology, shipbuilding, machine technology, metal technology, motor vehicle technology, design technology, aircraft maintenance and renewable energy technology.

In order to increase the professional knowledge and skills of the trainers in these determined areas, theoretical and practical



vocational training will be given to workshop and laboratory teachers by the SSB in line with current technology.

Within the scope of the protocol, the SSB will also provide support for the coordination of awareness activities such as meetings, seminars, conferences, competitions for the development of vocational and technical education in this field and in-service training activities to be organized for domain teachers. The coordination activities for the award of sub-protocols between the Ministry of National of Education and defence industry

organizations after the signature of this main protocol will also be provided by the SSB.

With the training of trainers, the objective is to reach students at the secondary level, to raise experts in these fields and to increase awareness in the defence industry. By 2023, training of 2023 trainers is aimed within this scope and as a result, the expectation is to fill the qualified manpower deficit in our defence industry and to overcome the deficiencies of vocational activities related to technical education.

Başak HASSOY Appointed as Deputy General Manager of ONUR Mühendislik A.Ş.

Başak HASSOY was appointed as the Deputy General Manager of ONUR Mühendislik A.Ş. as of March 4, 2019. She has served in executive level positions at various companies in the defence industry for more than 25 years.

As a graduate from Gazi University, Faculty of Architecture, Department of Urban and Regional Planning in 1992, HASSOY then completed her Master's degree in the field of Industrial Engineering

at Middle East Technical University, Department of Urban and Regional Planning.

HASSOY began her career with AGS Holding as an Industrial Planning Supervisor, she then assumed executive positions at TUSAŞ, SDT A.Ş. and GATE Elektronik A.Ş., respectively. HASSOY recently served as a Director at STM A.Ş. and was executing STM's R&D projects in the field of Radar and Simulation over the last 4 years.



FNSS Receives the Brandon Hall Award in 3 Separate Categories with its “Reliable Human Resources Consultancy” Project

FNSS received awards in the “Best HR Data Analytics”, “Best Human Resources Management Innovation” and “Best HR Strategy and Measurement Model” categories for its project named “Reliable Human Resources Consultancy”. The awards were given at a ceremony held in Palm Beach, Florida, United States, on January 24th. The focus of the project was the efficient human resources, and gold medals in three separate categories were awarded.

FNSS’s project was evaluated amongst 500 different projects by a jury of independent professionals who are recognized worldwide and FNSS succeeded in becoming the first company from Turkey that received three gold medals for its projects.

Noting the importance of hearing the voice of employees, FNSS Human

Resources Director Mehpare ALP pointed out that, in order to achieve this, they performed one-on-one dialogues with employees and that they were attentive to listen to their ideas via the use of surveys. ALP also mentioned that while preparing for this project, they attended many international conferences and listened to best practices, and they also performed benchmarking studies with those who are best in the sector and in their field.

In order to share the results obtained from the Human Resources Analytics project with management, meetings were held on ‘Reliable Human Resources Consultancy’. During the meetings, data collected under the topics of employee statistics, recruitment and work volume analyses, working hours,

performance evaluations, competition evaluations and training were examined together with all department heads. Inspirational and dedicated practices were acknowledged in the meetings and improvement actions were determined.

As one of the most important awards in the business world, the Brandon Hall Excellence Awards have been awarded since 1994 by Brandon Hall, a leading independent research and analysis company. Amongst other companies that were eligible to receive medals were global companies in different sectors such as Accenture, Bank of America, Cisco Systems, Dell EMC, Deloitte, Google, IBM, PepsiCo, PwC, SAP, Siemens and Walmart.

Turkey Hosts Boeing’s Leadership Training for Female Staff of the Qatar Air Force

In order to strengthen its global business partnerships and to contribute to the training of qualified individuals in the rapidly growing aviation sector, Boeing organized a training program to improve the competencies of female officers and employees of the Qatar Air Force in Istanbul.

