DEFENCE TURKEY

VOLUME 13 ISSUE 93 YEAR 2019
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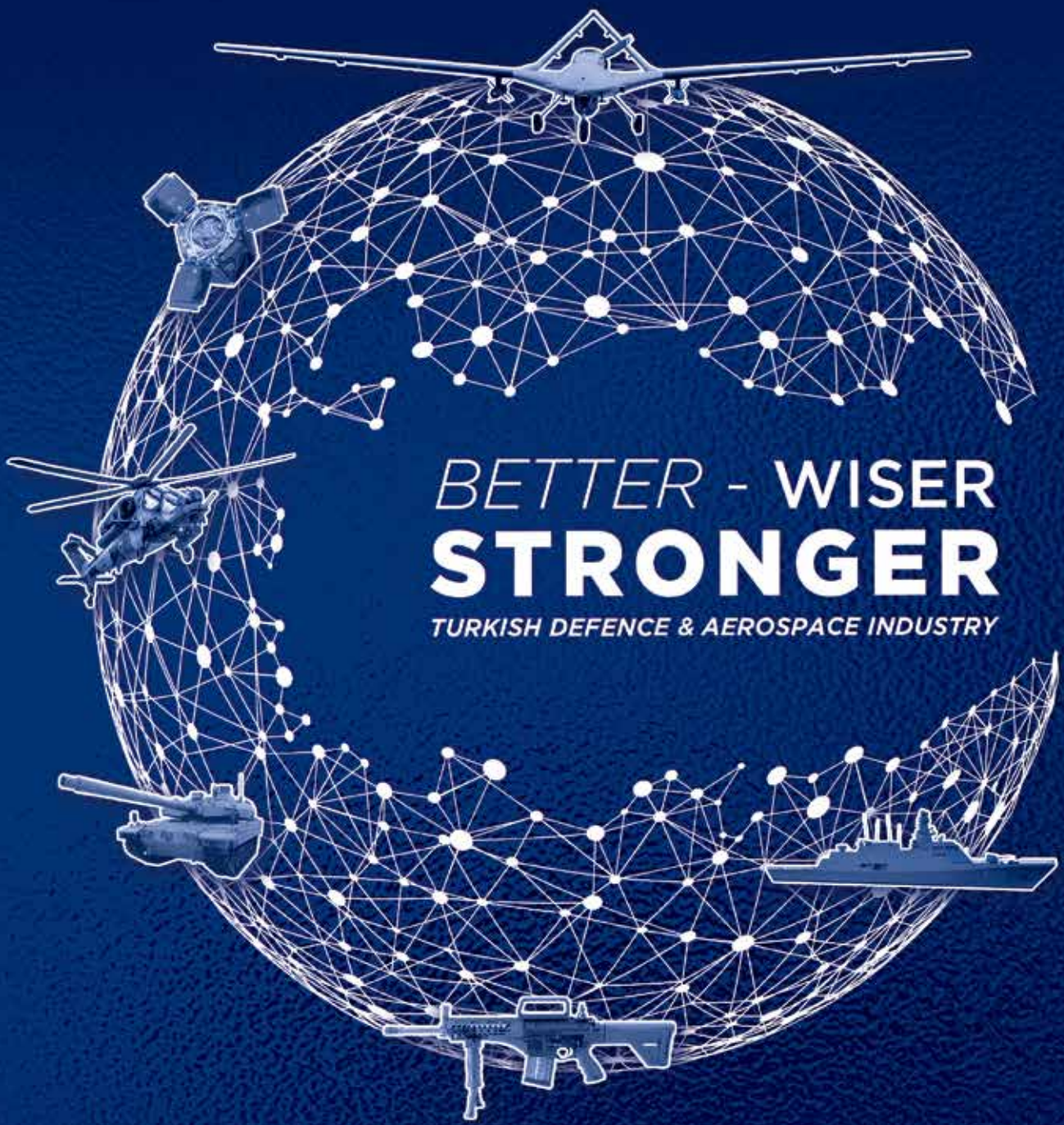
AN EXCLUSIVE INTERVIEW WITH FNSS GENERAL MANAGER & CEO NAIL KURT

TURKISH DEFENCE INDUSTRY'S LATEST INDIGENOUS SOLUTIONS MAKE THEIR DEBUT AT IDEF'19

HONEYWELL TURKEY'S VALUABLE CONTRIBUTION TO THE TURKISH DEFENCE INDUSTRY

KURTARAN 2019 MILITARY EXERCISE

ANATOLIAN EAGLE 2019 TRAINING EXERCISE



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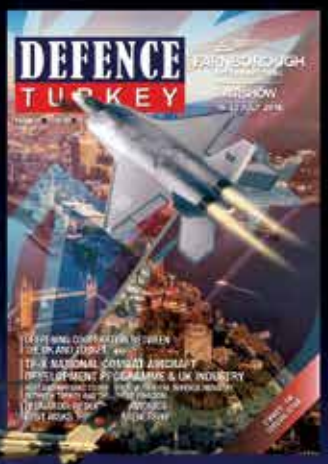

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Defence and Aerospace's Future Lands at IDEF'19

Ayşe Evers
Publisher & Editor in Chief

IDEF' 19 was held under the auspices of the Presidency of the Republic of Turkey, hosted by the Ministry of National Defence and executed under the management and responsibility of the Turkish Armed Forces Foundation (TAFF) between April 30rd – May 4th 2019, with 14 exhibition halls in the city of Istanbul.

This year, a total of 1,061 companies from 53 countries (481 local and 580 international companies) attended the IDEF' 19 event which is the most crucial platform where small and medium sized businesses, as well as major companies contributing to the defence industry displayed their products, services and capabilities to various procurement committees from Turkey and other countries across the globe. 587 committee members of 151 committees from 70 countries and 3 international organizations were amongst the visitors of this important event where companies showcased a variety of innovative products. Moreover, 100 signature ceremonies and 9 meetings and launches were held at IDEF'19 which was closely followed by 394 local and foreign press members from a total of 26 countries.

100 signing ceremonies occured in various forms, such as signatures on Good Will Agreements and Memorandums of Understanding and Cooperation Agreements, for projects such as : the Altay Serial Production Project Main Subcontractors Contract; Kaplan MT Medium Weight Tank Serial Production Contract for the Indonesian Land Forces between FNSS Savunma Sistemleri A.Ş. and PT Pindad; Low Altitude Radar System Project Signed by the SSB and Aselsan; Transportable Electronic Warfare System to be Procured for the Land Forces Command Presidencyof Defence Industries and Meteksan Defence; PARS Scout 8x8 and 6x6 to enter into the inventory of the Turkish Armed Forces; Agreement on Major Subsonic Wind Tunnel by Turkish Aerospace and AIOLOS Engineering; Critical Protocol of STM and Aselsan on Vessel Technologies; Memorandum of Understanding Between Havelsan and Environics; Asisguard and Dahua Technology's Public Security Systems Technology; Export Agreement Between Alp Aviation and Kidde Dual Spectrum; Altay Software and Konsgberg Signed an MoU on Software Export, and Nero Industry's Laser Warning and Smoke Grenade Launcher Export Agreement.

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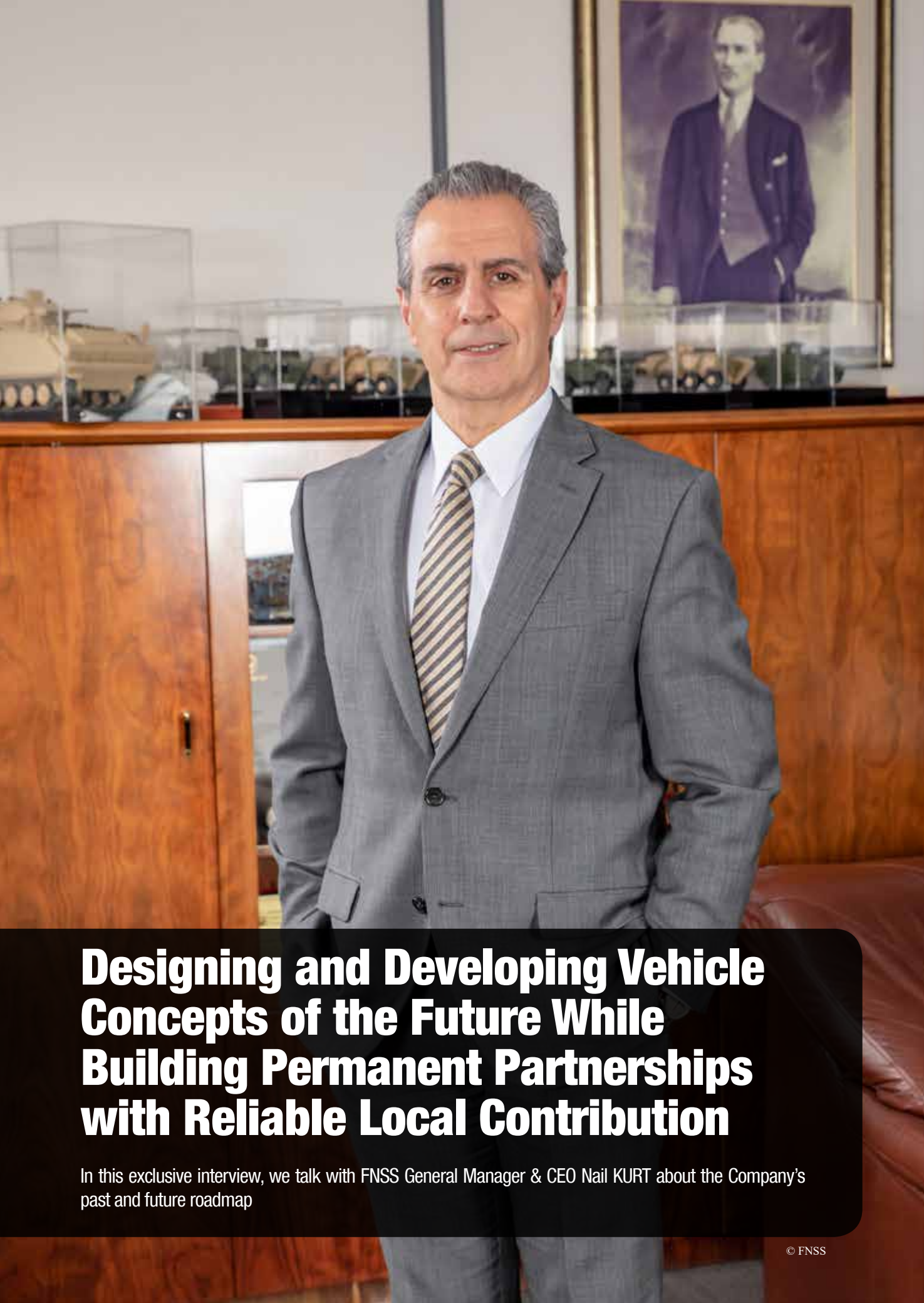

Designing and Developing Vehicle Concepts of the Future While Building Permanent Partnerships with Reliable Local Contribution

In this exclusive interview, we talk with FNSS General Manager & CEO Nail KURT about the Company's past and future roadmap

Defence Turkey: This year, FNSS Savunma Sistemleri A.Ş. celebrates its 30th anniversary. While it has become a global brand in land systems, FNSS has also become one of the major suppliers of the Turkish Armed Forces in land combat system solutions. Can we start our interview with an evaluation of 2018 for FNSS? What can you say about the company's goals and expectations for 2019? Are there any new business acquisitions or business partnerships on the horizon?

Nail KURT: Our turnover of US$357 Million in 2018 was the highest sales performance we have achieved so far. Approximately 80% of this turnover was export sales. In parallel with the increase in our revenue, the number of our employees also now exceeds 1,000.

We continue our design and production activities in Turkey with the Marine Assault Vehicle (MAV), Anti-tank Vehicle (ATV), and KORKUT projects. In addition, despite fierce competition, we also signed a contract with the SSB to procure 12 highly equipped Pars 6x6 vehicles for the Special Forces Command. Furthermore, we signed the Special Purpose Tactical Wheeled Armored Vehicles (SPTWAV) contract for a total of 100 Pars Scout vehicles.

Our Saudi Arabia 120mm Mortar, Oman Wheeled Armored Combat Vehicle (WACV), and Malaysia AV-8 projects in the Middle East and the Far East continue without a problem. We have successfully completed the qualification phase of the medium-weight class tank KAPLAN MT, which was developed jointly with the Indonesian manufacturer PT Pindad, and we signed the first phase of the serial production contract at IDEF' 19.

In 2018, we also participated in the Turquality program. Within the scope of this support program, the Minister of Trade offers incentives for advertisement, marketing, and institutionalization projects & investments, which will further strengthen the export success of our company.

We aim to sign new contracts in 2019 both at home and abroad. Naturally, these sales will not be reflected in the turnover immediately. Our 2019 sales will be based on the contracts we signed in prior years. We expect to achieve similar performance to last year's performance in 2019. Moreover, we continuously make significant investments in R&D projects to expand our product portfolio, increase our technological capabilities and localize our products/subsystems. We will continue our efforts on these activities without slowing down in 2019 as well.

FNSS is a joint venture company between Nurol Holding A.Ş. and BAE Systems. For companies of this nature, establishing new business partnerships or acquiring other companies are important issues, which require the participation of all shareholders. Because of our ongoing projects in Oman and Malaysia, we are considering our options to establish companies in these countries. On the other hand, we are aware that consolidation, acquisitions, and investing in small technology companies are among the most important tools of strategy implementation. These transactions are usually done to access technology, access markets, to keep in close contact with the customer and to ensure efficiency or achieve different synergies. We follow these developments closely to seize opportunities as they arise.

Defence Turkey: Could you inform us about FNSS's cooperation activities with sub-industries and universities? Can you share information about the number of local subcontractors currently working with FNSS?

Nail KURT: Our R&D department's vision is to support the corporate strategy by leveraging the product portfolio strategy and receiving guidance from the technology roadmap. Determining and prioritizing the necessary technologies required to achieve the designated properties of a target product is the basis of the technology roadmap process. Critical outputs are the results of necessary technology investments, technology prioritizations, short and medium-term R&D strategies, action plans, core competency determination, and potential strategic technology development partnership decisions with the sub-industry. In this context, various R&D activities are carried out with the sub-industry in five basic technology areas such as material & design, survivability, mobility, electronics, and firepower. These R&D activities are supported by industry participation/offset transactions such as Category-A, Category-B, and Category-C to improve the abilities and capabilities of domestic sub-industry companies and increase their international competitiveness through investments and projects. FNSS has 678 actively certified local suppliers.

University-industry collaboration is one of the most important issues of the FNSS R&D Center. Starting university-industry collaboration projects such as SAYP, SANTEZ, ARDEB, and using the output of these projects in FNSS products is an important part of the FNSS R&D strategy. In this context, FNSS signed approximately 20 SAYP protocols with universities to date. Moreover, regular visits to university Technology Transfer Offices to inform about the technologies prioritized by the FNSS technology roadmap provide opportunities for developing joint projects focused on university-industry collaboration. As a result, FNSS receives academic consultancy from various universities and hires services in the areas needed. Through these meetings and related activities, FNSS aims to increase successful university-industry collaboration activities year over year.

Defence Turkey: What are your assessments on FNSS' competitive capacity in the domestic and international markets?

Nail KURT: FNSS is a medium-sized defence industry company with two strong joint-venture partners like Nurol Holding and BAE Systems. Both Turkish and foreign identity enrich our corporation structure and this gives us a distinct advantage in different markets. Using our Turkish identity, we have signed numerous export programs with Muslim countries in the Middle East and Southeast Asia. We also seek business

opportunities in European and South American markets with the support of BAE Systems. As we are a medium-sized company, we can make highly flexible decisions and respond to the requests of our customers in every possible way. The vehicles and configurations we have developed specific to the customer requirements in our export programs are the best examples of this.

Defence Turkey: What can you tell us about FNSS's ongoing major export activities, its most important export markets and the share of exports in turnover?

Nail KURT: As it is known, FNSS is the export leader of land combat platforms in the Turkish Defence Industry and has achieved many firsts in this field. The Middle and the Far East are among the most important export markets for FNSS. We are working on potential export projects for both Tracked and Wheeled Armored Vehicles in these regions. We have ongoing projects in Malaysia, the Sultanate of Oman, Saudi Arabia, and the United Arab Emirates. During IDEF' 19, we signed a preliminary agreement with our business partner PT-Pindad for the joint serial production of KAPLAN Medium Weight Tanks in Indonesia. The development process of the KAPLAN-MT has been completed successfully within the framework of a joint development project with Indonesia. Additionally, we also continue our business development activities in other regions where we see potential such as in Latin America.

So far, FNSS has exported complete vehicle systems to seven countries plus subsystems, parts, and services to many more countries. The volume of our export projects to date has exceeded US$2.6 Billion. FNSS will continue to export to new countries in the future as well.

FNSS has generated almost all of its revenues from exports for many years. Currently, the share of exports in our turnover is around 70%.

Defence Turkey: What is the current situation of the comprehensive M113 Modernization in Saudi Arabia? How many vehicles have been modernized to what level since 2004? Can you share information about the price of the contracts signed so far? How do you plan to use the experience gained from this project in the future?

KAPLAN Medium Weight Tank

Nail KURT: When the Royal Saudi Armed Forces decided to modernize its various types of M113 Armored Personnel Carriers, FNSS provided both an effective solution and delivered this solution in Saudi Arabia by undertaking the operation of the Al-Kharj Maintenance and Repair facilities of the Royal Saudi Land Forces. During the process that started in 2004, more than 1,000 M113s in various configurations have been modernized to M113A4 level with consecutive contracts. The total value of the projects has exceeded US$1 Billion. 120mm mortar integration project for the modernized vehicles is currently underway. If the Royal Saudi Land Forces decide to modernize more vehicles, FNSS can modernize the unmodified M113 vehicles remaining in the inventory with an even higher local production commitment.

Defence Turkey: Currently, there is a successful ongoing cooperation between FNSS and Malaysia. This collaboration, which started with the ADNAN project, continues today with the PARS-II/AV8 Gempita (Storm) Family vehicle project that we carry out together with DRB-HICoM DefTech for the Malaysian Army. What can you tell us about the current state of this project including the number and configurations of the vehicles delivered to date?

Nail KURT: Currently, 160 vehicles have been delivered in the Malaysia AV-8 Gempita project, which includes the development, production, and delivery of 257 8x8 Wheeled Armored Vehicles in 12 configurations. Design

M113A4 with SABER Turret

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THE SKIES AND BEYOND

activities of 11 configurations out of the 12 configurations have been completed. Nine different configurations have already entered the service and the other two configurations will be added to the inventory this year. These vehicle configurations include, the Infantry Fighting Vehicle equipped with the FNSS 25mm Sharpshooter Turret, the Armored Fighting Vehicle equipped with the LCT 30 two-man turret manufactured by Denel Land Systems with a GI30 30mm gun and a 7.62mm coaxial Machine Gun, the Armored Reconnaissance/Surveillance Vehicle, Armored Command Vehicle, Armored Personnel Carrier equipped with a 12.7mm remote-controlled weapon station, Armored Ambulance, Armored Repair Vehicle (ARV), 120 mm Armored Mortar Carrier (AMC), and the Armored CBRN Reconnaissance Vehicle (AENBCRV).

Defence Turkey: Under the US$500 Million contract signed on September 20, 2015, FNSS delivered the first of 172 new-generation PARS-III 6x6 and 8x8 Tactical Wheeled Armored Vehicles to be developed and produced for the Royal Army of Oman/RAO on July 12, 2017, at a ceremony held in Gölbaşı, Ankara. What can you share about the current situation of the project and the vehicles delivered to date?

Nail KURT: The production and deliveries of the vehicles as part of our project for the Sultanate of Oman successfully continue following the project schedule. Within the scope of the project, PARS III 6x6 and 8x8 vehicles are manufactured in 13 different configurations. More than 60 vehicles have been delivered up to now, and this number will exceed 100 by the end of the year. These vehicle configurations include the Reconnaissance and Command vehicle with the FNSS 25mm SABER turret, 120mm Mortar Carrier, Armored Engineering Vehicle, Armored Recovery Vehicle, Armored Ambulance, and Armored Personnel Carriers.