The program was particularly designed for the development of leadership and communication skills by the Boeing Global Learning Institute for female officers and employees that will operate the Qatar Air Force’s Boeing platforms. Boeing Turkey General Manager and Country Representative Ayşem SARGIN said, “Boeing has long-standing and strong relations with both Qatar and Turkey. While Boeing’s business partnerships with Qatar and Turkey serve as a model in many areas, they also show

our determination in achieving joint success in aviation and growing together. Hosting the valued members of the Qatar Air Force in Istanbul within the scope of this training program reflects the spirit of our strong business alliance with Qatar and Turkey as well as the exemplary relations between the two countries. As a woman leader in the aviation industry, I am also very pleased that Boeing and the Qatar Air Force are investing in the female workforce and supporting them to become leaders of the future”.

7 women officers and employees from the Qatar Air Force as well as Boeing trainers participated in the program. Throughout the program, participants were encouraged to be open to research, strengthen their comprehension and to share their experiences. Qatar Air Force’s Fleet

Commander Colonel Hamad H. Al-IBRAHIM said that such training would build a bridge between Boeing and the Qatar Air Force, and that more women officers and civilians from other state agencies would be encouraged to join the Air Transport Squadron.

Extending his thanks to Boeing for meeting their training demands, Air Transport Fleet Deputy Commander Colonel Hamed Al-Qahtani pointed out that this training program would further strengthen the relations between the Qatar Air Force and Boeing as well as between Qatar and Turkey. Al-QATANI stated that they wish such joint efforts continue with the arrival of the new Boeing platforms in Qatar, and that more women officers join the Qatar Air Force.

The Groundbreaking Ceremony of Aselsan Konya Weapon Systems Inc.

Konya Weapon Systems Inc. was established by 24 Konya companies and Aselsan as a partnership with Konya Defence Industry Inc. The company will play a leading role in the production of weapons and weapons systems.

The Factory's groundbreaking ceremony was held with the participation of official delegations in Konya on 21 March.

The factory will be built on a 300 thousand square meter area near the Konya airport. This factory is established with the name Aselsan Konya Weapon Systems Inc. with 49 percent of its shares owned by Konya Defence Industry Inc. while the remaining 51 percent belongs to Aselsan. An investment of US\$ 65 million is expected to be made in the factory for the production of remote-controlled weapon systems and the weapon systems that currently could not be manufactured in the country.

In his speech at the groundbreaking ceremony, Vice President of the Defence Industries Mustafa Murat ŞEKER mentioned that the defence industry has made great progress in the last 15 years. Vice President ŞEKER: "We have been manufacturing many devices and systems and exporting them. Still, it's not sufficient. We have more ambitious targets. In order to achieve these targets, infrastructure and human resources across our country should be mobilized. I consider this company as a great example for this."

Aselsan Chairman, President & CEO Prof. Haluk GÖRGÜN: "As is known, our country's competence in developing military systems and introducing these developed systems to the service of friendly and allied nations in the international arena has been increasing day by day. Our country has put forth great will in the development and indigenization of its own independent systems and has dedicated itself to achieving



rapid progress to this end. This investment will be a critical step towards the main objective of minimizing foreign dependency as well as achieving regional development. Today, we are laying the foundation of a facility in which not only the production, test and integration activities will be conducted, but also the foundation of a facility that will serve as a design and innovation center for weapons and weapon systems. Additionally, this company is our country's first "Spin-Off company." I would like to thank everyone who contributed to the realization of this project".

Konya Defence Industry Inc. President and CEO Ibrahim KOYUNCU expressed that they were witnessing a historical moment and said, "Konya has served as a capital to this geography, and together with Aselsan, a leader in the defence industry, are building cooperation together. We have significant targets. We plan to be among

the league of the top fifty export companies within a short span of time".

18 Different Countries are Utilizing Aselsan Remote Controlled Weapons

The Remote-Controlled Weapon Systems developed indigenously by Aselsan are being utilized by the Turkish Armed Forces and National Police within the country, and they have been included in the inventory of 18 different foreign countries. Over three thousand Aselsan Remote-Controlled Weapon Systems are being utilized over thirty different platforms in the country and abroad. Weapon Systems are providing services in wide range of areas in land platforms; from armored personnel carrier vehicles to Main Battle Tanks, from fixed platforms to howitzers. Similarly, in naval platforms the system functions in utilization areas extending from fast intervention



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boats to frigates, from fast patrol boats to landing ships.