Defence Turkey: What can you tell us about the current situation and the projected delivery schedules of the Anti-Tank Vehicle (KAPLAN-ATV, and PARS-ATV) projects which were signed in 2016? It was previously stated that the deliveries will start at the beginning of 2019.

Nail KURT: Qualification tests for KAPLAN ATV and PARS ATV are in progress, and the first vehicles will be delivered at the end of 2019. We are developing another configuration of our KAPLAN ATV for the Pedestal Mounted CİRİT project signed by Roketsan with the SSB, and we will deliver it together with the first Anti-Tank Vehicles.

Defence Turkey: The initial ATV design had 4 OMTAS and KORNET-E anti-tank missiles on its turret, however, the prototype vehicles were equipped with a dual launcher turret. What was the reason behind this design change decision? According to our information, the number of missiles carried on the vehicle was reduced from 10 to 6.

Nail KURT: We started the project with a turret carrying four missiles, however, during the design review phase both the ready-to-fire missiles on the turret and the number of missiles carried inside the vehicle was changed in line with the operational requirements of the end-user.

Defence Turkey: Could you enlighten our readers about the technical specifications and test and delivery schedules of the Marine Assault Vehicle (MAV) that will be designed and produced from scratch according to the user requirements stated under the contract signed in March 2017?

Nail KURT: Currently, we are at the Critical Design Review (CDR) phase, and in this project, we reflected the manner of FNSS. The design review will be done not only on paper but also on the vehicle prototype in the integration hall. We are going through a long internal verification process with this prototype vehicle. There are unprecedented requirements for a tracked land vehicle in this project. The vehicle is expected to act as a vessel at sea, and show standard tracked APC performance on the ground. We will verify all these requirements with 5 prototype vehicles that will run different tests in parallel.

PARS-III 8X8 and 6X6 Tactical Wheeled Armored Vehicles

Defence Turkey: The Defence Industry Executive Committee (SSİK), which convened under the chairmanship of President Recep Tayyip ERDOĞAN on October 10, 2018, decided to initiate contract negotiations with FNSS in the Special Purpose Tactical Wheeled Armoured Vehicles (SPTWAV) Project for the procurement of 6x6 Command and Radar Vehicles, 8x8 Sensor and CBRN Reconnaissance Vehicles for the Turkish Land Forces, and 6x6 Armored Combat Vehicles for the Gendarmerie General Command. What can you tell us about the total of 100 6x6 and 8x8 vehicles in 5 different models which will be based on the PARS WAV? Could you share information about the vehicles, delivery schedules, and contract that will also include the FNSS production turret?

Nail KURT: The Special Purpose Tactical Wheeled Armored Vehicle (SPTWAV) Project Agreement was signed with the Presidency of Defence Industries (SSB) in April for a total of 100 8x8 and 6x6 vehicles to be delivered to the Turkish Land Forces Command and the Gendarmerie General Command, and the signing ceremony was held at IDEF' 19. Once the contract goes into effect, we will complete the development of the vehicles in three years and deliver all the vehicles.

Within the scope of the SPTWAV Project, FNSS designed a new vehicle based on the PARS family to provide high situational awareness, especially during reconnaissance operations. PARS Scout 6x6 and 8x8 provide superior mobility for comfortable and safe driving in all kinds of roads and terrain conditions, stable driving at high speeds with low risk of understeer and with its transparent armor (ballistic glass) integration, it makes a difference for reconnaissance operations. Furthermore, domestic subsystems will be used in basic automotive and mission equipment such as the engine developed by TÜMOSAN and the powertrain developed by FNSS.

Defence Turkey: KAPLAN-10 ATV was selected as the carrier vehicle for the 3 Pedestal Mounted CİRİT (PMC) System ordered under the contract signed between Roketsan and Turkish Land Forces. Have you completed the deliveries of the vehicles?

FNSS was displayed PARS Scout 6X6 at IDEF' 19

Nail KURT: The production contract for the KAPLAN-10 ATV vehicles, selected as carrier vehicles for three Pedestal Mounted CİRİT (PMC) Systems, was signed between FNSS and Roketsan in August 2017. The production activities of the vehicles are currently underway, and they are expected to be delivered to Roketsan between December 2019 and February 2020.

Defence Turkey: The concept design of the Medium Weight Tank (MWT) KAPLAN-MT, which was developed in cooperation with the Indonesian state-owned enterprise PT Pindad to meet the needs of the Indonesian Army, was launched on November 2-5, 2016 at the Indo Defence 2016 Fair held in Jakarta, the capital of Indonesia. The prototype vehicle, which was exhibited at IDEF 2017, was sent to Indonesia for testing in September 2017 and participated in the parade held on October 5, 2017, as part of the 72nd Indonesian National Armed Forces Day. What can you tell us about the feedback received and the activities carried out in 2018 with KAPLAN-MT called Harimau?

Nail KURT: Kaplan MT, which has the highest level of ballistic and mine/blast protection in its class, provides superior survivability and mobility in the battlefield with high firepower and rapid threat response time. In 2018, we carried out extensive tests in Indonesia. The blast/mine resistance tests, which are the first phase of the qualification tests, were carried out in Indonesia in July 2018. The co-produced mine-resistant prototype vehicle successfully passed all the tests and met all the requirements set by the customer. In August 2018, we conducted the durability and firing tests of our Kaplan MT. The 20-day durability test was carried out in the different and rough terrain conditions of Java Island both day and night, and our vehicle was tested for more than 2000 km. The tests were conducted by the Indonesian Army and Ministry of Defence Personnel. The Kaplan MT completed all tests successfully and achieved the highest numbers in its class during both field and road tests. The KAPLAN MT became the first Medium Weight Class Tank, which was certified by the armed forces of a country in the world. The Indonesian Army and the Ministry of Defence were extremely satisfied with the successful performance of the vehicle.

Defence Turkey: Is the serial production contract expected to be signed in 2019? How many MWT vehicles will be built during the Serial Production Period?

Nail KURT: The joint serial production agreement between PT-Pindad and FNSS was signed at IDEF' 19. The first batch of serial production will be mutually determined according to the requests and planning of the Ministry of Defence. We envisage it will be 18 vehicles. We predict that the second batch requirement is 106 vehicles in different configurations, and the budget studies are still ongoing.

Defence Turkey: As FNSS, you are fighting on many fronts at the same time abroad. What difficulties do you face in terms of employment and logistics?

Nail KURT: As a company, we anticipated the complex working environment that includes multiple products, multiple projects, and production in more than one country, and we implemented plans that will prepare us for today. We have prepared our Company by continuously training our personnel, developing our processes, and improving our infrastructure, facilities, and capabilities. Constantly searching for better methods, improving in every field, and managing change at the same time form the basis of our core business philosophies.

The knowledge and experience we have gained from overseas projects over the last 20 years have contributed to us significantly. Undoubtedly, new projects have some challenges, but we know how to overcome these difficulties by working hard and using our experience.

Defence Turkey: Can you find adequate support in terms of local qualified personnel and sub-industry in your overseas activities?

Nail KURT: In our overseas projects, the possibility of finding local qualified personnel and capable sub-industry varies from country to country. The projects that we carry out abroad generally comprise production activities such as know-how, technology transfer, and localization. Within the framework of these projects, we provide necessary training to the personnel of our business partners in the related countries and support the infrastructure installation activities. We also carry out studies to identify, qualify, and improve the production activities of sub-industry companies that will assist in local production. We both start and run these activities with a core team that we establish at the beginning of the projects. Therefore, the projects continue with increasing local employment through both theoretical and on-the-job training for local personnel. In some countries, this process may be longer, and in others, it may be shorter.

KUNDUZ Armored Amphibious Combat Earthmover

Defence Turkey: Can you make an overall assessment of the future of the tracked and tactical wheeled armored vehicle industry which has made great progress in the last 25 years in Turkey? In this context, how does FNSS position itself?

Nail KURT: The Turkish land vehicle industry has reached a significant point. It became a highly specialized sector with intense competition between private companies, and it has the competence to meet all kinds of land vehicle requirements of our soldiers with national and cost-effective solutions. Moreover, our industry can sign significant export contracts. I believe that as long as we do not make strategic mistakes, this performance of the sector will continue increasingly.

If we look at our turnover and export performance since the day we were founded, I can proudly say that FNSS is the leading land-based defence systems company in Turkey. The number of our vehicles in the Turkish Armed Forces service, the diversity of our vehicle portfolio, and the fact that we have signed export contracts over US$2.5 Billion to date are the most important indicators of this. We delivered 2,249 Armored Combat Vehicles in four different configurations to the

Turkish Land Forces Command. These vehicles still form the backbone of our infantry units. We designed and delivered highly niche vehicles, which require high engineering capabilities, such as the SAMUR (OTTER) Rapid Deployable Amphibious Assault Bridge and the KUNDUZ (AACE) Armored Amphibious Combat Earthmover. The TAF is very satisfied with both vehicles and utilize them in operations. PARS 4X4 and KAPLAN-ATV, which were developed as part of the Anti-Tank Vehicle project, Marine Assault Vehicle (MAV), and the ZMA30, which is based on the HİSAR platform, are also to enter the inventory. With the PARS 6X6 and SPTWAV projects of the Special Forces Command, FNSS will develop the first domestic 6x6 and 8x8 wheeled armored vehicles that will be included in the TAF's inventory.

We are also preparing for other future projects. One of the most important among these is the New Generation Armored Fighting Vehicle (NG-AFV) project. In this context, we closely follow the SSB's studies on the procurement model based on the prototype competition model, and we are making preparations in this direction. A competitive prototyping approach allows the users to evaluate the performance of the solutions and ensures that the final product meets their expectations. For a long time, FNSS has participated in tests, in various parts of the world, competing against the products of the world's largest defence companies. In these competitions, our products allowed us to sign export contracts by leaving strong competitors behind. I believe that we will be quite successful in future projects with this approach in our country.

Defence Turkey: Can you share your thoughts on the importance of R&D in the tracked and tactical wheeled armored vehicles industries? What can you say about the resources you have allocated to R&D as an organization and the R&D activities you are currently carrying out? Are you working on new tracked/wheeled armored vehicles?

SAMUR OTTER

Nail KURT: Tracked and wheeled armored vehicles are the backbone of the armies around the world. There is serious competition between domestic and foreign companies in this field. In this competitive environment, it is highly crucial to correctly understand the needs of customers, meet these requirements on time, and change the game with the technologies that make a difference. Therefore, R&D and Technology development activities are extremely important in terms of system and subsystem capabilities. FNSS devotes approximately 3-4% of its annual turnover to self-financed R&D activities. As in the past years, we will carry out more than 40 "big and small" R&D projects of various sizes in 2019 as well.

Defence Turkey: Are there any studies for the half-life modernization of the FNSS products ACV-15 APC, AAPC and IFV platforms in the inventory?

Nail KURT: Within the scope of the IFV-AAPC Modernization Project initiated by the SSB, we have submitted our proposal for the modernization of the IFVs and AAPCs in the inventory of the Turkish Land Forces Command (TLFC). The offer includes improved mobility, increased firepower, upgraded electronic subsystems, and increased survivability. This solution package aims to increase the lifecycle of the vehicle by 20 years by providing optimum firepower and survivability without performance loss despite the increased weight due to additional requirements to be added to the vehicle. In addition to the integration of additional electronic subsystems, FNSS will use qualified equipment and subsystems that are already in the inventory of the Turkish Armed Forces for improved logistics performance. As part of the modernization package, ballistic &

ACV-15 can be fitted with RPG protection net

mine/blast protection of the vehicles will be increased, some critical parts of the tracks will be replaced, the electrical system will be completely renewed with existing technological systems and the powertrain will be overhauled. Furthermore, the vehicles will be integrated with a completely new turret. The feedback of Turkish Armed Forces' during the cross-border operations in Syria demonstrated that there was a need for IFV modernization. We started our studies in this context.

Defence Turkey: Can you share information about FNSS's ongoing studies on Remote-Controlled Turret Systems and export-oriented marketing activities? Under the 25/30mm Remote Remote-Controlled Turret (RCT) Project, which was initiated with a joint product development cooperation protocol signed with Aselsan in March 2008, you developed Pençe RCT and made it ready for sale following the firing tests. FNSS exhibited the SABER-25 New Generation Stabilized Weapon System at IDEF 2015, the TEBER-30 Two-Man Turret System at IDEF 2017 and the TEBER-30 RCT at IDEX 2019 Fair. What can you tell us about the current situation of the aforementioned turret projects, the tests performed and/or to be performed, and the potential customers of the systems?

Nail KURT: For many years, the Sharpshooter turrets were delivered to various users in different variants by increasing their ballistic protection level and equipping them with different caliber weapons. In 2015, we added one-man SABER-25 and two-man TEBER-30 turrets to our manned turret product family. As a result of procurement authorities' preference for unmanned turrets, we manufactured our KORNET and OMTAS Anti-Tank Remotely Controlled Turret (ARCT) within the scope of the Anti-Tank Vehicle project. While designing the dual-armed remote-controlled weapon system for the MAV project, we also developed the FNSS-RCWS, which can be used with 3 different types of weapons. The FNSS-RCWS was developed for two different projects, one domestic and one foreign. While designing our indigenous weapon systems for our vehicles, we proceed with two-way feedback in both turret and vehicle designs by paying maximum attention to vehicle weight distribution, amphibious capabilities, suspension system effects, roof rigidity parameters. Carrying out the turret and vehicle design process in parallel with each other allows for a smooth and easy integration phase. Therefore, we can deliver turnkey projects to our customers with cost-effective solutions.

TEBER-30 Two-Man Turret RCWS

- Oman Project: 88 SABER-25 were delivered.
- Oman Project: 16 RCWS will be delivered.
- ATV Project: 64 ARCT-KORNET will be delivered.
- ATV Project: 196 ARCT-OMTAS will be delivered.
- MAV Project: 26 dual RCWS will be delivered.

Defence Turkey: Could you share your vision, goals, and expectations for the next 20 years of FNSS with our readers?

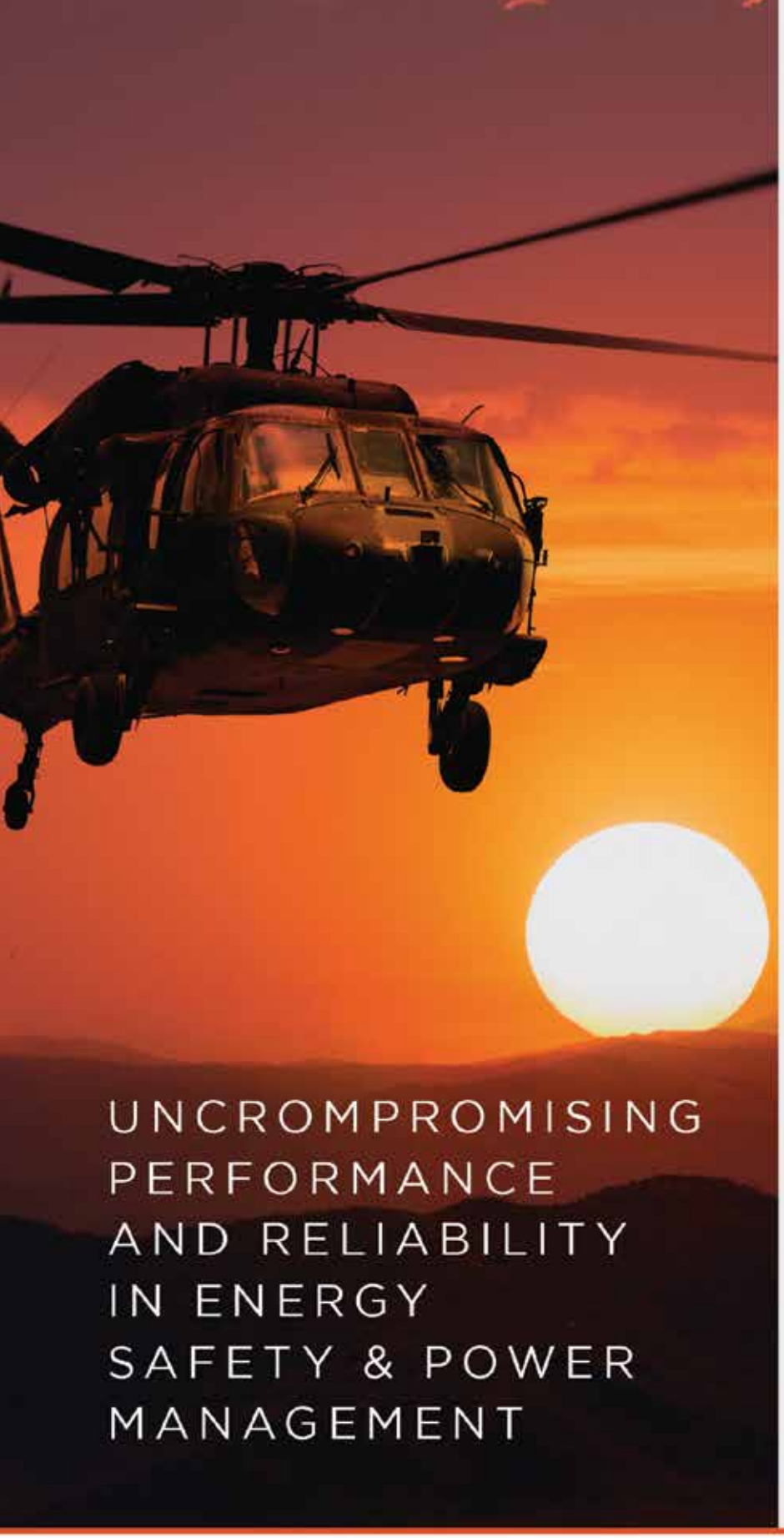
Nail KURT: FNSS conducts activities by focusing on protecting our customers & partners and adding value to them by providing creative solutions. By increasing our performance in defence system exports to even higher levels, we aim to be a reliable and notable Turkish defence company not only in our country but also across the world.

While meeting the needs of the Turkish Armed Forces, which is our top priority, with the most effective systems, we continue to offer the best to our users in the Middle East and East Asian countries as well. We consider user satisfaction as a long-term investment. It is highly critical for us to become a key player in the markets where we do business by establishing reliable partnerships, which enable our products to provide new solutions to the needs that may arise during their life cycle. Additionally, we follow significant business opportunities abroad as well as in different geographies.

As a national value of Turkey, we have successfully delivered more than 4,000 armored combat vehicles to date. We have a wide range of products ranging from tracked armored vehicles to medium-weight class tanks, from 4x4 to 8x8 tactical wheeled armored vehicles, from amphibious assault bridges to armored engineering vehicles as well as manned and unmanned turrets. However, the combat environment of the future will change considerably with the technological advancements in the defence and civilian sectors. As FNSS, our goal is to design and develop the vehicle concepts of the future. We shape our product portfolio and technology roadmap in line with these developments.

Our goals are quite big, and we are advancing on these goals step by step with the right strategies as in the past.

Defence Turkey: Thank you for your time



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Honeywell Turkey's Valuable Contributions to the Turkish Defence Industry, Aviation and the Space Industry, Fueled by Turkey's Resolve to Manufacture its Own Platforms

Serdar ÇETİNGÜL - General Manager Central & Eastern Europe and Turkey, Honeywell Aerospace talks about Honeywell Turkey, a high potential and rapidly growing division of Honeywell that is well positioned by collaborating with Turkish companies. Honeywell's integrated supply chain for the entire European region explores portfolio compatibility with Turkey's capabilities. We also insight into the activities toward establishing an indigenous depot in Turkey to provide maintenance and repair capabilities for military configurations. Beyond just cooperating with companies, Honeywell also works toward including certain companies in their global supply chain.

Defence Turkey: Mr. ÇETİNGÜL, can you touch on Honeywell's 2018 performance results? Did exports, turnover and sales fulfill your expectations? We've observed a recession in the growth of certain companies, while some achieve turnovers beyond their expectations. How has this period been for you thus far and what are your expectations for the remainder of 2019?

Serdar ÇETİNGÜL: 2018 was a very fruitful year for Honeywell. We were successful not only in our aviation activities but also in all of our activities. We began to collaborate on the distribution side with our local aviation partner Dormak in 2018. There, we aim to achieve direct access to the end-users because when we take a look at the existing platforms in the inventory, there are always Honeywell components in almost all airborne platforms such as the F-16, C-130, UH-1, S-70, CH-47 and Sikorsky. This is partly because of Honeywell's wide product range. We do not limit our activities in a single area such as engines, avionics or satellite communication. Instead we are a company that develops and manufactures all such products. Therefore, we are already collaborating with companies existing in the sector as platform manufacturer, but due to the legislation and public procurement laws, we did not have the opportunity to conduct business with the end-users. So, in order to overcome this, we started to collaborate with a local partner. There are many advantages that are offer to the end user via the method of distribution.

Defence Turkey: Will Dormak act as a bridge between the end-user and your company? Previously, the demands were submitted to companies via the Presidency of Defence Industries (SSB). Now, will you be identifying the user demands via Dormak without the involvement of the SSB?

Serdar ÇETİNGÜL: Within the scope of the projects that are conducted with the SSB, there is this view that the executive unit of the project should be supporting the logistical part of the project. Therefore, we do not face any problems in the projects, which launched during the recent period. For instance, Turkish Aerospace (TUSAS) is manufacturing the ATAK helicopter as well as being in charge of the sustainment of the helicopter. Before this initiative of the Presidency of Defence Industries, either the SSB or any given procurement authority procured the equipment and then delivered it to the end-user. The end-user maintained the sustainment of such equipment or platforms. Aside from the SSB, the end-users do not have their unaffiliated procurement methods. Certain difficulties arose from the legislation by working directly with the end-users. The model that we built with Dormak overcomes these difficulties and enables us to work closely with the end-user.

Defence Turkey: There is an entity ASFAT Military Factory and Shipyard Management Inc.) involved in Turkey. Did ASFAT make any attempt to be involved in this business?

Serdar ÇETİNGÜL: We are already collaborating with ASFAT. Our operational model involves us with the military factories, and our channel partner Dormak and it still continues, however it will be concluded soon.

Defence Turkey: Honeywell is a company active in a wide variety of areas in addition to avionics and satellite communication. Which features of Honeywell stand out in the eyes of your customers? Why do customers prefer Honeywell?

Serdar ÇETİNGÜL: Honeywell has been developing these systems for about 100 years now. Honeywell has significant experience in numerous platforms/projects in areas such as air conditioning, environmental control systems and life support systems. Moreover, software development has stood out in last fifty years. Honeywell has been manufacturing mechanics over the years, in conjunction with these skills, if add the software capabilities compliment these products, there is a value impact. When the main contractor gets involved in the platform design, the main contractors issue specifications regarding the sub-systems, these companies are selected, providing the best solution in all aspects, by the contractor. At the end of the day, system performance is defined on paper, hereunder the contracts are signed and the systems are delivered according to their schedule. Yet, as the integration of the systems is launched, they step into a different realm. We are a company that is well informed on integration problems as we have experienced them all before and we never let our customers down in terms of budget and project schedule. We always stand by our word and we've built trust over the years and we continue to build trust in this way. We also utilize our performance indicators. Eventually, we are capable of providing our customers quite different values both in areas of software and mechanical.

Defence Turkey: R&D is vital for the development of new products. Customer requirements change every year along with technological developments. Can you discuss Honeywell R&D's resource allocation in conjunction with the rise of importance of R&D activities overall, not only for hardware but also for software?

Serdar ÇETİNGÜL: The requirements of customers and platforms are ever-changing. New requirements emerge throughout the utilization of the product or platform and the additional capabilities to fulfill these requirements need to be provided to the customer as well. Software has now become a requirement in all areas. Internet technology has entered all aspects of our lives. Everything started to develop very rapidly due to internet and mobile technologies. We cannot

survive without our mobile phones. What greatly displeases people is that they lose their internet connection as they step onto an airplane. Honeywell has been investing heavily in this area for nearly 5-6 years. There are certain advantages experienced when you increase the frequency 36-37 GHz in K-Band technology. First of all, a smaller antenna starts to conduct the same tasks. Secondly, you are allowed to broaden the band-with thanks to the center frequency and this enables quite rapid data communication. Therefore, you are able to conduct real time video calls while flying over oceans on airplanes using our systems. People got used to be in constant touch with technology and they do not to be away from it. The software I previously mentioned is exactly related with that fact. In very fast or very wide data rates, you are able to take down certain information such as the operational conditions of the engine/auxiliary power unit (APU), the characteristics of the power distribution, etc. Certain diagnostic algorithms are operating underneath. Since you are the designer of the product and as you keep the logs, no one would know which part will break down and when, better than you. These algorithms also provide information to the customer on what they should do, when required. In this way, the customer continues their operations uninterruptedly, without experiencing any problems. But when you fail to do this, the airplane remains on the ground when one of the systems breaks down.

Defence Turkey: So, does Honeywell conduct such monitoring or will the customers be able to acquire this capability if they request?

Serdar ÇETİNGÜL: The specific algorithms and several data analyses are required at this point. If the customer requests to do this, we also provide that opportunity if the technology allows it.

Defence Turkey: How did Honeywell's Turkey office fare in 2018?

Serdar ÇETİNGÜL: We employ about 300 personnel at Honeywell Turkey. All operational units of Honeywell are very active in Turkey. Turkish engineers are involved in decision-making positions. Therefore, it is quite critical for us, Honeywell already identified Turkey as a Rapidly

İbrahim SÜNNETÇİ - Editor of Defence Turkey Magazine, Cem AKALIN - Managing Editor of Defence Turkey Magazine and Serdar ÇETİNGÜL

Growing Region and attaches great importance to the country. All the senior executives aim to expand business in this region, especially in line with a focus placed on emerging markets, and they wish to give a chance to the executives from such regions as well.

Defence Turkey: Honeywell Aerospace's Central Eastern Europe center is located in Poland. Recently you were assigned Honeywell Aerospace's Regional Director of Central Eastern Europe. Could you briefly tell us about your areas of responsibility in your new position?

Serdar ÇETİNGÜL: Honeywell Aerospace's Central Eastern Europe is based in Poland. Therefore, this new position is very challenging in terms of job description. I was only in charge of Turkey and Turkic Republics, and now 10-11 European countries have been included to my job description upon this new position. There are three vertical specialization areas in the aerospace area; Defence and Space, Commercial Aircraft and Business Jets. Therefore, I will be in charge of all these three areas in a very large region during my new assignment.

Defence Turkey: You've stated that there are 300 employees in Turkey. This staff is in charge of both commercial and military activities in Turkey. Can you breakdown the positions of these employees?

Serdar ÇETİNGÜL: These numbers comprise the main divisions in which Honeywell is active in Turkey. There are many areas such as industrial control, building automation, etc. Therefore, our employees are not merely assigned to the aerospace group. Honeywell has 4 main divisions. Aside from the Aerospace division, there is the division generating solutions regarding smart buildings – "Honeywell Building Technologies - HBT", and the division in charge of industrial automation and chemicals - "Performance Materials and Technologies - PMT" and the "Safety & Productivity Solutions - S&PS" division that develops and manufactures products and generate solutions such as barcode scanners and industrial printers that will increase efficiency particularly in logistics and retail sectors. All these divisions are very active in Turkey.

Defence Turkey: What is the share of military aviation and defence within the 300 employees among these four main divisions?

Serdar ÇETİNGÜL: I cannot share exact figures, but I can say that our Aerospace group is the fastest growing division with great growth potential.

Defence Turkey: Is this case in parallel with Honeywell's status around the world or is it specific to Turkey?

Serdar ÇETİNGÜL: We are thriving in parallel with the world. Turkey is exerting utmost efforts in manufacturing its own platforms such as the Turkish Fighter (TF-X/MMU), HÜRKUŞ, HÜRJET, and the ATAK-2. Therefore, if you have diversified solutions from the landing gears to radars, from satellite communication to environmental control systems, major projects such as the Turkish Fighter contains significant potential for our company. Honeywell TR is a rapidly growing division and it will hopefully continue on its course of rapid growth.


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Defence Turkey: What does Honeywell offer regarding newly developed platforms and which areas do you think you may contribute to in the future? What type of activities have you conducted with companies, such as with Turkish Aerospace (TUSAS)?

Serdar ÇETİNGÜL: In terms of platform development projects, our capabilities definitely compliment the requirement of skills of Turkish Aerospace (TUSAS). Our goal is to swiftly present the platform to the market by minimizing the risks. In particular, if these platforms will be on the international market, we may add value to these projects. Turkey has great capabilities, but among these capabilities, they do not yet have key technologies to utilize these platforms. Consequently, we primarily integrate the existing capabilities then focus on subjects such as certification, because we know very well how to manufacture military platforms but when we speak of civil certification, an expertise is required. So, by positioning our specialization in certification by collaborating with Turkish companies, we are a company capable of assuming the integration of multiple systems that TUSAS can fully trust. We are intensely working with TUSAS in all platforms as well.

Defence Turkey: Export restrictions come to the fore as the defence industry products generally contain sensitive technologies. Certain products and technologies emerged on the agenda in negotiations that you have conducted so far regarding this issue. Could there be any restrictions or limitations on sharing such technologies? What type of solution will you be offering in such a case?

Serdar ÇETİNGÜL: Our approach at this point is as follows; For instance, when we receive a request on an APU from TUSAS, two different methods may apply. It is possible to position it as a fully military solution or a civilian system that will enable military performance. Both have advantages and disadvantages. Products manufactured fully for military purposes are more compact and durable as military platforms are designed to solve the problem within a shortage of space. However, on the civilian side it contains requirements involving many types of technology. They may cover slightly more space but in terms of life cycle costs the civilian systems sometimes turn out to be more cost efficient.

CTS800 A4 Turboshaft Engine

Defence Turkey: Even though they may be more expensive in initial procurement, in the long run those figures may be drawn to more cost-efficient levels as part of life cycle management with the help of commercial systems. Moreover, there are no problems regarding ITAR.

Serdar ÇETİNGÜL: Actually, the price is more affordable with the initial procurement as commercial volumes are very large. In other words, if you are capable of seizing the opportunity to use a component utilized in commercial platforms in a military platform, then that is the most ideal solution. We are putting forth the alternatives here. We are able to progress to a certain point depending on the criteria set for the platform to be developed by TUSAS. However, when the solutions fully developed for military platforms are required, then we are subject to the restrictions identified by governments. As far as I know, until today Honeywell technologies has not encountered any restriction issues for utilization in Turkey.

Defence Turkey: For instance, when you install the laser designator in the FLIR system to an armed or unarmed UAV it is noncompliant with ITAR. But if the Laser Designator and the FLIR are cleared from customs separately, then they are in compliance with ITAR. There are examples of this. Is it possible to apply a similar method in such technologies? For example, the FADEC of the engine to be assembled on GÖKBEY was supposed to be commercial but it was transformed into a military FADEC. Could such an alternative also be applicable for your company's products?

Serdar ÇETİNGÜL: Actually, it can be. You have provided a very good example, there was a road map to take the engine from ITAR if FADEC was designed again but this method was not preferred since the initial procurement costs became high. It is not always applicable, but the requirement of the customer stands out at this point. The camera and designator can be procured separately. The changes you have mentioned affect the non- recurrent costs, but the customer has to confirm this from the very beginning. We are always open to such methods, but since generally a cost efficient procurement method is preferred with limited budgets, the more of-the shelf products you offer, the easier it gets for the customer.

Defence Turkey: In fact a rather long road map was designed for the T625 GÖKBEY project as we have noted, but later as Turkey decided to fulfill its serial production requirements over the indigenous engine, it appears that the CTS800-4AT would be only be used in the prototype or in a part of the serial production. W hat is the current status of this activity? How

many engines will be delivered, when will they be installed in the helicopters, and will your engine take part in the test flight?

The difference between CTS800-4AT and CTS800-4A includes only certain application activities conducted for the platform. In fact, 95% of the engine has the same features. The engine utilizes during the hover flight was the engine delivered as part of this project as well. The deliveries are still going on and the prototype stage is intended to be completed until 2020. 10 engines will be delivered within the scope of the development stage of the project. Not whole lot of the engines will be utilized for the test flights; some of them will be used as part of the ground tests. We have already delivered 6 engines up to now, and we will be delivering four more engine in the earliest time. Whole engines will be in CTS800-4AT configuration.

Defence Turkey: Previously, you made a work share contract with TEI. Could you speak of a figure on the deliveries made to TEI up to date? Within this period was any issue on quantity increase or an additional work share brought to the agenda? Are there any activities to this end?

Serdar ÇETİNGÜL: Actually, TEI is designing a certain part, a module of the CTS800 engine. This module dispatches at our facilities from TEI facilities, the integration is completed in our plant and then it is delivered not only to the customers in Turkey but also to other customers. In the very recent period, we have been examining not merely the engine but also other alternatives overlapping the TEI's capabilities. We initially started in the following way, nearly 5 years ago, as a result of the analyses we conducted over certain parts within the CTS800 engine, we discussed the parts that could or could not be manufactured by TEI. Certain parts over the engine were not fully compatible with TEI's capabilities. They requested other parts and those components were subject to licence restrictions. Our existing approach is quite change. We are examining the whole Honeywell portfolio (landing gears, APU, gearbox, etc.) not on the basis of just engine and working on putting forth solutions in line with the capabilities existing in Turkey. Our colleagues from the integrated support and supply chain team frequently pay a visit to Turkey and negotiate with many companies, assessing their capabilities. we are also aiming to constitute a robust supply chain and this is quite critical for us as it will also strengthen our position in the global market.

T129 ATAK Helicopters

Defence Turkey: Have there been any requests from your company regarding avionics apart from the engine, or in other areas within the scope of the T625 GÖKBEY project? Have you made a proposal for other systems?

Serdar ÇETİNGÜL: Aselsan provides the avionic systems of the T625 GÖKBEY project. We have been cooperating with Aselsan for many years. Therefore, there may be certain technologies that we did not directly conduct with Turkish Aerospace but were supplied by Aselsan.

Defence Turkey: Regarding the export of the T129 ATAK helicopter, the export license for the engine for 30 T129s to be sold to Pakistan has not yet been granted by the U.S. Could you please enlighten us on this subject? What is the current status of this project?

Serdar ÇETİNGÜL: As far as I know, this issue is still being evaluated by the U.S. Government. You may get more information from Turkish Aerospace since it is a project conducted by that company.

Defence Turkey: In terms of depot level maintenance, the ATAK helicopter reached a significant figure of 43-44 with the Gendarmerie Helicopter. If you think of it as two engines, it is around 80-90, in the end these are engines that are used for an average of 4-5 years and the requirement for maintenance emerges inevitably. Are you contributing to maintenance and depot level maintenance requirements of existing engines, or are any activities on the establishment of this capability being conducted with your company, or does the 1st Main Maintenance Command undertake this mission alone?

Serdar ÇETİNGÜL: The SSB identified TEI to address this process. The project will become active for depot level maintenance very soon. Depot level maintenance is composed of two phases: first is the allocation and establishment of the depot and second is the sustainment phase.

Defence Turkey: You mentioned that the SSB and TEI will collaborate. Has it become official? Have you been identified as the subcontractor?

Serdar ÇETİNGÜL: Yes, the contract was signed. The Depot Level Maintenance facility will be established within TEI.

Defence Turkey: Could you indicate a figure regarding the engine's Depot Level Maintenance requirement?

Serdar ÇETİNGÜL: All the engines we developed are operating with the condition-based maintenance concept. There is no fixed term, conditions trigger maintenance and this offers a value to the user more than an fixed-interval maintenance concept under all circumstances.

Defence Turkey: When we analyze UAV engines on paper, for instance, they go under maintenance after 600 hours of utilization, and after three maintenance instances they are out

of service end of the 1,800 hours. The engine of particularly UAVs requires maintenance in the range of 34 or 36 hours. In this case, for example, the Air Force may prefer to put it under maintenance after flying it twice as 18 – 18 hours rather than flying it once 24 hours. Does this apply to the CTS800 as well?

Serdar ÇETİNGÜL: In some engines, maintenance is required after a period of determined hours. In our engines, you only change specific parts with a certain life cycle, but you keep going to utilize the engine as long as it signals its malfunction light

Defence Turkey: Are you also involved in the avionic side of the Chinook helicopters, besides the engine?

Serdar ÇETİNGÜL: In this helicopter, we take part in the engine, navigation, heat exchanger, HUMS – Health Usage Monitoring System and APU- Auxiliary Power Unit - systems but there is another APU in the configuration in Turkey. Here, the sub system engine is of essential concern to the customer.

Defence Turkey: The quantities increase in the engine aspect. The Turkish Armed Forces will acquire this capability for the first time, when we approach it from a geographical perspective, this platform will be used quite heavily and the issue will eventually come the point of Depot Level Maintenance. Are there any activities being conducted to this end?

Serdar ÇETİNGÜL: Yes, there are. The following development; two types of engine could be used in Chinooks. One is a military configuration and the other is the Honeywell configuration. In the military configuration and Honeywell configuration, about 95% of the engines are composed of the same parts. Both are manufactured by Honeywell. However, the military configuration engines are powered the Turkish Armed Force Chinooks. Until now, we could not conduct the maintenance of the military configuration as Honeywell. A depot belonging to the U.S. army executed this maintenance for the customers. But all the international customers requested for a rapid reaction for the MRO process when they dispatch the engines to the depot. In the recent

Turkish Armed Force's Chinook CH-47F Multi-Mission Helicopter

time, we collaborated with the U.S. Federal Aviation Administration (FAA). An application was made to the FAA through a channel partner. It applied to FAA by expressing that it wishes to use its existing infrastructure for the military engine and when a breakdown concerning the remaining 5% emerges, it wishes to change it with a part in the Honeywell configuration and committed that this will not cause an interference with its airworthiness. The FAA accepted this and therefore a path was opened to all international customers. Ultimately, we can establish an indigenous depot here, and provide the maintenance and repair capabilities for the military configuration. Activities to this end are continuing.