The Remote-Controlled Weapon Systems (RCWS) were developed to achieve effective defence against asymmetric threats by being integrated over land, naval and air platforms. Machine guns and automatic cannons, the 40mm automatic grenade launcher and anti-tank missiles are being used in the Remote-Controlled Weapon Systems. With the help of the electro-optical units enabling night and day precision surveillance capacity and stabilization, target tracking and ballistic computation capabilities maintain the effective utilization of the weapon's firepower. These weapon systems are able to operate under all types of weather conditions, night and day.

Aselsan Increases Competition with RCWS in 13 Different Calibers and Standards

Many machine guns and automatic cannons that are being utilized in the aforementioned systems are currently being imported from foreign companies



due to the lack of domestic alternatives. This causes negative impacts such as high costs and lengthy procurement processes and problems occur from time to time due to the restrictions and embargoes imposed on the final user countries. Aselsan's Remote-Controlled Weapon Systems in nearly 13 different calibers and standards are being developed and manufactured indigenously through Aselsan's own resources together with the sub-industry companies with seasoned know-how and experience. Aselsan aims to generate more competitive and rapid solutions by eliminating

foreign dependency on these weapons. As a result of the analyses conducted within this scope, the aforesaid investment was realized in Konya after the evaluation of factors such as the support of institutions, interest of investors, existence of production infrastructure, experience in the weapons industry, the status of developed university and technology development zones, fire and test fields, coordinated activities executed towards the indigenization of the defence industry and Konya's environment enabling the production of weapon systems.

Turkish Aerospace's Bursa R&D Center Inaugurated

Turkish Aerospace continues its activities in technology development and training of skilled human resources. The aim of the R&D center, which was established on an area of 174 m² in the ULUTEK Technology Development Zone at the Bursa Uludağ University Görükle Campus, is to develop solutions for the company's indigenous product designs. 24 students that will support TUSAŞ's R&D activities have been working since December. The opening ceremony was held by the Chairman of Board of Turkish Aerospace Prof. Oğuz BORAT, Head of Strategy and Technology Management Prof. Fahrettin ÖZTÜRK, Rector

of Uludağ University Prof. Yusuf ULÇAY, Rector of Bursa Technical University Prof. Arif KARADEMİR, ULUTEK Technology Center Director Prof. Mehmet KANIK and Turkish Aerospace-Uludağ University R&D Center Director Prof. Kemal FİDANBOYLU. In his opening remarks, Chairman of Board of Turkish Aerospace Prof. Oğuz BORAT said, "In our R&D centers, that will form the core staff of technological developments, we will continue our efforts to support training our intelligent minds that will ensure the continuity of innovation and to develop their creative thinking".

The successful Faculty of Engineering students studying at

Bursa Uludağ University, Bursa Technical University and Yalova University will be trained within the scope of the Intern Engineer Program at the center, which was established in order to contribute to the indigenous product design of TUSAŞ and to develop solutions to the problems encountered by conducting joint R&D projects with universities and major industrial organizations in Bursa.

TUSAŞ plans to expand its range of qualified engineers and is continuing its efforts to provide qualified human resources with the required PhD degree within the scope of the TÜBİTAK Industry PhD Program Protocol signed with Uludağ University.

International Flight Training School: First Two M-346 Aircraft Landed into the Italian Air Force's 61st Wing Base

The first two new Leonardo's M-346 aircrafts, part of the International Flight Training School (IFTS) project, joined the other 18 Italian Air Force's M-346s at 61st Wing's base in Galatina (Lecce), in Southern Italy. The new airplanes will be used to meet the growing demand for training services at the IFTS, established under the Leonardo-Italian Air Force Agreement signed in July 2018 and aimed at strengthening the training services delivered by the Air Force.

The Leonardo-Italian Air Force IFTS Agreement was inspired by the common decision of these two preeminent national entities to foster synergies to the benefit of the Country: combining the capabilities of the largest Italian industrial player in the aerospace, defence and security sectors with the Air Force's expertise in the military flight training domain.