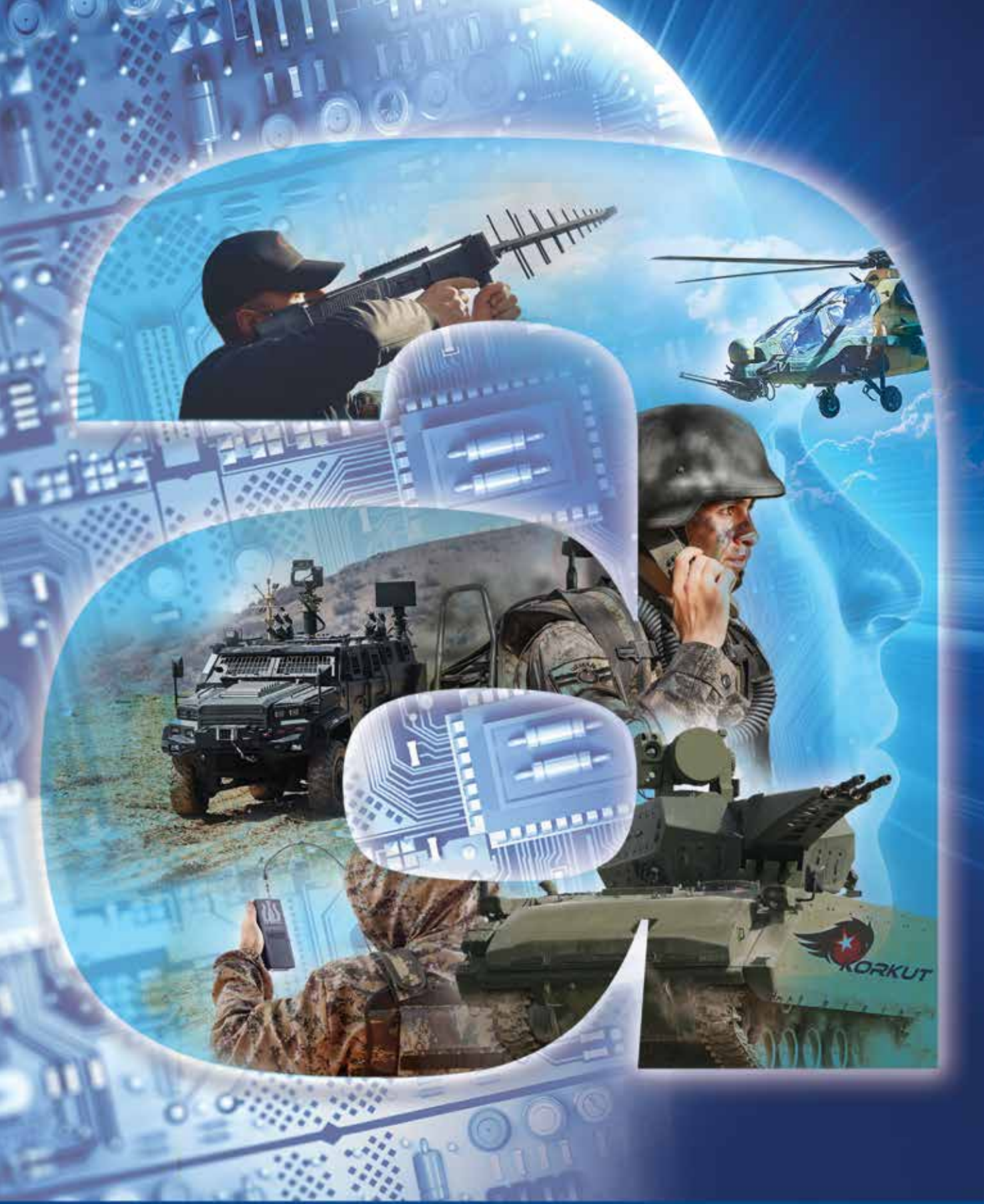
Defence Turkey: Will this depot be operated by TEI or Honeywell?

Serdar ÇETİNGÜL: This point is not clear yet. Honeywell does not have any initiative, but Turkey may have an initiative at that point. Honeywell's approach to this issue is that the customer establishes the depot and Honeywell provides the required support to the customer. When we examine the depot capability, there are other components in it as well such as engine test cells; Honeywell does not manufacture engine test cells. It acts according to its customer's preferences.

Defence Turkey: In Chinooks, the engine code of the U.S. Land Forces and the export versions is slightly different. Does this difference arise due to the configuration?

Serdar ÇETİNGÜL: Turkey uses the GA version. GA is the military configuration and the L configuration is the Honeywell version. As the procurement of helicopters are actualized through the FMS channel, and mostly international users are utilizing the GA version. The configuration of this model is authorized by the U.S. Government. The customers that utilized the GA version previously had to dispatch the engines to a depot under the auspices of the U.S. for maintenance. But as we resolved this issue with the FAA, this availed us to establish Depot Level Maintenance here.

Chinook's TP55-GA-714 Engine



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Defence Turkey: What is the status of Honeywell's cooperation with the sector companies in Turkey such as Alp Aviation, Aselsan and TUSAS?

Serdar ÇETİNGÜL: As I have just mentioned, our colleagues in charge of the integrated supply chain for the whole European region are constantly visiting Turkey and instead of adapting a certain sub-system to Turkey's capabilities, they are working to find which components are included in the portfolio compatible with Turkey's capabilities. Since we manufacture numerous systems, we do not have a strategy of establishing a factory in Turkey and performing production here. Instead, we approach the issue as to how to integrate existing capabilities and how to make them available on the market more rapidly. Therefore, industrial cooperation is inevitable. Beyond just cooperating with companies, we are also working toward including certain companies in our global supply chain as well.

Defence Turkey: Have you managed to include any companies in your Supply Chain or is there such potential?

Serdar ÇETİNGÜL: Yes, we did. I do not want to disclose their names now, I will be announcing the companies in the recent time because we have been through a very intense process, and we are now very close to finalizing.

Defence Turkey: What kind of developments have occurred during this period with Alp Aviation regarding both the F-35 and commercially? Did the production and deliveries start or is it still under the design phase?

Serdar ÇETİNGÜL: Alp Aviation is a very successful company, in respect to the landing gear the production of certain complex mechanical parts was launched and their deliveries were made as well. Alp Aviation is a company successfully using lean production methodologies and has the culture of operating with international standards. Therefore, its customers are capable of monitoring the production stage of the components in real-time. Alp Aviation's delivery performance is quite good as well, and this is a very unique opportunity for companies like us. Alp Aviation is a very good supplier and I believe that we will make our mark in far better projects in the upcoming period.

The Quality Control of T55 Engine

Defence Turkey: Which other activities have you been conducting in Turkey? Are there any other projects you want to mention?

Serdar ÇETİNGÜL: At present, we are focusing on real time connectivity. It is possible to digitalize the products, which you may never think of, it is even possible to digitalize an engine and this process is providing incredible advantages to customers.

Defence Turkey: We've focused on the military dimension so far. What type of activities have you been conducting in Turkey regarding civil aviation? Which companies are included in your customer portfolio?

Serdar ÇETİNGÜL: One of the most crucial features of Honeywell that distinguishes the company among the competition is that it is very active in both commercial and military areas. So, the systems we mention are revealed through a joint engineering infrastructure. Though it has a different packaging in military platforms, the internal algorithms are same for Radar Altimeters as with the commercial side. Sometimes the commercial side may become more demanding in terms of performance, and in respect to packaging and optimization, the military side may become more demanding. At the end of the day, this brings our company an advantage; you observe the developments on the civilian side while developing solutions that may fulfill the requirements of the military side. As a result, a very robust portfolio emerges. We are collaborating with all commercial aviation actors in Turkey as there are a remarkable number of Honeywell components within the commercial platforms as well.

Defence Turkey: Does Honeywell Turkey act as a bridge regarding maintenance and repair of the sub systems for military platforms in case of breakdown? If so, is the user directly applying to your company or does it call your office in the U.S.? Can you share the process with us?

Serdar ÇETİNGÜL: On the commercial side, we have colleagues taking care of the problems faced by the users. In the end, the customers surely get in touch with us if a product - whether military or commercial – needs to return to a factory in any part of the world.

Defence Turkey: Is the supply chain in Turkey, which you previously mentioned, only taking part in the defence side or are there any companies supporting you also on the commercial side? Is your current search designated for military purposes or is it also for the civilian side as well?

Serdar ÇETİNGÜL: We do not categorize our search here as military and commercial, but I have to note that the capabilities of the defence sector companies in Turkey are quite developed. Because, as you know, Turkey has become a country capable of developing its own platforms. Since we will be focusing on the capabilities during selection process, the companies may be on the military side but there are no obstacles preventing us from collaborating with these companies for the technologies on the commercial side.

Defence Turkey: The in-flight tracking of avionics that you mentioned could be conducted by Honeywell or by company X, Y, or Z. Did any company in Turkey apply to your company for such a requirement, or for establishing a capability?

Serdar ÇETİNGÜL: The subject you mention requires highly different working conditions. In its simplest form, interpreting certain data by sharing and using satellite communication also falls under the area you mention and optimizing normal functioning is also the part of this. Therefore, I can say that we are at the starting point with our customers in Turkey.

Defence Turkey: Where does Turkey stand in Honeywell's projections for the upcoming period?

Serdar ÇETİNGÜL: Turkey is a crucial country for us. We do not consider Turkey merely as a market. Our Honeywell Turkey organization is the management center of all countries in Central Asia. We have a lot to contribute to the Turkish industry, aviation and space industry in this country as Turkey wishes to manufacture its own platforms. We have a wide portfolio, and maybe if we were only an avionics manufacturer, we may be competing only with Turkish companies at the end of the day, but we are not a company focused on a single product. We never positioned our company in that way. In other words, while a customer is designing a platform, the value we will be adding here is to reduce the duration of the platform's launch to market and to minimize the risks. Because, when you bring together the systems at the beginning, the integration problems specific to that platform arise then. These all need to be planned appropriately and previous experiences need to be transferred thoroughly to this process. Big and especially complex systems may severely affect the launch of the platform to market in terms of project schedule. The Turkey market is quite crucial for us; we try to provide similar support to the end-users as we provide to the OEMs (Original Equipment Manufacturer). Software and this mechanical world started to combine, in other words the physical realm and the digital realm started to merge. This will afford many advantages, and as Honeywell we see our future in that context. We believe we may create very effective benefits that the customers have never thought of, in their operations. All the solutions developed are the systems we refer as 'connected'. And Honeywell underlines the power of this connection we call "the power of connected" not only in aerospace area but in all main business groups. This may either be the automatic control system for a refinery or a smart building control center of a shopping mall or a passenger aircraft. Here it is important to constantly collect data from physical products and mechanical systems, transferring that data to the cloud and keeping it there as big data then in that way achieving increases in efficiency, malfunction management and the increase in the benefits and efficiency to the maximum level by using the correct analytic tools. The world is going towards this point. Honeywell positions itself as a leader in these technologies and over 25.000 software engineers are employed globally. The company now positions itself as a Software Industrial Technology leader. Honeywell manufactures thousands of types of products but in addition, and it develops software to enable communication between them in order to create maximum benefit. Almost all the products we manufacture are being designed in a way to operate with software. The thing that distinguishes our company amongst our rivals is that they all lack the domain knowledge that we own. Honeywell systems are being used in tens of thousands of aircraft in the world. Honeywell systems operate in thousands of refineries, and our smart building systems are being used in hundreds and thousands of buildings. Honeywell has been doing this for over 100 years, and now when you combine this domain knowledge with software and go for optimization and add the technology of the "Internet of Things", the era that we call Industry 4.0 a new technology age starts at that very point. Innovation in this age is what we will nourish with our most critical vision and seasoned experience.

Defence Turkey: Thank you for sparing your time for our readers

Serdar ÇETİNGÜL
General Manager CEE (Central & Eastern Europe), & Turkey Honeywell Aerospace

Serdar ÇETİNGÜL is Aerospace Leader for Central Eastern Europe and Turkey at Honeywell Aerospace. Headquartered in Phoenix, Arizona, Honeywell Aerospace is a technology and services leader in three main sectors: Air Transport & Regional, Business & General Aviation, and Defense & Space.

In this position Serdar is for leading, owning and coordinating all the Aerospace Business (airlines, business & general aviation and defense) in Central & Eastern Europe and Turkey by leading regional Customer Core Teams including business & sales managers to deliver on business objectives and customer commitments and developing & maintaining extensive interface with crossfunctional team, including Marketing & Product Management, Engineering, Integrated Supply Chain, Contracts/Legal, Export / Compliance, and Customer & Product Support.

Before this role, he was responsible for Turkey and Central Asia countries for Aerospace Defense as a Regional Business Director.

Serdar has been at Honeywell since 2013. Before Honeywell, he spent almost twenty years at various Aerospace & Defense companies with a focus on Design & Systems Engineering, Sales, Business Development, Program & Project Management and Consultancy. Serdar brings extensive experience in business development, leadership and management development, from the 'High Growth Region' perspectives, to Honeywell.

Serdar earned a Bachelor of Science & Master of Science degrees in electrical engineering from Middle East Technical University Turkey. Later on, after having 10 years of industry experience he earned Master of Business Administration degree from the same university.

by Cem DOĞUT

Anatolian Eagle 2019 Training Exercise Conducted Successfully

The Anatolian Eagle 2019 Training Exercise was conducted at the Konya 3rd Main Jet Base Command on June 17-28. In a realistically simulated operational environment, the Anatolian Eagle Training Exercise is executed both nationally and internationally every year at the Anatolian Eagle Training Center to increase the training level of pilots, air defence staff and controllers in operations, where they experience and improve joint and combined operation methods, which minimizes losses under real operation conditions and increasing task effectiveness to the maximum level. Since the establishment of the center, a total of 41 training terms composed of 23 international and 18 national and about 24,000 sortie flights have been accomplished with the participation of 15 countries.

In this year's international Anatolian Eagle 2019 Training Exercise, Azerbaijan Air Force participated with 3 observers, U.S. Air Force with 6 x F-15Es, Italian Air Force with 3 x AMX A-11s, Qatar Air Force with 1 x C-17 and 1 x C-130J, NATO with 1 x E-3A, Pakistani Air Force with 6 x JF-17s, Royal Jordanian Air Force with 3 x F-16AM/BMs, Turkish Naval Force with 2 x Frigates and 1 Torpedo Boat. Turkish Air Force attended the event with 6 x F4E-2020s of the 111st Squadron, F-16C/D of the 113rd, 132nd, 152nd and 161st Squadrons, with KC-135R of the 101st Squadron, with E-7T of the 131st Squadron, with CN-235M and AS-532UL of the 135th Squadron and with C-160D "MİLKAR-2U" aircraft of the 221st Squadron.

The Anatolian Eagle Training Center (AKEM) established at the 3rd Main Jet Base in 2001 is one of the world's most developed tactical training centers with its broad airfield, realistic threat environment and serves many participants and pilots of friendly and allied nations. The Anatolian Eagle airfield featuring one of the greatest worldwide military training areas with a width of about 330 km at a North-South direction and about 400 km at an East-Weststst direction enables many aircraft to realize their flight tactics without any limitations and without being affected by civilian air traffic.

During the training held at the Anatolian Eagle, the blue forces (units/elements attending the training) attack the targets in thethe red zone protected by the enemy's air defence systems and the aircraft within the scope of the identified scenarios. During the training, F-16C/D jets from the 132nd Squadron of Weapons and Tactics fly and act as the red force, in other words the enemy. At the Anatolian Eagle Operation Center, data/information transfer between all air vehicles, ground threat systems, early warning aircraft, ground surveillance radars and all components are monitored in real-time, coordinated and evaluated.

The Air Combat Maneuvering Instrumentation – ACMI System is used to this end. An ACMI System is installed on the air platforms in the form of an external pod and enables the air-to-air and air-to-ground combat training of the pilots and operations in an effective fashion. On account of the RF data link with a high range and high speed features and integrated processors, the ACMI System is capable of advanced air-to-air and air-to-ground combat training capabilities such as a real-time autonomous position generator, weapon simulation and real-time hit notification. Within the scope of the training, the MİLKAR-2U intelligence, surveillance and reconnaissance (ISR) aircraft of the 221st Squadron identified the ground targets on the training field and designated the targets to the aircraft commissioned to attack with the air-to-ground task under the blue forces. In the recent period, the development of joint and combined operation methods of the Naval and Air Forces units/ elements are of great importance to the TAF. Within this framework, another scenario of the training was the joint operation conducted with Frigates and Assault Boats cruising in the South Mediterranean. Moreover, some equipment was dropped by the Qatari C-17 and C-130-J aircraft as part of the training and meanwhile the blue forces executed the Civil Air Patrol (CAP) task.

Another considerable point in the Anatolian Eagle Training Exercise was the attendance of the U.S. Air Force in the operation with F-15Es despite the increasing tension between the U.S and Turkey. Additionally, the Pakistan Air Force joined the Anatolian Eagle Training with JF-17 aircraft that were co-produced between China and Pakistan this year. The Pakistan Air Force participated in the Anatolian Eagle Training due to logistic reasons with the F-16 Squadron during previous years.

Within the scope of the training exercise, “Spotter Days” were held on June 25-26 and over 300 local and foreign aviation photographers attended the event. Within the framework of the activities organized for Spotter Days, the Turkish Stars and F-4E 2020 aircraft performed formation flight which was the first time in Turkish Aviation History and saluted the This formation flight accompanied by 6 NF-54/B and 4 F-4E 2020 was imprinted in the memories of the spotters as an historical moment. Moreoverall the participant aircraft passed overhead with various formation flights at this stage. On June 28, the International Anatolian Eagle 2019 Training Exercise was successfully accomplished with the deployment of all participants.

FEINDEF, The International Defence and Security Fair was held for the First-Time in Madrid, Spain

The International Defence and Security Exhibition, FEINDEF, organized by TEDAE and AESMIDE - the two Spanish business associations in the sector - with the support of the Ministry of Defence, is the first exhibition of its kind to take place in Spain.

The Fair, which had to expand its initial exhibition space due to the high demand, spanned 14,000 square meters of exhibition space with a premium conference program designed at the highest level. The exhibition hosted 48 official delegations of 32 countries and brought together 150 exhibitors from 11 different countries, including the main companies in the sector like Navantia, Airbus, Indra, Leonardo, Tecnobit, Expal, GDELS-Santa Bárbara Sistemas etc. In addition, numerous small and medium-sized companies that make up the supply chain were presented, accounting for more than 67% of the total number of exhibitors. Defence Turkey Magazine was represented by Ms. Ayşe EVERS, our magazine's editor-in-chief. Defence Turkey Magazine was also the only Turkish Media in attendance at the exhibition.

The first edition of FEINDEF closed its doors with successful visits by more than 10,000 defence professionals. Moreover, with the presence of European defence-related institutions, many opportunities for international collaboration offered by the new European defence policy framework has arisen. FEINDEF, as a meeting point for the industry, was an ideal setting to promote collaboration between companies in the sector in terms of investment in R&D and technology. There were numerous signatures on collaboration agreements between private companies, and in addition, collaborations between companies and public institutions were confirmed as well.

FEINDEF had the participation of first level authorities such as the Minister of Defence, Margarita ROBLES; the Secretary of State for Defence, Ángel OLIVARES; the Chief of Staff of Defence (JEMAD, by its acronym in Spanish), TG Fernando Alejandre MARTÍNEZ; the Chief of Staff of the Army (JEME), GE Francisco Javier Varela SALAS; the Chief of Staff of the Air Force (JEMA), GA Javier Salto MARTÍNEZ-AVIAL; Admiral Chief of Staff of the Navy (AJEMA), AG Teodoro LÓPEZ CALDERÓN and the Director General of Armament and Material, AL Santiago GONZÁLEZ GÓMEZ. As the main promoters of FEINDEF, representatives from the Spanish Ministry of Defence visited the Fair on all three days, engaging in the opportunity to get a closer look at the products, concepts and services on display.

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The fair also attracted the interest of other high-level authorities as the Minister of Science, Innovation and Universities, Pedro Duque; the Secretary of State - Director of the National Intelligence Centre, Félix Sanz ROLDÁN and the Director General of Recruitment and Civil Education, Amparo VALCARCE.

Many other international authorities were present at the different activities and forums of the exhibition, such as the former head of the UN Secretary-General's Cabinet and former minister of Foreign Affairs, Susana MALCORRA; the Director of the European Defence Agency, Jorge DOMECQ and Head of Unit 1 Defence - DG GROW - European Commission, Alain ALEXIS, among others.

Innovation, Dual Technologies and Employment as the Backbone of Defence

The event had also an extensive program of forums and conferences in which current defence issues were addressed. Employment, Innovation and Women's Forums were among the topics in the program, which were discussed and explored with several round tables in which experts debated the perspectives of the sector. Innovation and dual technology were the central main themes.

The Employment Forum was geared toward the so-called Special Availability Reservists, troops and seamen who at 45 years end their contractual relationship with the Armed Forces, and also these topics were of special interest to Human Resources (HR) managers of companies in the sector.

The Defence and Security innovation Brokerage (DSiB), the entrepreneurship forum of the first edition of FEINDEF focused its attention on innovation and dual technology through a brokerage and

various round tables. 20 projects were selected and presented to specialists from the university world, the Armed Forces and national and international companies in a 3x3 brokerage format (three slides in three minutes). The proposals were framed within the areas defined by the European Defence Action Plan (EDAP): electronics, meta-materials, drones, robotics, etc.

Companies, representatives of the Armed Forces and of the Administration, including the Director General of Armament and Material (DIGAM), the AL Santiago R. González GÓMEZ, and the Deputy Director General of Coordination and Institutional Relations of the Ministry of Science and Innovation, Felipe Formariz POMBO participated in this forums with the aim of sharing the different approaches and defining the challenges and needs of the future. Additionally, there was a Round Table, moderated by GD Jose Luis MURGA (PLATIN), in which the new European Defence Policy and the new lines of financing it brings with it was debated.

Gender Equality and Female Talent Debated at the Women's Forum

The FEINDEF Women's Forum was an initiative of the organizers to highlight the important role of women in peace processes and to promote the participation of women in the Security and Defence sectors as well as in the technological and scientific sectors. The Forum was created with the aim of sharing experiences, exchanging opinions, analysing trends and discovering new talents.

Spain is one of the European countries with the highest percentage of women in the Armed Force, tripling, for example, Italy. In the Spanish Armed Force, only 12.8% of the troops are women, a percentage that drops to 9.2% in the case of officers. As a result of the late incorporation of women into military life, barely 30 years ago. Despite the low figures, Spain is one of the European Union countries with more women among its ranks. It is slightly below France and Greece, with more than 15% of women among its ranks, but well above Italy, whose Armed Forces only have 4.3% of women.

In this regard, the Women's Forum addressed how gender mainstreaming in peacekeeping operations and national training programs for military and police personnel has contributed to conflict prevention and resolution.

New Products and Innovation at FEINDEF

During the exhibition, lot of novelties were presented. Some of them as a result of new programs driven by the Spanish Ministry of Defence, such as the presentation of the new Engineering Combat Vehicle (ECV), of GDELS-Santa Bárbara SISTEMAS, and two of the turrets competing for the VCR 8x8 program, the first one which is the result of the collaboration between Navantia and Expal, and the second one is the fruit of the partnership between Indra, Escribano Mechanical Engineering and Leonardo.

Technological advances were exhibited too, such as the new USV of Marine Instruments, the development of the new displays for the F18 of Tecnobit-Oesía Group, the new rucksack with built-in airbag of Altus Yuma which is capable of saving a soldier's life if caught in an avalanche. These novelties confirm the important role of investments in R&D in the industry.

Defence Industry Key to Strengthening Spain's Industrial and Technological Base

The defence and security market is one of Spain's sectors with the greatest strength and economic projection, with a turnover of more than 5,900 million euros per year. The sector has a high technological level, based on the high investment in R&D and the continuous activities focused on innovation. Being one of the sectors that invests more in R&D compared to others, exceeding 10% of turnover. It is a sector with a high added value associated with most of its activities, and it also has a high industrial and technological complexity that favours the competitiveness of our industry on an international level. Many of the technologies developed in the military field are dual in nature, which makes them useful in the civil field, thus helping to strengthen the country's technological and industrial base.

The high degree of internationalization of this industry is one of the keys to its stability. More than 83% of total turnover corresponds to exports, which in nominal terms means around 4,930 million euros per year. Sales have been made to a total of 67 countries, through international defence programs, international industrial cooperation agreements and direct sales. The main clients of Spanish Defence companies are international Consortiums, which account for around 36% of total defence exports. These are followed in importance by Europe (25%), the Middle East and North Africa (6%) and the United States (6%).

By market segments, aeronautics also leads the Defence export market with an advantage, accounting for more than 71% of the sector's total sales abroad. Behind this are naval with 7.8%, land vehicles with 6.1% and ancillary services with 5.7% of total export turnover.

The Government of Spain Closed 2018 with a Significant investment in Defence

In the last six months, more than 12.7 billion euros have been approved in large multiyear contracts. The new investment cycle ensures the development of Spanish R&D and thousands of jobs in Spain.

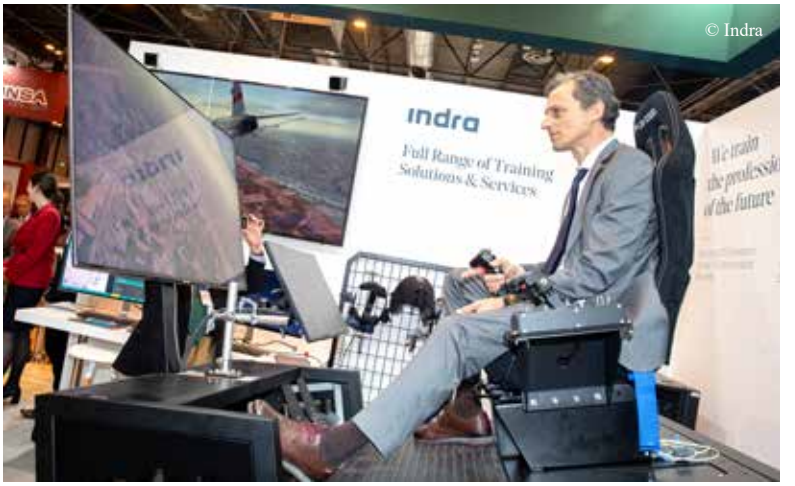
In the last quarter of 2018, the Government of Spain promoted a new cycle of investment in Defence, with the approval of large contracts that exceed 12,7 billion euros and which represent the largest investment in the sector in the last 20 years.

Last December, the Council of Ministers approved three of the industry's key programs: F-110 frigate, 8x8 VCR, and the modernization of the Eurofighter. These programs involve not only the Ministry of Defence but also the Ministry of Industry. Thanks to these plans, the development of Spanish R&D is guaranteed, and tens of thousands of jobs are secured throughout Spain for years to come.

These three contracts represent an investment of 7,331 million euros in a Multiannual Plan until 2032, and the creation of more than 8,500 direct and indirect jobs throughout Spain. Since June 2018, the ministry led by Margarita ROBLES has also given the green light to the modernization of Chinook helicopters and Piraña Army vehicles, as well as the acquisition of a fourth Super Puma helicopter for the Air Force.

Last July, the Council of Ministers also approved the processing of a new agreement to guarantee the Armed Forces access to data from the new generation SpainSat satellites.

This latest investment drive by the Ministry completes the effort made during 2018 in Defence, which began in the first half with the approval of some important contracts such as the updating of the Navy Harriers, for 19.6 million euros, or the acquisition of basic night vision modules for the Army, for a value of 14.4 million euros. The approval of all these programs confirms the Defence industry as a strategic sector within the Spanish industrial fabric. Positioning Spain at the forefront in the development of its own R&Dis a key element when it comes to forming European consortiums as envisaged in the new European Defence Action Plan.



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Fostering Innovation and the Dual Nature of Technology for the Benefit of Society

Dual technologies are an important part of the Spanish industrial fabric. The interaction between universities, research centers and the defence industry has led to a merge of strictly "military" and "civil" in R&D developments. The defence and security sector are aware of the need to work side by side with the civil world, promoting innovation and the dual nature of technology for the benefit of society.

Internet, GPS or microwaves are some of the best-known cases of this type of technology that were developed in response to defence needs and which became popular when the technology crossed over to the civil sphere.

These synergies add value to technological cooperation and the exploitation of investments, since technology is developed once and is later adapted to multiple applications.

The European Union is also investing resources in this type of technological development, especially with the Horizon 2020 program, in which mechanisms have been articulated to promote the participation of different units and bodies of the Ministry of Defence to participate in various dual programs.

At the same time, the Ministry of Defence calls each year for a selection process for R&D projects "of interest to Defence", with the aim of being included in the program of Cooperation in Scientific Research and Development in Strategic Technologies (COINCIDENTE program). This initiative, for the promotion of dual technologies, seeks to benefit from adapting civil developments that can also meet military needs.

Europe Moves Towards a Common Defence Policy

Currently, 80% of defence spending in European countries is done on an individual basis. The European Defence Fund has been set up to support investment in research, development and joint procurement programs across the Union. The European Union is taking great strides towards a common defence policy. In recent years, a multitude of initiatives have emerged to homogenize investments in this area.

The EU is the second region in the world in terms of military spending, surpassed only by the United States, which in 2015 doubled European

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defence spending. Despite this level of investment, its fragmentation within the EU means that between 25,000 and 100,000 million euros are considered inefficient expenditure. For example, while the US has only one model of tank, in Europe there are at least five different models, and the same applies to combat aircraft.

Each country has its own procurement policy, which means that approximately 80% of defence procurement is carried out individually, which increases the rate of duplication in the Union's systems. On the other hand, Europe continues to be highly dependent on foreign technologies, mainly the United States.

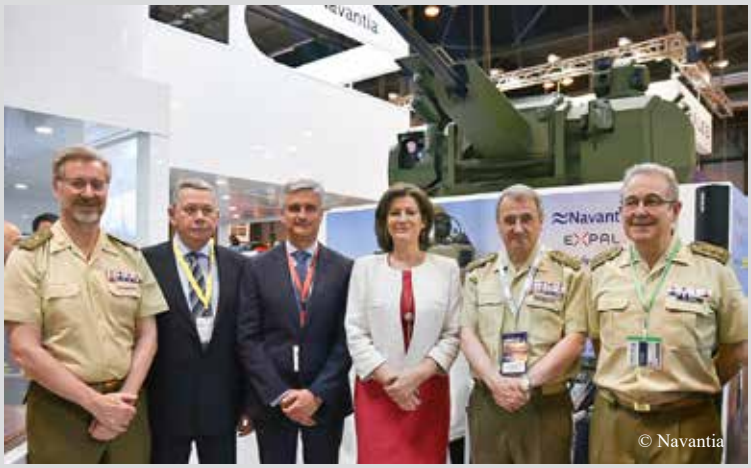
European Programs

Considering this data, the European Union has proposed ambitious programs to alleviate the effects of duplication and fragmentation, as well as to promote the development of its own technologies. This is the first time that the EU has allocated EU funds to finance defence-related projects and activities.

The main project is the European Defence Action Plan (EDAP), which aims to coordinate Member States' defence investments. The EDAP's most important instrument is the European Defence Fund (EDF), through which funds are channelled into research, financed directly by the EU, and development and procurement, where the EU will create incentives for Member States to cooperate with each other. This fund is expected to mobilize around €13 billion over the period 2021-2027.

Prior to the EDF, the EU created two initiatives to test the feasibility of earmarking European funds for R&D activities in the defence sector. The first of these is the Preparatory Action on Defence Research (PADR), which had a budget of 90 million euros from 2017 to 2019. Following this, between 2019 and 2020, the EU has launched the European Defence Industry Development Program (EDIDP) which was created to promote the competitiveness, efficiency and innovation capacity of European industry and under which activities in the product and technology development phase will be supported. The EU's budget for the EDIDP is 500 million EUR

Navantia, EXPAL and Elbit Systems Present TIZONA, the 30mm Unmanned Turret for the 8x8 of the Spanish Army at FEINDEF



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Navantia, EXPAL and Elbit Sytems officially present TIZONA, the 30mm unmanned turret for the Program "Combat Vehicle on Wheels" (VCR 8x8) of the Spanish Army, at FEINDEF, the International Defence Exhibition held in Madrid from the 29th to 31st of May.

An institutional event held at Navantia's stand at the show had an important presence by the Ministry of Defence and the Armed Forces. Susana de Sarriá, President of Navantia, put in value "the national nature of our proposal, which in addition to generating an important workload in Cádiz, is a safe bet for the Ministry, in terms of production risk reduction and life cycle".

Pedro Sallent, General Manager of EXPAL, highlighted that "this alliance seeks to offer our Armed Forces a state-of-the-art weapons system produced by two Spanish Defence companies, strengthening our technological sovereignty."

The presentation of TIZONA in FEINDEF confirms the agreement signed by the three companies in December 2018, which will allow both the production in Spain of the towers and their future maintenance and updating.

In this program, Navantia provides the knowledge, experience and facilities with a high capacity to integrate and manufacture weapons systems, artillery and medium-caliber weapons, while EXPAL will be responsible for the manufacture and testing of electrical and electronic subsystems, as well as their maintenance. Elbit Sytems, as technologist, will support the start-up and qualification of the new production lines, and guarantees the low technological risk of the program. In addition to the strong domestic production plan, the partners have defined an ambitious export plan, which will benefit from the strong international vocation of the Spanish partners.

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Kurtaran 2019 Military Exercise

by Cem Devrim YAYLALI

Planned by Turkish Naval Forces, the Kurtaran-19 Military Exercise was executed from 27-31 May 2019 under the management and control of the Northern Area Sea Command in the Aksaz/ Marmaris region.

The aim of this military exercise is to rescue submarine personnel not capable of reaching the surface through the utilization of the Turkish Naval Forces Command vessels.

The TCG Gelibolu Frigate, TCG Alemdar Submarine Rescue Mother Ship, TCG Işın and TCG Akın Rescue and Towing Ships, TCG Köyceğiz Patrol Boat, TCG Akçay Minehunter Vessel, TCG Dolunay, TCG I. İnönü and TCG Gür Submarines and Six Coast Guard Boats attended the drill as surface ships. In addition, one S-70B ASW/ASuW Helicopter of the Turkish Naval Forces Command (TNFC), one C-130 cargo aircraft of the Turkish Air Force Command (TurAFC), one AS-532 Cougar helicopter of the Turkish Land Forces Command (TLFC) and one U.S. Navy Maritime Patrol Aircraft (MPA) were present at the military exercise.

Moreover, an international organization – the International Submarine Escape and Rescue Liaison Office (ISMERLO), a total of 35 distinguished observers from 18 different countries, representatives from the Ministry of Environment and Urban Planning, Ministry of Health, Ministry of the Interior, Ministry of Industry and Technology, Ministry of Transportation and Infrastructure, Directorate General of Meteorology as well as press members attended the military exercise.

The Kurtaran Military Exercise commenced on 27 May 2019 with a briefing and the introduction of the vessels attending the exercise. On 28 May following the alarm given as three submarines settled onto their assigned areas, the search phase started and ROV identification and survey activities were executed in pursuit, and search and rescue forces identified the position of the submerged disabled submarines.

On 29 May, the press day of the military exercise began with a press statement made at the TCG Alemdar Ship, Rescue and Submarine Commander Col. Niyazi UĞUR gave detailed information to the press on the military exercise and the activities to be conducted. Following the press meeting, the submarines participating in the exercise started to dive at different locations in the 24 square mile area assigned and played the role of submarines that were incapable of reaching the surface.

The first activity of the day was the airborne intervention to rescue the survivors who wore their special escape suits and had reached the surface from the submarine. The Para Rescue Team (PRT) responded to personnel acting as survivors. Arriving at the scene of the accident with a

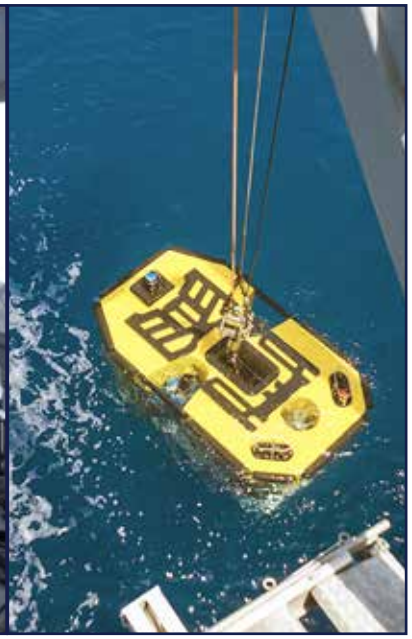
C-130 cargo aircraft, the team of 12 jumped in 3 parts as the aircraft made 3 passed over the submariners waiting to be rescued after the detection of the signal flare fired by the survivors. The Parachute Search and Rescue Team quickly inflated several life rafts and bound them together which created a support base. They used the RHIBs to collect the survivors from the water and immediately responded to those requiring first aid.

As per the scenario, the survivors were transferred to the TCG Alemdar arriving at the accident scene and the first response to these survivors was made by the Submarine Evacuation and Rescue Team on the ship. During the triage, the medical status of the survivors was examined and the ones facing respiratory distress were located at the two Constant Pressure Chambers, each with 22-person capacity, aboard the TCG Alemdar ship. One of the survivors with a fracture had his x-ray taken in the x-ray room on the ship while a survivor in critical condition had a surgery in the operating room on the aboard. A survivor who needs to be taken to full-fledged hospital on the ground was disembarked with an AS-532 Cougar helicopter of the TLFC.

During the next phase of the military exercise, the TCG Alemdar ship launched search activities for the TCG I. İnönü Submarine acting as a submarine that was not capable of the surface. The location of the submarine was precisely identified thanks to the active sonar and multi-beam sounder on the ship. The communication was established with the submarine that settled onto the seabed at a depth of nearly 75 meters via an underwater telephone and the damage of the submarine as well as its immediate requirements were acquired. On account of the dynamic positioning system aboard the TCG Alemdar, the ship was positioned over the TCG I. İnönü Submarine and by constantly and automatically adjusting its position according to the wind and sea state, using its active position controlling systems, the rescue ship was able to stay on the exact spot for the remainder of the exercise.

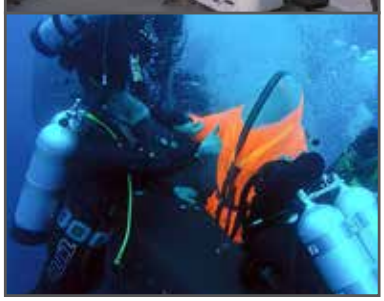
After the detection of the position of the submarine incapable of surfacing, the remotely operated underwater vehicle, dubbed as TCB İstakoz-1 that made in Turkey and capable of functioning at a depth of up to 1,000 meters, was launched at sea. In addition to the emergency life support packages taken to the submarine, ROV was used for many critical tasks such as the connection of hoses for the ventilation of fresh air, and was directed by two pilots. As one of the pilots moves the vehicle under the water, the other one operates its bars with 7 functions.

After TCB İstakoz-1 transferred the first images of the submarine to the ship, the Atmospheric Diving System was launched at sea. This system enables the diver inside it to operate for long durations up to 365 meters underwater without getting affected by the pressure, brought the emergency life support package that was launched at sea from the ship to the submarine. This support package was placed on the hatch over the concertina at the sail of the submarine by the 1st Class Diving qualified staff within the Atmospheric Diving System (ADS), this diver inside the ADS then returned to the TCG Alemdar ship and took the wire belonging to the Submarine Rescue Chamber which would be launched at sea in the next stage, dived underwater



and joined this wire to the hatch of the submarine.

All these operations were monitored from the TCG Alemdar via the cameras installed both on the ADS and TCB İstakoz-1 and confirmed whether all operations were executed as necessary. Following the ADS' installation to the ship, the McCann rescue chamber named after its inventor, also officially known as the Submarine Rescue Chamber, was launched at sea. This diving bell capable of operating at a depth of up to 207 meters is able to dock with the submarine with an internal pressure of 1 atmosphere and can carry the submarine staff to the surface. It is capable of taking a total of 8 personel with its two operators. The rescue chamber used the steel guide wire fixed to the submarine and docked with the submarine by reaching over the hatch as mentioned previously. Following the evacuation of the water between the chamber and the submarine and pressure equalization, the hatch of the submarine was opened and two submariners entered the chamber and it resurfaced.



After the Submarine Rescue Chamber followed the guide wire and reached the surface, the staff was transferred to the ship and the bell was removed from the sea. As TCB İstakoz-1 disconnected the guide wire installed over the submarine, both the wire and the remote controlled underwater vehicle were taken to the TCG Alemdar ship. Later on, as the press day stage of the military exercise ended, the TCG I. İnönü Submarine reached the surface again and returned to Aksaz Naval Base with the TCG Alemdar.

On 30 May, training was provided for the freestyle safe exit of the staff from the concertina of the submarine by using the MK-10 escape suit and thus the rescue of the remaining staff onboard the TCG I. İnönü Submarine which was at a depth of 30 meters. The military exercise was completed with the evaluation meeting held on 31 May.

The Kurtaran-2019 Military Exercise is significantly different from the Sorbet Royal or Dynamic Monarch series military exercises previously organized under the auspices of NATO as the search and rescue activities were conducted simultaneously by three different ships for three submarines.

The First Class Diving qualified staff working at the Underwater Rescue Command to search, find and rescue staff serving on 12 submarines in the Turkish Naval Forces and are the most critical and strategic striking power; this capability is possessed only by very few countries in the world ■

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NOVA Power Solutions: "The Increase in Indigenous Development and the Progress of the Turkish Defence Industry is an Advantage For Us!"