The Galatina Air Base will play a key role leveraging on its long

and well-established operational expertise. The reinforcement of the 61st Wing to achieve the highest operational capability is core to the establishment of the IFTS. This goal will be achieved starting from 2020 when the brand-new integrated training system arrives in Galatina. This system is based on the M-345 HET – High Efficiency Trainer aircraft (designated T-345 by the Air Force) which will progressively replace the T-339A (used for the Phase II of training) and the T-339C (used for the Phase III).

The IFTS will have Phase IV - Lead In to Fighter Training – LIFT - at the core of its activities before

pilots move to fighters and will enable it to also meet the demand for pilot training from foreign air forces while foreseeing a possible further expansion with another base in Italy.

The Italian Air Force's modular syllabus has already proven its effectiveness to train students to the requirements of many air forces. Many have already been trained at the 61st Wing Air Base to transition to 4th and 5th generation fighters.

Operational training, carried out by the Italian Air Force with the T-346A, prepares pilots to transition to the latest-generation combat aircraft including the Eurofighter and the F-35. The Galatina Air Force Base is also equipped with LVC (Live, Virtual and Constructive Simulation) technology including the advanced M-346 simulator, enabling trainees on the ground to interact with pilots in the air, flying real aircraft, during the same training missions.



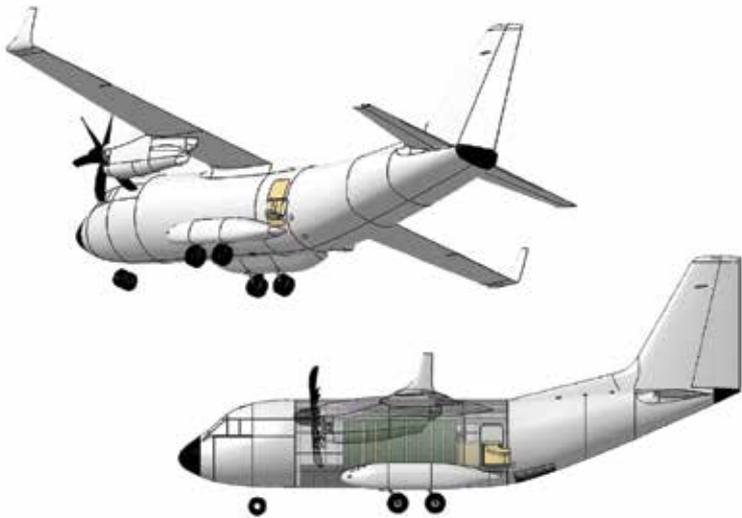
Leonardo Eyes Enhanced Firefighting Configuration for its C-27J Aircraft to Expand Multirole Capabilities

Complementing its rugged and reliable capabilities in extreme conditions, the firefighting configuration will benefit C-27J customers. Humanitarian assistance and support in the event of natural disasters are the types of missions typically performed by tactical transport aircraft such as the versatile Leonardo C-27J Spartan

19th, March 2019 - The 16th Aerial Firefighting Europe event returns to Nimes, France, 19th & 20th March with a new entry, the C-27J in firefighting configuration. The C-27J firefighter with roll-on/roll-off Fire Attack System (FAS) made by Simplex Aerospace – the world leader of advanced aerial application systems – represents an effective solution in airborne firefighting technology and capability. This enhanced firefighter configuration is a flexible solution, ideal for enhancing the capabilities of the C-27J multi-mission aircraft with significantly lower acquisition and operating costs than a dedicated firefighting platform.

The Simplex Fire Attack System can be easily installed or removed by a small team in approximately 60-90 minutes via the aircraft's rear loading ramp. No major structural modifications are required to the airframe. The main tank has a maximum capacity of 10,600 l (2,800 gal US). 568 l (150 gal US) of foam retardant can also be added. The firefighting system is one of the options that C-27J customers can add to the C-27J Spartan new baseline configuration which incorporates a brand-new avionics system designed to comply with Next Generation Air Traffic Control requirements, new cockpit control panels and LED aircraft lights. Operators will enjoy improved operational cost and performance within the aircraft flyaway price.