NOVA Power Solutions, Inc. is a U.S.-based company that has partnered with local Turkish firms on Defence projects over the past seven years. In an exclusive IDEF '19 interview, NOVA Power Solutions President and CEO Steve ZIFF, NOVA Power Solutions Business Development Manager for EMEA (Europe, the Middle East & Africa) Süleyman BAYRAMOĞLU, and NOVA Power Solutions Business Development Manager Kurt WORDEN discuss the company's seven-year presence in Turkey. Their discussion focuses on their role as a component system provider to Turkish Defence firms and the ways this partnership has enabled indigenous Turkish design to proceed more quickly and reliably. The team from NOVA Power also shares the company's plans for future local partnerships on military and commercial projects

Defence Turkey: As a company doing business in Turkey for several years, how do you evaluate interest from Turkey and other countries in your IDEF booth, and what kinds of products are you displaying or showing to your visitors?

Steve ZIFF: NOVA Power is a component product manufacturer, so we are quite focused on selling our products to the Turkish market and to others. We've seen a number of our customers and potential customers come by the booth and expect to see more in the next couple of days. I don't know if we have seen as much non-Turkish international traffic as we may have in past years, but the show is still only about halfway through. For those who have come to our booth, we've been able to showcase our successes. We have over 300 of our systems deployed in Turkey on military platforms. Every class of Turkish Navy ship has our products on it, and there is still a lot of room for growth and improvement in Navy applications and also outside of the Navy as well, not only in terms of other military applications but also things like infrastructure, rail, traffic, and more.

Currently, our solutions are only deployed in military environments in Turkey, and we are looking to expand that presence and believe there is a lot of opportunity there, but we also want to expand into civilian infrastructure and transportation sectors as well.

Defence Turkey: Have you had any contact or meetings with Turkish officials during IDEF '19, such as with the SSB, MoND, or the Turkish Armed Forces ?

Steve ZIFF: Yes, all of them. We operate by working mostly with the system integrators, so they are hired by the military or whomever to create a broader solution, of which we provide one of the critical components, so

our end customers may be on a ship somewhere or on a ground station or operating UAVs or things like that. We work very closely with Aselsan, Havelsan, YALTES, Vestel, and many of the other integrators or system manufacturers to embed our products in theirs.

Defence Turkey: What kind of systems have you provided to Vestel?

Süleyman BAYRAMOĞLU: We have provided the power supply solutions for their UAV Ground Control Systems.

Steve ZIFF: It's commonly referred to as an Uninterruptible Power Supply or UPS. When people think of a UPS, they think of something that sits off to the side and it's waiting, and when there is a power loss it starts working and provides battery backup. That's maybe 10% of the functionality of what our company would consider a full power solution. Our products are always running. To take the example of a UAV Ground Control Station, which is most likely somewhere in a remote area and probably running off a generator, or even if it is getting power, probably not the most reliable consistent power. What we do is make sure that the critical technology in that ground station has consistent power at all times regardless of whether there's a drop, a surge, or a power loss. We make sure that none of those things affect the end system and that it still does its job. If you're the Ground Control Station for UAV and you have power fluctuations affecting the performance of that UAV, that's very harmful. Also, in addition to perhaps having a generator that typically is not providing perfect power, in your whole network of electronics you may also have one component that runs into issues, and this can have a negative impact on other components. From an electronics perspective, we make sure that doesn't happen either. We isolate the input, we isolate any anomalies in the input, and then we also isolate all the component parts from one another, so it's far more than what a lot of people think of as a UPS, which is why we tend not to call it that. If someone just simply wants ten minutes of battery backup power in case they lose power, they can go buy a very cheap commercial product to do that. If they want something that ensures continuous consistent power, whether it's a weapons system, a communications system, or another critical system, they should get a full power solution.

ESA - Control Room

Defence Turkey: How can you ensure power continuity for a remote sensor of a UAV System that is deployed high on a mountain for several weeks?

Süleyman BAYRAMOĞLU: We provide power continuity at all times no matter what the power infrastructure is. One side of it is electrical problems, and the other side of it is environmental problems. What we do is in the electrical aspect. We eliminate all the power anomalies coming from the infrastructure or generator.

Steve ZIFF: Oftentimes, we are talking about very remote areas. Of course, those sensors are still getting power from somewhere. There's the power that the sensors are getting and then there's the sensor, and we sit in between the two of them and make sure that the system is continuously getting what it needs, and we can do that in very cold areas on mountains or in very warm or dusty desert environments. Another good example of a critical system we support is the traffic at intersections. A traffic intersection has some controls that dictate when the light turns and when it doesn't, and those are controls that obviously have to be running all the time. Our power solutions can keep those systems running as well.

Defence Turkey: Do you also work with other UAV makers in Turkey such as TUSAS and Baykar Makina?

Süleyman BAYRAMOĞLU: We have some relationships, but so far nothing has become a solid output.

Steve ZIFF: But in the U.S. we do. We have multiple programs that we support. It's interesting for us, as we've been in the Turkish market now for six or seven years, that the U.S. has UAVs and Turkey has UAVs, the U.S. has Navy ships of varying classes and so does Turkey, so a lot of our applications are very transferable.

Defence Turkey: Are your products subject to U.S. ITAR Regulations?

Steve ZIFF: We are not ITAR-regulated. While we offer a custom solution, it is still U.S. Commerce Department-regulated, so the nice thing is it is very easy for us to sell to Turkey, but, as you are saying, it is even more important as you look to export. That's a big benefit. Aselsan is exporting our technology. For example, if we built the solution for Aselsan and say, for example, it's for the Pakistan Navy and Aselsan builds components of the ship, as they send off their solutions, ours is right in there with it and becomes an Aselsan product. In that same sense, for Aselsan particularly, a lot of our products for those reasons have their name on them. They don't even have NOVA Power on them; they say Aselsan, and we are fine with that.

Süleyman BAYRAMOĞLU: In the beginning of our interview, you underscored that the number of EU and U.S.-based foreign participants to the IDEF Fairs is decreasing gradually. That actually does not affect us at all because we position ourselves to contribute to the Turkish Defence Industry, especially indigenous development activities, by providing the most reliable power solutions to go with their systems. Therefore, the increase in indigenous development and the progress of the Turkish Defence Industry is an advantage for us.

Defence Turkey: Do you also provide your power solutions to Turkish Air Force (TurAF)? Do you have any business with them?

Steve ZIFF: The model we followed in Turkey is very similar to

Steve ZIFF - Nova Power Solutions President & CEO

the model that we've had in the U.S. We've been in business for over 30 years in the U.S. Our deep expertise has been in the U.S. Navy.

Defence Turkey: What kind of systems do you provide for ships? They have their own power systems such as diesel engines or gas turbines or both.

Steve ZIFF: If you take any size Navy ship, think of how many different systems they have on that ship: communications, radars, weapons, guidance, TV, etc. If you go on a typical U.S. ship and you walk the ship and see the different rooms and the different equipment and the technology, we're all over the ship. We're in nearly all of the different systems and the components, so the more technology and the worse the power, the more important it is for us. Our 30 years of success have come in large part from naval applications. When we looked at the Turkish market, we figured that we would most likely follow a similar path because we have so many success stories and our team of experts have a very strong Navy background, and as we've made success on the Navy side, just like we have in the U.S., then we start to expand to some of these other areas. While we have had a lot of successes and it's no surprise that they have been on the Navy side, we are still pursuing other areas, and we see those as areas for us to grow within Turkey.

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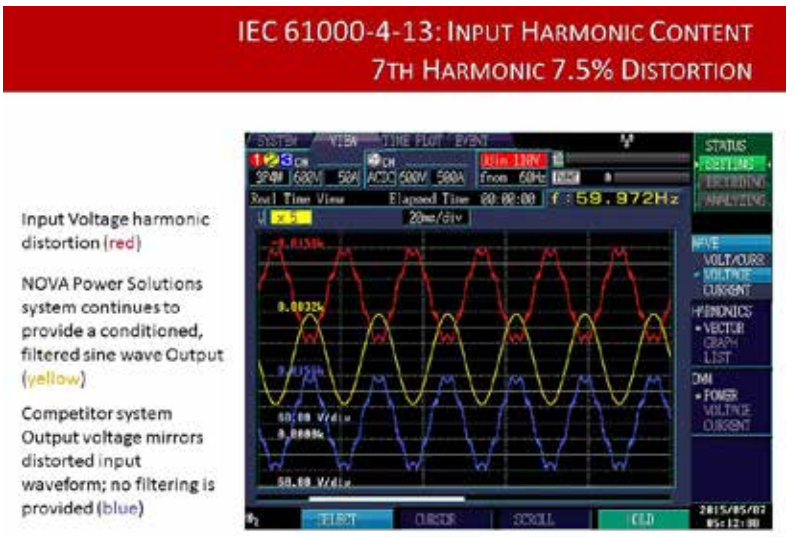
Defence Turkey: So your solutions are customer unique?

Steve ZIFF: Yes, exactly. For example, we may have had an opportunity for a SATCOM system for Turkey, and then maybe later a different system comes up with a need. While we could go and build something new, the power solution that we built for the earlier customer could very well be a good solution that requires no additional development, so we've been successful in being able to recognize when solutions we have already designed might work



in a different system with minimal adaptation.

Süleyman BAYRAMOĞLU: Our design and development processes are compliant with relevant military standards for shock, vibration, electro-magnetic interference, humidity, and very extreme environmental temperatures, from very hot areas to very cold areas, especially important for military applications that operate in harsh environments. Our products are designed to meet those standards, and we also meet the specific environmental requirements of a particular system or project. Of course, our solutions are always tested by third-party independent test laboratories and certified. We meet all the miliitary and industrial standards for electrical, EMI/EMC, and for environmental conditions.

Defence Turkey: Are you also delivering power solutions for submarines in Turkey?

Steve ZIFF: Yes, we deliver for U.S. and also for Turkish submarines as well. One thing worth mentioning when we talk about indigeonus development is that, five years ago when Turkish customers asked if we can build something in Turkey, we always said that we are committed to considering what we can do in-country as the amount of business increases and justifies it. While we have Süleyman, who lives here, we are also close to establishing in-country technical support, co-development, maintenance-type capabilities as well. We will do this ourselves; we will hire some resources. We are nearing that point and are close. We have a plan, and we have identified some resources, and it is now just a matter of execution. To meet the general requirements for all of our customers in Turkey, we currently have to ship some equipment back to the U.S., and that takes time. Soon we will be able to provide maintenance here in Turkey. Five years ago when we had almost no business, Turkish customers were understanding and quite reasonable with us about the situation. Now that we've had years of successes and future growth, we have said all along that we would make incremental investment as it made sense, and we are keeping our end of that as well.

Defence Turkey: As you have pointed out, in order to be successful you have to join the process from the beginning – and at the moment there are many Turkish Navy programs such as Reis Class Submarines, TGC Anadolu LHD, I Class Frigates, TF-2000 AWD, MILDEN, etc. Have you already joined the process?

Süleyman BAYRAMOĞLU: Not directly, but through the system integrators who are developing systems for those platforms and shipbuilding activities. We do not directly provide the systems. We are a component provider. We do not provide a standalone system. Most of the time, we team with the system integrator or the system manufacturer. Our solutions will be present on those platforms through the systems integrators that we have been collaborating with. For certain systems, especially satellite communication systems, we are a de facto power system provider for all of the Turkish Navy's satellite communication systems onboard the ship.

Steve ZIFF: So, it has become the standard, which is important, and of course our goal is to become the standard for as many of those things as possible. That might start from the satellite communications on a certain class of ship, and as they go and upgrade and put in modifications, then for other classes our product is part of that.

Defence Turkey: Have you delivered any solutions to the Turkish Air Force?

Steve ZIFF: No, not yet. However, in the U.S. we have served all branches of the military and civilian as well. We have been trying to pursue similar opportunities in Turkey.

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Nova Power Solutions INC- Aselsan SATCOM uninterruptible power system

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Defence Turkey: You have said that you are providing solutions for SATCOM systems in Turkey. SATCOM is also being employed on land platforms. Have you received any contracts from any land platform manufacturers, such as Otokar, BMC, or Nurol, for such a requirement?

Kurt WORDEN: Not directly, the platform manufacturers are not providing the SATCOM equipment. SATCOM equipment is being provided by the electronic systems integrators, and we do have work with them for land systems platforms.

Defence Turkey: You have also underlined that you are on the way to establishing a maintenance facility in Turkey to meet maintenance and upgrade requirements. Will this facility also be able to provide services to other customers in the region?

Kurt WORDEN: Yes, the map displayed in our booth and our web site shows where our products are deployed. Süleyman focuses most of his time in Turkey, he also has responsibility for the broader surrounding region, including service and support.

Defence Turkey: Do you have any plans to establish a partnership or joint venture, or just to stay as a standalone company? Or do you have plans to buy a Turkish company in this field?

Kurt WORDEN: We are interested in finding a partner that is compatible with our business, but finding the right partner is difficult in a niche market. We have looked at a couple of different companies, and we are having discussions with some and will see where it goes.

Steve ZIFF: Obviously, our business model is very collaborative, so we form a lot of partnerships. In some of the areas where we lack certain expertise we will partner with others, and I think every time you talk about a partnership it can have many different forms. A partnership can be simply transactional in form, or it can be a little broader from a collaborative business pursuit perspective, or it can be something even more intertwined that takes on more of an investment aspect or a joint venture or something like that, so we will consider all types of partnerships as we progress in this phase. We are only seven years into our relationship in Turkey, and for us to continue to have success and grow, we are constantly revisiting our approach and our model, and those things that you have suggested are things that we are considering all the time.

Defence Turkey: What about your supply chain? Do you have any Turkish companies in your supply chain?

Steve ZIFF: That's very much in the mix as well. For us, while we currently do 100% of our manufacturing in the U.S., the hard step is to go from zero in Turkey to something. It's not necessarily that we are going to shift to doing everything here; we will do what makes sense. As Süleyman said earlier, we have all the quality control processes – the military standards and the testing that needs to be done – back in the U.S., and how do you replicate that in another country from a manufacturing perspective? However, we may be able to improve the supply chain side of things. From an investment perspective, we have customers across the globe that we spend time with and try to pursue, but nothing at the same level as in Turkey. The investment that we have made here is far and away the most significant investment we have made.

Defence Turkey: Since you're going to make an investment in Turkey, have you contacted the SSB to make business/investment easier and to get info, such as info on tax benefits?

Steve ZIFF: I don't think we've had those conversations. Up until now, we haven't had a lot to talk about

because we were still very early on, but as we potentially invest on the service, maintenance, and support side, we will certainly want to let them know, and if there are things that they might be able to help with, we would be glad to take their assistance.

Süleyman BAYRAMOĞLU: As far as I know, that will be on the table when we decide to do some co-development or co-manufacturing activities, and right now we are in the process of finding the right model. The maintenance and support are separate from this. When we decide to do some local manufacturing, to move some of the manufacturing efforts to Turkey, of course we will try to get at least some technical support, not financial support, and some recognition from the SSB.

Kurt WORDEN: One of the challenges that we have, not specific to Turkey but across the board, around the that there are a very limited number of component manufacturers. Most component manufacturers are located in Asia; China, Vietnam, Taiwan, etc. While you were conducting the earlier part of the interview, I was searching the IDEF exhibitors for new component manufacturers. I didn't find any. Finding Turkish component manufacturers (not distributers) of individual components is desired, but difficult. Would we use them if we found them? Probably. This is a challenge for us.

Steve ZIFF: If you look at electronics in a circuit board, almost all of those components are manufactured in China, Vietnam, Taiwan, etc. Everyone is buying them from the same place. Of course, the value is what you do with those when you put them together if you are making electronics. We were able to buy those components in enough volume and have relationships that we could get them at a good price and in a relatively quick timeframe. We don't know what the actual benefit of investment in local component manufacturing would be to the process.

Defence Turkey: Can you share some figures from the business volume in Turkey?

Steve ZIFF: Last year, in 2018, Turkey represented 15% of our overall revenue, the U.S. represented 80%, and 5% was other international business. When we made the investment to at least investigate the Turkish market back in around 2012 or 2013, we knew that it would take some time. I don't think we saw our first revenue until 2015-2016. It was two, three, four years of nothing, and now it is 15% of our business and growing. Those were the expectations that we had going in. Half the battle going in is making sure that your expectations are right. We don't say, 'Alright, Süleyman, you're on board, on day one we need a lot of revenue.' We knew that it would take time and investment, and continued investment in things like attending this event, working with your magazine, are important for us to continue to grow our presence here and create a service organization.

Defence Turkey: Ministry of Interior, Turkish Police, and Gendarmarie—do you do business with them?

Kurt WORDEN: Our direct involvement with the Government is fairly minimal; most of it is through integrators. We are a subsystem supplier, not a complete capability provider. We provide a subsystem that allows for indigeonous Turkish design to proceed at a faster, more reliable rate.

Steve ZIFF: It's been mostly defence so far. If the integrators that we are working with are defence or if they happen to work in other non-defence areas, then those of course are areas that we want to pursue with them. Public

Safety is an area that we have expertise in, along with transportation, rail, and those kinds of things. For example, a public safety vehicle, a train, a bus – it is very important for all the systems there to function without interruption. Those vehicles are not plugging into the wall as their power source, and a public safety vehicle is no different from a tank from that perspective. These are mobile vehicles, and they have critical technology that needs to function.

Defence Turkey: Do you also have products for electrically powered or hybrid military platforms?

Kurt WORDEN: Yes, but not from the perspective of power storage or dispersion to the main drive train. What we will do is ensure that the subsystems continue to receive the power that they are supposed to receive during high discharge applications of the vehicle's primary storage.

Steve ZIFF: No matter what the power source is – solar, wind, it doesn't matter – it is about how that power is going to feed those systems.

Defence Turkey: So what about space platforms? Do you have power solutions also for space platforms?

Kurt WORDEN: We don't have the capability in space platforms. We do currently at the ground level with space control, but nothing in space as of now.

Steve ZIFF: We are working on it, but the issue there is that airborne has another set of standards, and intentionally we have not pursued that area. We are actually working with a Turkish engineering firm to potentially get those airborne certifications. To give you an example, while we been doing business here in Turkey for seven years, there was a U.S.-sponsored trade mission in February that we participated in. Some might wonder, why are you on a trade mission when you already know the market? Well, that gets us great exposure to other companies. On this trade mission, we may have met a firm that has engineering capability for airborne, and then we may have followed up with them, and we might have seen them here at IDEF. So, pursing through IDEF, through U.S. trade-based activities, and through regular follow-ups, we have identified a possible partner to help us with that, and if they can help us with our airborne capabilities here in Turkey, we can use that back in the U.S. as well. That is a great example of a relationship that can have a significant effect for both organizations.

Defence Turkey: In conclusion, would you like to add a message to our readers about your future activities and objectives in Turkey?

Steve ZIFF: I think that we attempt to put our blinders on and not worry about the politics of the day between our countries or the world and instead focus on what we do. We are very confident that we have done a good job in establishing a strong reputation here. We have educated the Turkish market as to why they need our technology, why it is critical for them, and we fully expect to continue on a growth path for many, many years to come, and we think it is a very strong market for us. We will definitely be at IDEF '21.

When we are working closely with a team, when they get ready to go through some of their testing, obviously they are not testing our product on its own. They are testing it in conjunction with all the systems. And often times, as with any testing of electronics, things don't work right the first time, and we are very much involved in helping them troubleshoot. Most times the problems are not with our product but with something else – some configurations, some interactions – and we are able to help them identify what those issues are. Sometimes the answer might be a configuration change on our end because the information they gave us six months ago about their load systems or power needs is no longer accurate because they have made design changes along the way. For example, maybe they swapped something out and it has more power needs or less power needs, and suddenly things aren't configured exactly perfectly or there are issues with how one of those other systems interfaces with our product, so oftentimes we are helping them through those types of challenges. We are not just selling them a component and saying, go ahead, good luck. This has been true in the U.S., and I think we would see it here in Turkey also – if customers were asked about NOVA Power, they would say two things: product quality, and service and support. When they call, we answer. When they email, we answer. When there's a possible problem that may not even be related to us, we answer. If there's something that is not even related to us but they want our advice, we answer. Our products are very reliable, our defect rates are very, very low, even in Turkey so far. We have very, very few issues. We take a lot of pride in quality and our support service. I think most customers would answer the same way when asked about us.

Kurt WORDEN: You have asked about last words. We are very excited about the potential of the market in Turkey and the potential for us to bring Turkish content to other parts of the world. I am extremely excited about the ability to work with particularly Turkish engineers because they are very good, and I am also excited about the ability to grow our business with some capabilities that we don't currently have.

Defence Turkey: Will you be here at IDEF '21, perhaps with a local company?

Steve ZIFF: That could very well be.

Kurt WORDEN: Inşallah.

Defence Turkey: Thank you for sharing your time for our readers ■

Kurt WORDEN, İbrahim SÜNNETÇİ, Süleyman BAYRAMOĞLU and Steve ZIFF gathered at IDEF'19

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 saglamak 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 teçhizatlı piyade taşıma kapasitesine sahip bir helikopterdir.

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

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by İbrahim SÜNNETÇİ

Turkish Defence Industry's Latest Indigenous Solutions Make their Debut at IDEF'19!

Organized by TÜYAP Tüm Fuarcılık Yapım A.Ş., the 14th International Defence Industry Fair [IDEF' 19] was held under the auspices of the Presidency of the Republic of Turkey, hosted by the Ministry of National Defence and executed under the management and responsibility of the Turkish Armed Forces Foundation (TAFF) General Directorate on 30 April - 3 May 2019 across 14 exhibition halls at the TÜYAP Fair and Congress Center in Beylikdüzü, Istanbul and at the West Istanbul Marina zone where 7 ships of the Turkish Naval Forces and Coast Guard Commands were displayed. The International Defence Industry Fair was held for the first time in 1987 under the title IDEA and since 1993 it started to be organized under the auspices of the TAFF and was renamed IDEF

Qualified at the same time as the 'Eurasian Meeting' since 2009 - when it started to be organized in Istanbul and was considered to be one of the top five worldwide Defence Industry Fairs and as the greatest Defence Industry Fair of the Eurasia region, IDEF has been gathering local and foreign Defence Industry professionals under a single roof. The Ministry of Foreign Affairs, Ministry of Treasury and Finance, Ministry of the Interior, Ministry of Culture and Tourism, Ministry of Industry and Technology, Ministry of Customs and Trade, Ministry of Transport and Infrastructure, Turkish Armed Forces General Staff, Land Forces Command, Naval Forces Command, Air Forces Command, Presidency of Defence Industries (SSB), Gendarmerie General Command, Governorship of Istanbul, General Directorate of Security, Coast Guard Command, Istanbul Metropolitan Municipality, the Union of Chambers and Commodity Exchanges of Turkey (TOBB), Small and Medium Enterprises Development Organization (KOSGEB) and the Defence and Aerospace Industry Manufacturers Association (SASAD) were among the institutions supporting IDEF' 19 this year, which was held under the auspices of the Presidency for the second time.

According to the data provided by TÜYAP the company that organized the event, 587 members of 151 delegations from 70 countries and 3 international organizations attended the 14th International Defence Industry Fair IDEF' 19, which is a crucial opportunity in terms of the exhibition of high technology products in the world

and development of cooperation facilities between local and foreign participants. 15 Ministers, 13 Chiefs of General Staff, 4 Deputy Chiefs of General Staff, 1 Land Forces Commander, 2 Naval Forces Commanders, 3 Air Forces Commanders, 2 General Directors of Security, 4 Coast Guard Commanders, 15 Deputy Ministers, 13 Undersecretaries and equivalents were among the delegation members in charge of the Defence procurement of the countries. Whereas, at IDEF' 17, from 67 countries and 2 international organizations a total of 637 delegation members of 133 delegations composed of one President [Ernest Bai KOROMA, the President of the Sierra Leone - a West African country], 26 Ministers, 17 Deputy Ministers, 6 Chiefs of General Staff, 5 Deputy Chiefs of General Staff, 10 Force Commanders and 14 Undersecretaries who are in charge of the procurement of their countries' defence needs attended. Over 90 delegations from over 60 countries were invited to IDEF' 19 by the SSB.

The event was launched on Tuesday, 30 April 2019 with the participation of President Recep Tayyip ERDOĞAN, Vice President of Turkey Fuat OKTAY, Minister of the Interior Süleyman SOYLU, Minister of National Defence Hulusi AKAR, Minister of Industry and Technology Mustafa VARANK, President of the Defence Industries Prof. İsmail DEMİR and many foreign representatives, and a total of 1,061 companies/company representatives composed of 481 local and 580 foreign companies from 53 countries attended according to the data provided by TÜYAP.

From 50 countries, 503 foreign and 317 local, a total of 820 companies and company representatives attended IDEF' 17. Followed by local and foreign 394 press members from 26 countries, IDEF' 19 Fair was visited by a total of 76,010 people composed of 71,082 local residents and 4,928 foreigners. Delegations, personnel from the Ministry of National Defence, Ministry of the Interior and other relevant institutions/associations in addition to employees of the Defence industry and security companies as well as academicians and university students were among the visitors.

The IDEF' 17 Fair was visited by a total of 65,782 people from 116 countries and 5,028 people out of the total visitors were foreigners and the remaining 60,754 were locals.

At the IDEF' 19 Fair which is an international specialized fair in the areas of the Defence industry and military aviation, interview offices were available to 29 authorities from the Ministry of National Defence, Turkish Armed Forces General Staff, Service Commands, Presidency of Defence Industries, Gendarmerie General Command, General Directorate of Security and the Coast Guard Command. In line with the data provided by TÜYAP, nearly 2,700 (79%) out of 4,026 planned interview/stand visits by the interview office authorities, delegations and participant companies were realized. At IDEF '17, interview offices for 28 authorities from the Turkish Armed Forces General Staff, Ministry of National Defence, Service Commands, Gendarmerie General Command, Directorate General of Security (EGM) and Coast Guard Command (SGK) were available and 83% of the planned interview/stand visits by the interview office authorities, delegations and participating companies were realized.

Moreover, at the Fair, at the stands launched by the departments of the Ministry of National Defence and Ministry of Interior, the weapons and equipment in the inventory of the Turkish Armed Forces and Law Enforcement Offices were displayed, 7 surface platforms of Turkish Naval Forces Command (TNFC) and Coast Guard Command were opened to visitors at the West Istanbul Marina in Yakuplu, Beylikdüzü. Throughout the Fair, over 20 country delegations visited the Marina and gathered information from the officers on the displayed naval platforms. On the other hand, at IDEF' 17, 8 naval platforms and systems built at civilian and military shipyards in Turkey and that are within the inventory of the TNFC and the Turkish Coast Guard were either displayed as anchored off shore or exhibited statically at the pier at the Bay of Küçükçekmece.

100 signing ceremonies and 9 meetings/launching meetings were held during the Fair. The Ministry of National Defence's activities

were accomplished on the second day of the Fair and on the third day the Ministry of the Interior's Promotion Day was held. At the Suppliers' Zone allocated within the Fair area, representatives of the Supply/Procurement/R&D departments of major companies and small scaled manufacturers were gathered on the 2nd, 3rd and 4th days of the Fair creating an environment for the development of cooperation opportunities. Four panels and eight presentations on various contemporary issues were accomplished on the 2nd, 3rd and 4th days of the Fair as well. Furthermore, a Career Day was realized on the 4th day of the Fair enabling contact between university students and the staff from human resources departments of the participant companies.

The opening ceremony of the 14th International Defence Industry Fair, IDEF' 19 was honored by the President of the Republic of Turkey Recep Tayyip ERDOĞAN and accompanied by the delegations and the Ministers officially invited to the Fair from the foreign countries, the President led the ribbon cutting ceremony. Following the opening ceremony, President ERDOĞAN visited the stands of certain countries with the accompanying representatives and gathered information on the displayed products.

The next Fair, IDEF' 21 International Defence Industry Fair is expected to be launched again in Istanbul in April 2021.

Our Comments on the IDEF' 19 Fair

Covering all industrial branches either directly or indirectly related with the Defence Industry, IDEF is a critical promotion center and an international market both for our country and other participating countries and Defence industry companies.

The IDEF' 19 Fair is a crucial platform where the small and medium sized enterprises as well as the major companies contributing to the Defence industry with their products and services seize the opportunity to introduce their facilities and capabilities to the procurement committees of Turkey and the world. Just like the previous years' fairs, Aselsan and Turkish Aerospace (TUSAS) had the largest participation to IDEF' 19 and both companies displayed many products and platforms at both indoor and outdoor exhibition areas. On the other hand, Roketsan broadened its participation this year and the company's exhibition of a few new products, which have not been introduced to the public drew attention. ATMACA Surface - to - Surface Guided Missile developed for the TNFC was among the products introduced at IDEF' 19 at Roketsan's stand for the first time. The serial production contract regarding the product was signed in November 2018.

Despite the fact that international participation in the Fair seemed to considerably increase according to the figures and compared with the

ATMACA Surface- to- Surface Guided Missile

previous fairs, due to the political atmosphere and the political tension arising from F-35/S-400, companies from the U.S. and Europe such as Boeing and BAE Systems did not attend the event, while certain companies displayed a low level of presence. After the second day of the Fair, particularly U.S. companies almost emptied their stands. The rumor had it that Lockheed Martin decided to attend the Fair at the very last minute and even the poster of the F-35 Lighting II Aircraft was not displayed at the company's stand. On the other hand, the representatives from European companies wishing to take part in the ongoing indigenous development projects in Turkey seized the crucial opportunity to conduct negotiations towards building cooperation with the Turkish authorities and potential partners at the IDEF '19. It has been interesting to see that a critical part of the representatives within the visiting delegations were from the African, Middle Eastern and Asian countries that are also Turkey's target markets regarding Defence industry exports.

Many companies, mostly the main contractors put forward their proposals regarding products and projects towards the projects that were not launched and potential requirements that may come up on the agenda in the future, instead of the products and solutions geared towards the existing contracts and placed orders. This has been another interesting development as part of the fair. With such an approach, the companies, especially the major companies that are also main contractors have put forth an effort to create a demand towards new local orders/contracts and trigger the procurement process in a sense.

According to the Performance Report of the Year 2018 prepared by the Defence and Aerospace Industry Manufacturers Association (SASAD) the total employment of the Turkish Defence and Aerospace Sector was 67,239 people (44,740 in 2017). This industry achieved a turnover of nearly US$ 8,761 Billion, imports of US$ 2,449 Billion (approximately 36% of the turnover) and almost US$ 2,189 Billion in exports in 2018. It is useful to underline that Turkish Technic and ASFAT data has been included in the data of 2018 for the first time, unlike previous years. According to the data provided by the Turkish Exporters' Assembly (TİM), the Turkish Defence and Aerospace Sector realized exports of US$ 1,282 Billion between 1 January 2019 and 30 June 2019, in other words in the first six months of the year. Though this figure represents an increase of 41,4% (US$ 907 Million) compared with the same period of 2017, it remained below the target of US$ 1,5 Billion. The exports of Turkish Defence and Aerospace Sector is expected to reach US$ 3 Billion by the end of 2019. The U.S. took the lion's share of the aforementioned exports with the export of US$ 404 Million containing air platform airframe and engine parts and components sales mostly conducted under off-set commitments. Germany remained on the third rank with US$ 122,4 Million after Qatar (US$ 134,6 Million). Therefore, as it failed to achieve the targeted figures in terms of exports, the Turkish Defence and Aerospace Sector is still dependent on the potential orders from the internal market and it even made a considerable leap in export revenues with particularly the indigenous product/platform sales in the recent period, and the greatest part of the Defence industry is still being actualized under off-set commitments. On the other hand, the level of the foreign dependency observed in the critical sub-systems and components within the indigenous products developed by domestic companies, mostly the power packs and ballistic armors, should not be underrated. In line with the data of 2017, merely US$ 500 Million of the Turkish Defence and Aerospace Sector's exports valued at US$ 1,7 Billion was achieved through the sale of indigenous products and the remaining portion was actualized with the revenue collected with the parts sold as part of off-set commitments. Indigenization activities continue in order to further increase the domestic participation ratio within the indigenous products. Critical progress has been achieved within the scope of the development of an indigenous power pack and for instance the diesel engine manufactured by Tümosan will be used in the SPTWAP (Special Purpose Tactical Wheeled Armored Platforms) to be produced by FNSS. Moreover, a crucial step was taken towards the local production of the armor steel used in the tactical wheeled armored vehicles. According to the information received, the production of indigenous armor steel with an annual capacity of 13,000 tons will be launched at the new factory/facility named as MİLUX OY, which will start its activities in Manisa as part of Erdemir as of July 2019. The production capacity is planned to be increased to 20,000 tons annually after the year 2020. The raw material of the flat steel to be

Tümosan TMSN X 7.5 6-cylinder 2-stage turbocharged Common Rail Diesel Engine

manufactured and processed at MİLUX OY facilities will be supplied from Erdemir and the production technology will be transferred from the MİLUX Company purchased from Finland by OYAK. The initial armor steel sheet metal samples were displayed played at the company's stand during IDEF' 19.

A major increase was seen in the participation of sub-system, parts and components manufacturers SMEs in the Fair and the reduction of the stand costs/m2 fees down to affordable levels by the cooperation of the SSB - TSKGV played an essential role in this increase. This increase seen in the participation of SME companies is being evaluated as a positive indicator in terms of the sustainability and horizontal and vertical extension of the sector. Then again, the interesting fact in the participation of the SMEs is that due to the focus of companies in certain activity areas the sub industry and supplier eco system in certain critical areas of technology with high foreign dependency failed to mature to a sufficient level. For instance, the number of SMEs active in areas of structural design, composite material, machining has been much more common than the number of SMEs active in areas such as electronics, software and sensors. This picture indicates that the sub industry and supplier eco system towards the structural parts of land vehicles, ship building and air platforms have reached a certain level of maturity and competence while the planned level of the eco system for the sub industry and suppliers regarding electromagnetic and electro-optical sensors, micro-electronics and advanced material technologies areas failed to be achieved. In a way, this non-proportional distribution signals that the foreign dependency observed in the critical sub-systems and components utilized in indigenous products developed by local companies could not be decreased to the desired levels, and we assess this as a problem that needs to be considered.

President of Defence Industries İsmail DEMİR's Assessments on the Fair

Stating that IDEF' 19 was conducted with a very broad participation DEMİR said that at the fair, which was executed with the participation of over a thousand companies from over 60 countries, the distribution of local and foreign participation was almost equal. Telling that a total of 1,061 companies with 153 delegations from 71 countries attended the Fair and that they held 49 high-level President of the Defence Industries (SSB) Prof. İsmail DEMİR evaluated IDEF' 19 and answered questions at the press meeting held on the last day of the Fair, 3 May 2019.

Delegation and bilateral cooperation negotiations as the Presidency, DEMİR added that 75 signing ceremonies in forms of signing Good Will Agreements, Memorandums of Understanding and Cooperation Agreements were executed.

DEMİR expressed that in terms of exports, a Medium Weight Tank Serial Production Contract between the Turkish Defence Industry company FNSS and Indonesian PT Pindad company, a contract on the procurement of thermal cameras for the SKIFT Anti - Tank Missile System between Aselsan and Ukrainian company STE, software based military type radio procurement contract for fulfilling the communication needs of the Ukrainian Armed Forces between Aselsan and STE and a Cooperation Agreement on Defence Industry between Republic of Turkey and Republic of Guinea were signed.

Stating that this event constituted the defence industry's display in Turkey, DEMİR continued: "The participants and delegations observed the impressive level that Turkey has reached and spoke very highly of our achievements. Especially the countries that do not know Turkey really well and the people who did not attend the Fair before underlined their astonishment at what they saw. And this once again proved that we need to exert more effort regarding the promotion of our country and our Defence industry, because our existing capabilities may not be known very well. Such a perception is created on the basis of the fact that our country has not been a Defence industry exporter throughout history, but everyone can see now that this fact has changed, and Turkey is taking part in this area as a player as well".

DEMİR underlined the limited participation of the major foreign companies and said, "My comment regarding this is as follows: They either did not need to make their presence felt with the understanding that they would not be able to sell their goods easily to Turkey anymore or they might have thought that our products would perhaps out shine theirs in this environment".

Mentioning that a total of 130 activities were conducted together with the product and project introductions throughout the Fair, President of the SSB DEMİR pointed out the importance of this figure. DEMİR noted that the activities on the promotion of the Defence industry and on exports will continue.

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Serdar Demirel - VP of Defence Industries, Prof. İsmail DEMİR - President of SSB and Ali Kerem ESKİGÜN - Press Secretary of the President of SSB

Responding to questions on the popular products of the Fair, DEMİR stated that the new products regarding unmanned air vehicles and helicopter platforms, electromagnetic cannons, various laser capabilities, the variety of land vehicles, armor steel, and several engine and power pack solutions stood out. Noting that they observed products types regarding unmanned land vehicles, DEMİR stated that cyber security products, types of software, ÖZGÜR Project, digital cockpit of HüRKuŞ, radar, missile, ammunition and light weight weapons were followed with attention as well.

When reminded of the comments of the U.S. on Turkey's procurement of S-400s, President of the SSB stated that Turkey had made its decision and acted accordingly. Telling that they were ready to hear about the logical and technical arguments claiming that F-35 and S-400 could not remain together and adopt the required measures in case there were any risks, DEMİR said, "They did not want to make even a single negotiation on this subject or any studies to this end so far. We are expressing that we took the measures required for the functioning of these systems in a way compatible with Turkey and our own software and identification for friend or foe systems. I do not know what to think if this point fails to be understood. We now believe that they do not wish to understand this fact. If they form a technical committee then please let them show us the risks and dangers. They do not know anything about the measures we took, and they do not tell us what the danger is".

DEMİR's answer to a question on how the reports and achievements of the sector looked was as follows: "When a comparison is made with the previous Fairs, there is an obvious improvement. There is an increase especially in the SME level participation. We collaborated very closely with the TSKGV who undertook the logistical organization of the Fair in order to reduce the costs regarding the participation of the SMEs to this event. The participation of the SMEs to this Fair is quite critical in terms of making their presence known. At this point, we were only concerned if we neglected or ignored any SMEs waiting for our support. We are really very sensitive about this. We believe that Turkey has to display all its capabilities both in this environment and in future gatherings. Some activities may be repetitive, but we do not have any time or money to waste. Therefore, a structure that creates synergy is required. To this end, we wish to implement more initiatives regarding regulating the sector. We will be following the sector more closely."

President of the SSB, DEMİR's expectations from IDEF' 21 are as follows: "While we wish IDEF' 21 to be more attractive and have a broader participation, we also expect it to become an environment where the performance of the products we are now able to observe to a certain extent is fully demonstrated. Especially, being more open in terms of international participation is critical for us in terms of increasing the number of delegations and participants. We wish to have a much more attractive IDEF '21 in terms of venues, logistical facilities and additional activities".

News from the Companies at IDEF' 19

Aselsan

As in the previous Fairs, Aselsan was the greatest participant at IDEF this year. Presently conducting exports to 65 countries and compared with the same period last year increasing its sales revenues by 46,4% and its profit by 79,1% by achieving a sales revenue of TL 2 Billion in the first quarter of 2019, Aselsan hosted visitors with the most attention-grabbing stand at IDEF this year. Company's stand contained Aselsan's vast range of products and its solutions varying from renewable energy to communication as well as its brand-new products introduced for the first time. Aselsan also displayed the FIRAT-M60T, RAKAS and MUKAS, MİLKAR-4 HF-ET System, new generation Radar Electronic Attack (REDET), SERHAT Counter Mortar Radar installed over COBRA II Tactical Wheeled Armored Vehicle, KALKAN II ADR and the modernized 35mm Oerlik on GDF-003 towed guns in the outdoor exhibition area.

Equipped with new and various introduction capabilities by using up to date technologies and hosting over 300 products together with brand new solutions, Aselsan's stand also hosted over 50 high level foreign committees including Chiefs of General Staff, Ministers of Defence and Force Commanders throughout the Fair, in addition to many visitors.