The firefighting capability and



the new baseline configuration are also being offered as a retrofit to current operators that want to upgrade their C-27J fleet.

While offering the C-27J Firefighter with the Simplex Aerospace roll-on/roll-off Fire Attack System, Leonardo, in collaboration with the European SCODEV Consortium, is also studying and testing a further

innovative solution to enhance the C-27J's firefighting potential. The SCODEV scooping device will provide increased operational flexibility by allowing the water tank to be filled from a stretch of water, without the need to return to base. The system will provide a scooping device for the safe loading of water (sea, lakes, rivers) from around 30m above the surface, with a roll-on / roll-off approach to allow the aircraft different roles between firefighting, emergency support (medevac) and transport.

Eighty-five C-27J Spartans have already been ordered by the Air Forces of Italy, Greece, Bulgaria, Lithuania, Romania, Slovakia, United States, Mexico, Australia, Peru, Kenya, Morocco, Chad and Zambia.



F-35C Achieves Initial Operational Capability

The Commander, Naval Air Forces and the U.S. Marine Corps Deputy Commandant for Aviation jointly announced that the aircraft carrier variant of the Joint Strike Fighter, the F-35C Lightning II, met all requirements and achieved Initial Operational Capability (IOC).

The Feb. 28 announcement comes shortly after the Department of the Navy's first F-35C squadron, Strike Fighter Squadron (VFA) 147, completed aircraft carrier qualifications aboard USS Carl Vinson (CVN 70) and received Safe-For-Flight Operations Certification.

In order to declare IOC, the first operational squadron must be properly manned, trained and equipped to conduct assigned missions in support of fleet operations. This includes having 10 Block 3F, F-35C aircraft, requisite spare parts, support equipment, tools, technical publications, training programs and a functional Autonomic Logistic Information System (ALIS).

Additionally, the ship that supports the first squadron must possess the proper infrastructure, qualifications and certifications. Lastly, the Joint Program Office, industry, and Naval Aviation must demonstrate that all procedures, processes and policies are in place to sustain operations.

"The F-35C is ready for operations, ready for combat and ready to win," said Commander Naval Air Forces, Vice Admiral DeWolfe Miller. "We are adding an incredible weapon system into the arsenal of our Carrier Strike Groups that significantly enhances the capability of the joint force."

Naval Air Station (NAS) Lemoore is the home-base for the Navy's Joint Strike Fighter Wing, Navy F-35C fleet squadrons and the Fleet Replacement Squadron (FRS), VFA-125 that trains Navy and Marine Corps CVN-based Joint Strike Fighter pilots. To accommodate the F-35C program at NAS Lemoore, several facilities were built or remodeled to facilitate specific F-35C requirements with regard to maintenance and training, including a Pilot Fit Facility, Centralized Engine Repair Facility, Pilot Training Center and a newly-remodeled hangar. Future projects are planned as additional Navy squadrons transition into the F-35C. The Marine Corps plans to transition four F-35C squadrons that will be assigned to Carrier Air Wings for deployments.

"We're very proud of what our Sailors have accomplished in the

Joint Strike Fighter community," said CAPT Max McCoy, commodore of the U.S. Navy's Joint Strike Fighter Wing. "Their commitment to mission delivered fifth generation capability to the carrier air wing, making us more combat effective than ever before. We will continue to learn and improve ways to maintain and sustain F-35C as we prepare for first deployment. The addition of F-35C to existing Carrier Air Wing capability ensures that we can fight and win in contested battlespace now and well into the future."

Meanwhile, Rear Admiral Dale Horan, director, USN F-35C Fleet Integration Office said, "The F-35C will revolutionize capability and operating concepts of aircraft carrier-based naval aviation using advanced technologies to find, fix and assess threats and, if necessary, track, target and engage them in all contested environments," adding "This accomplishment represents years of hard work on the part of the F-35 Joint Program Office and Naval Aviation Enterprise. Our focus has now shifted to applying lessons learned from this process to future squadron transitions, and preparing VFA-147 for their first overseas deployment."



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