Moreover, Aselsan signed a series of critical agreements during IDEF' 19. The most attention-grabbing ones were the contract with a total value of EUR 840,986.250 Million signed under the ALTAY MBT Serial Production Project and the contract on the Low Altitude Radar System Project valued at TL 450 Million and signed as part of the demands of the Turkish Air Forces Command (TurAF).

Within the scope of the contract on the ALTAY MBT Serial Production Project valued at EUR 3.5 Billion signed with the Main Contractor BMC, Aselsan will be delivering the following, noted below to ALTAY T1 (40 tanks) and ALTAY T2 (210 tanks) tanks and the prototype of ALTAY T3.

- Tank Fire Control System
- Tank Command Control Communication and Information System
- Remote Controlled Weapon System
- AKKOR Active Protection System
- Tank Driver Vision System
- Tank Laser Warning System
- Combat Area Recognition and Identification (IFF) System
- Close - Range Surveillance System

In line with the contract, the company will also be conducting the delivery of the products required for the training tools to be formed for the user/maintenance training of the aforementioned systems.

The overall/regional air and missile Defence of Turkish sovereign airspace (Turkish Air Forces has to see and know 300ft and over [up to infinite space] and establish the acquisition, identification, tracking and destruction capabilities in an ideal duration of 1.5 minutes or within maximum 5 minutes) and the operation field is being executed under the guidance and overall coordination of the TurAF. The real time air picture of Turkish sovereign airspace is composed by over 30 early warning radar sensors in fixed and transportable configurations organized under the Air Control Group Command, 7 Control and Reporting Centers/Posts (CRC/CRP), 4 E-E7T Airborne Early Warning and Control [AEW&C] Aircraft regarded as force multipliers operating under the auspices of Airborne Warning and Control Group Command [131st Fleet Command], ground based air Defence weapon systems of the 15th Missile Base Command [with Nike Hercules and HAWK XXI Systems. They will be supported with the S-400 Triumph Systems the deliveries of which started in July] and the Tactical Data Link Systems that enable the command and control between these systems. **The Low Altitude Radar (LAR) System Project** was launched in order to cover the low altitude and medium/long range areas that cannot be covered by the Early Warning Radars and the areas that cannot be covered during the breakdown of the Early Warning Radars in the air surveillance picture. To this end, under the contract for the LAR System Project signed between the SSB and Aselsan during the IDEF Fair, the procurement of 5 Low Altitude Radar Systems was determined. On account of the technology it owns, Aselsan will be completing the Project within only 3 years and the first LAR System in a mobile structure (will be carried over a tactical vehicle with 8 wheels) with an AESA type antenna that will function at the S-Band frequency (the same frequency band with EIRS) will be delivered to the TurAF in 2022. According to the information we received, the delivery of the remaining radars is planned to be accomplished at intervals of 6-8 months.

During the Fair, Aselsan also launched the **Close-In Weapon System for the GÖKDENİZ Naval Platforms** (CIWS), which used to be known as KORKUT-D, one of the latest products of the company's know-how and experience in the area of air defence.

The GÖKDENİZ CIWS System was designed and manufactured by the cooperation between TÜBİTAK - SAGE and MKEK (Mechanical and Chemical Industry Corporation) and Aselsan was the Main Contractor of the project. GÖKDENİZ CIWS System was equipped with Airburst Munition (ParM/ATOM) programmed with '35mm Mod 95 Airburst Munition' code by MKEK. The system will enable the most effective air defence against anti-ship guided missiles, Unmanned Air Vehicles (UAV), Aircrafts and Helicopters. It will be efficient against

close asymmetrical surface naval threats as well. GÖKDENİZ will be able to conduct target acquisition, identification, tracking and destruction fully autonomously. The 3-Dimensional Search Radar, Fire Control Radar and E/O sensors within the system will enable the efficient utilization of GÖKDENİZ at night and under adverse weather conditions. The system could be operated under the control of an operator and it is also able to fulfil its tasks fully automatically, without requiring the intervention of an operator. With the help of the Automatic Linkless Ammunition Feed Mechanism within the system, munition in two different types could be fed to the system and switching between munition types is possible. GÖKDENİZ demonstrated its capabilities at the ballistic tests conducted in May 2018 with the support of the SSB and the TNFC; a high-speed target aircraft simulating a guided missile attack was fired and crashed during this test.

Utilizing the matured sub-systems of the KORKUT Self Propelled Air Defence Gun System, the serial production deliveries to Turkish Land Forces of which started in March 2019 (3 Weapon System Vehicles and 1 Command Control Vehicle), GÖKDENİZ was adopted to sea conditions during the development process and was brought to a size capable of being installed within the I Class Frigates. Different from KORKUT-D, the barrel of the gun is stabilized at the back of the turret and the swept area was narrowed. The same weapon and ammunition (MKEK/ÇANSAŞ product 35mm KDC-02 automatic gun) is being used by KORKUT and GÖKDENİZ. A total of 200 ammunitions could be carried in the the ammunition boxes at the right and left sides of the front of the GÖKDENİZ CIWS turret. According to the information we received, on account of the smart ammunition utilization, GÖKDENİZ could be effective at lower ammunition different from the other CIWS systems such as the rapid shot Phalanx and Goalkeeper CIWS. It has been mentioned that 200 missiles are sufficient for an average of 5-6 engagements including the supersonic anti-ship guided missile types. In case the ammunition in the boxes runs out, the ammunition feed is actualized simultaneously by two personnel from the lids at the sides. The ammunition could be fed to the turret again in less than a total of 10 minutes in the form of ammunition clips of five pieces.

GÖKDENİZ CIWS System

The indigenous electrical servo systems manufactured by Aselsan are being utilized in GÖKDENİZ. The top part is fully independent from the turret and it is stabilized. The turret is already stabilized. The Automatic Linkless Ammunition Feed System is similar with the one in the KORKUT System. In fact, it is the same sub-system but while KORKUT features a feeder mechanism under the armor without getting out of the vehicle, in GÖKDENİZ the missile feeder mechanism is designed in a way to feed over the turret from the top. The reason behind this is based on the requirement for not allowing penetration to the deck of the ship as not all ships have under-decks available for penetration. For example, the under-deck of the I Class Frigate does not allow penetration.

As all the sub-systems are placed within the turret and since power-related units are located under the turret, GÖKDENİZ CIWS could be easily installed to a surface platform as it also does not require any penetration to the under-body/ under-deck. Expressed that it could be installed over the ship and availed directly to utilization, GÖKDENİZ CIWS is capable of operating fully autonomously according to the selected configuration with the MAR-D Search Radar over it as well. MAR-D is the same with the land version, yet there is an increase in the angles of its coverage area. After MAR-D accomplishes its target acquisition, the system tracks the anti-ship guided missiles targeting the ship. Then it utilizes the E/O camera and radar in a hybrid form, heads toward the target and processes the shooting decision. According to the information we gathered, GÖKDENİZ CIWS is integrated to ADVENT and GENESIS CMS, too. One of the two operator consoles on the system is designed in the structure of a remote console integrated to the CMS, and the other is designed in order to be located at the selected region as the own weapon console of GÖKDENİZ. The full control of the system could be accomplished over both consoles.

The data collected by the search radar over GÖKDENİZ could be utilized also for the other weapons over the ship. It is possible to transfer these data to the CMS. The tracking radar could also be used in order to direct another weapon. The system could receive engagement via other radars over the ship with the data provided by the CMS and head towards the target. It could fire the target displayed by the other E/O sensors over the ship. This capability constitutes the most critical feature of GÖKDENİZ compared with other CIWS systems. Moreover, GÖKDENİZ is capable of executing surface naval

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threat engagement via the radar and E/O radar both over the ship and over itself. In fact, the main reason behind the system's being named as GÖKDENİZ (SKYSEA) is its capability of engagement to targets in the sky and at sea.

Even though such capability does not exist in our country yet, the utilization of a single barrel, revolver type rotary feeder weapon system as the one used in the Millennium CIWS manufactured by Rheinmetall is possible in the GÖKDENİZ System. In this case, as the single barrel will cover less space, the volume of the turret will be decreased to a certain extent and the weight of the system will be reduced. Although, the presently utilized double barrel KDC-02 automatic gun has certain advantages. The twin gun is critical in terms of redundant operations, the firing continues with the single barrel when the gun is stuck. Another advantage is that the measures should be adopted, and active sensors should be used for the cooling of the drum in the rotary drum weapon systems referred as the revolver type, and this complicates the weapon in terms of operation and maintenance. Though the revolver type is a higher-level weapon as they have a relatively new design and new technology, as the single barrel is excessively heated when fired rapidly, a water-cooling system is required for the barrel. Therefore, from a technological perspective, though it has an older design compared with the single barrel, the revolver type rotary feeder weapon in the Millennium CIWS, the KDC-02 automatic guns proved themselves and they have quite significant advantages in terms of both maintenance echelon and logistics.

Within the scope of the Capability Demonstration activity, GÖKDENİZ CIWS was integrated to the TNFC training ship TCG Sokullu Mehmet Paşa (A-577) in 2018. The depression angle of -5 was sufficient as it was an on-board configuration at the KORKUT turret. But when it was installed over a ship, it was observed that the -5 degrees was not convenient for compensating the swaying of the ship. Therefore, the turret was placed over the ship in an inclined position. In line with the information we gathered, this layout configuration was only used for the tests over the TCG Sokullu Mehmet Paşa training ship and no such demand is in question for the time being. In its current form, the GÖKDENİZ CIWS turret is capable of descending and ascending to -15 and +85 degrees. At the ballistic tests carried out on May 4, 2018, two types of shooting - slow and fast targets - yet 3 types of targets were used. Two types of slow targets were shot and within this scope a target similar to the Harpoon Surface to Surface Guided Missile was shot as well. Over 6 drones were shot down during the shooting of the slow targets. The rapid target conducting sea-skimming simulation and approaching the ship under 50 feet (15,24m) with high speed was shot twice (the Banshee Jet 80 target aircraft manufactured by Qinetiq, with two turbojet engines with 40kg propulsion power over it and capable of executing attack scenarios at an altitude of 5m). According to the latest information we received, GÖKDENİZ is designed in a way to be effective against kamikaze drones conducting swarm attacks and supersonic anti-ship guided missiles similar to Brahmos. The design of the system is executed to fully enable efficiency against supersonic targets as well and both the target acquisition and tracking ranges of GÖKDENİZ is at the level that allows acquisition, tracking and shooting of the targets at the speed of Mach 3 and over. Analyses and simulations regarding this issue were conducted and striking probabilities were estimated. No problems occurred related to this subject. In line with the information we gathered, execution of additional ballistic tests in the near future with GÖKDENİZ CIWS is planned and also conducting ballistic tests against supersonic targets (if provided) is aimed.

The total weight of the Close-In Weapon System for GÖKDENİZ Naval Platforms is expected to be around 8,5 tons including the ammunition and two operator consoles. We learned that Aselsan is currently conducting negotiations on the delivery of GÖKDENİZ for both I Class Frigates and the DİMDEG Fleet Replenishment Ship. By the way, the very first export of GÖKDENİZ was made to one of the Turkic Republics countries. According to the information we received, GÖKDENİZ will be utilized in a corvette type platform of the related country. 80% of GÖKDENİZ is presently composed of indigenous parts, the remaining 20% is not composed of critical foreign parts and they could be provided through multiple sources. As all the critical parts of GÖKDENİZ is fully indigenous, no export-related problems are expected.

One of the products that drew attention at the Aselsan stand was the **AESA type F-16 Nose Radar** displayed in scaled model section. As you will recall, in order to replace the AN/APG-68 radars (AN/APG-68[V]5 radar exists at Block 30 and 40s, [V]7 radar exists in Block-50, and [V]9 radar exists in Block 50+) in the TurAF inventory with the new generation radars, the F-16 AESA Nose Radar Development Project Phase - 1 Protocol was signed between the SSB and Aselsan in March 2019. Aselsan is presently continuing its activities within the scope of the aforementioned project. As of May 2019, no agreements were signed for the AESA radar to be utilized over the AKINCI UAV. At the first stage, the mechanically steered nose radar will be utilized over the UAV system and the utilization of the AESA type nose radar was planned for the second stage, which will be launched after 2022.

The production of the first prototype of the F-16 Nose Radar is expected to take place in 2021. The radar is expected to become a finished product in 2023 and the TF-X Nose Radar is expected to be ready around 2025/2026. The utilization of the AESA Nose Radar manufactured by Aselsan is aimed in concern with the MMU Block-I Aircraft that will be launched to the service of the TurAF in 2028.

A scaled model of the Multi-Functional Phase Arrayed (ÇAFRAD) System to be utilized in TF-2020 Anti-Air Warfare Destroyers was displayed at Aselsan's stand as well. As you may recall, the Technology Demonstration

AESA Muti-Function Radar

Prototype of ÇAFRAD manufactured as part of the Multi-Functional Phase Arrayed Radar (ÇAFRAD) Phase-1 Project, featuring the single-sided and scaled (what is implied with scaling is related with the number of internal modules contained rather the size of the antenna) versions of Multi-Functional Radar (ÇFR-1) with the AESA antenna technology and Illuminating Radar (AYR-1) and the IFF System with a static antenna capable of electronic scanning was integrated to the Topmast Class TCG Göksu Frigate with RIM-162B Block 1 Enhanced SeaSparrow Missile (ESSM) capability in November 2018 and the ballistic tests were conducted on December 11, 2018. Even if the size of the CFR-1 and AYR-1 radar panels used in the tests appeared to be the same size as the radar panels to be manufactured as part of the Serial Production Phase, the number of T/R modules inside them was less than required. Regarding this issue, a representative of Aselsan said, "In terms of performance, we are capable of observing the scaled version of the radar. For instance, if the performance of the 100 modules is this, we can estimate the performance of the 500-module version. This was a technology demonstration and it was also verified with the ballistic test. By the way, during the ballistic tests we did not decrease the range because we used the scaled version of the radar, the ESSM shot the target at the range it needed to shoot it."

Upon the successful completion of the tests, the ÇAFRAD Technology Demonstration Prototype was uninstalled and transferred to the campus of the Naval Academy and it was reinstalled and launched for test purposes there in the first quarter of 2019.

ÇAFRAD is a system composed of three different radars operating at different frequency bands, 12 radar antennas and IFF. The Multi-Functional Active Phase Arrayed [ÇAFRAD] System with digital beamforming capability contains Active Static Type IFF with the electronic scanned array structure, Active Phase Arrayed X-Band Multi-Functional Radar [ÇFR], Active Phase Arrayed X-Band Illuminating Radar [AYR] and S-Band Long Range Radar [UMR] antennas/sub-systems. The Long-Range Volume Search Radar [UMR] will have a new EİRS based [a follow-up of the EİRS] S-Band

antenna. It was not clear whether the antenna would be utilized in the static type or in the rotary type and whether it would be placed at the mast of the ÇAFRAD's integrated antenna or independently at the back of the ship. However, the UMR was utilized in the static type and it was located around the bridge on the scaled models of the TF-2000 Anti-Air Warfare Destroyer displayed at the stands of Aselsan and Naval Forces Command. 4 X-Band ÇFR antennas remained over the mast of the integrated antenna in the ÇAFRAD System over the TF-2000 model and a total of 8 antennas were located around the bridge. The relatively smaller of these antennas at the top part are the AYR antennas while the bigger ones at the bottom are long range S-Band UMR antennas. In line with the information we received, the ÇAFRAD System which will remain on the TF-2000 Anti-Air Warfare Destroyers will be in the similar structure with the configuration over the scaled models that are stated to have a 90% similarity with the final configuration. On the other hand, activities to assess the utilization of a scaled version of ÇAFRAD on I Class Frigates such as the EL/M-2248 MF-STAR AESA radar utilized on Israel's SAAR-5 and SAAR-6 corvettes continue.

The information plate over the TF-2000 Anti-Air Warfare Destroyer model read that 7 ships would be constructed and that the first ship would be delivered in 2027. Previously, the delivery of the first ship was planned to take place in 2024. We were informed that the aforementioned delay did not occur due to the ÇAFRAD System. The date of delivery was indicated as 2027 probably in accordance with the plans of the TNFC. An Aselsan representative underlined that the ÇAFRAD System was presently ready for serial production and added that the schedule of ÇAFRAD was not a determining factor in the delivery date of TF-2000. The Aselsan representative also said that the serial production would be launched after the finalization of the activities conducted with the Bilkent University on the production of GaN chips.

At IDEF' 19, Aselsan introduced the **FERSAH Hull Mounted Anti-Submarine Warfare Sonar**, which was ordered to be utilized in the BARBAROS Class Frigates in line with the contract signed in June 2018 with the Presidency of Defence Industries. Aselsan will be the Main Contractor of the development of the FERSAH for the frigate and corvette platforms to be newly built or modernized with the support of Armelsan (a sub-contractor agreement was signed between two companies in August 2018). FERSAH is a Hull Mounted Sonar System operating at the mid-frequency band either actively or passively and its primary task is fulfilling Anti-Submarine Warfare (ASW) requirements. In addition to ASW, Aselsan FERSAH features an avoidance mode against mine like objects. The system is composed five units: a Sonar Wet End containing a cylindrical transducer array, a Connection Unit, a Power Cabinet, a Processor Cabinet and an Operator Console.

Within the scope of the contract signed as part of the Mid Life Update (MLU) of the Barbaros Class Frigates Project, Aselsan will be conducting the delivery of the FERSAH Sonar System on the 24th month (T0+24 months). The remaining deliveries are planned to be realized at periods of 6 months after the launch of the modernization of the ships. The FERSAH Sonar System will replace the AN/ASQ-56 Sonar System remaining on the Barbaros Class Frigates. The Barbaros Class Frigates will be equipped with GENESIS ADVENT CMS at the same time. An Armelsan representative with whom we had the chance to interview stated that the Aselsan/Armelsan pair would be revealing the prototype of the sonar on the 12th month and underlined that the Factory Acceptance Tests (FAT) would be launched on the 18th month, adding that the FERSAH Sonar System may be replaced with the existing sonar systems since the FERSAH Sonar System operating at

Mid-Frequency Band (1kHz-10kHz) utilizes the same sonar array with YAKAMOS-1.

In active mode, the FERSAH Sonar System is capable of detecting, tracking and analyzing submarines and mine like objects, and in passive mode the system is able to detect, track and analyzes the submarines, torpedoes or vessels with passive noise. In the FERSAH, Aselsan uses the up-to-date algorithms it used in the previous projects. As you may recall, as a passive sonar system Aselsan previously developed the ASIST Intercept Sonar System still functioning on three Ay Class Submarines and the passive sonar algorithms of the HIZIR Torpedo Counter Measure System utilized on the ADA Class Corvettes. The more improved version of the aforementioned algorithms would be utilized in the FERSAH Sonar System. In the Active Mode, the algorithms developed as part of the MATES (Mine Detecting Sonar System) and TORK Projects will be updated and used in the FERSAH.

Within the scope of the **FIRAT-M60T Project** launched for M60T AMT's more active protection against ATGM (Anti-Tank Guided Missiles) threats and terrorist organizations and for adding new capabilities to the existing systems, the Main Contract with the value of EUR 109.245 million + TL 25 million was signed between the SSB and Aselsan on 11 May 2017, and the Amendment no 1 to the contract with the value of EUR 96.7 million + TL 25 million was signed on 24 July 2018. With the amendment, the total amount of the contract reached EUR 206 million + TL 50 million. In accordance with the amendment to the contract, the AKKOR PULAT Active Protection System (APS) will be installed to 40 tanks out of 169 tanks named as M60TM that were modernized as part of the FIRAT-M60T Project, and the Telescopic Periscope System (TEPES) will be installed to 73 of these tanks. Moreover, 90 40mm automatic grenade launchers were procured in 2018 to be used in the tanks.

AKKOR PULAT APS is capable of physical destruction, it is able to simultaneously cope with multiple threats and it provides 360-degree protection capability. The system detects the guided anti-tank missiles directed towards the M60T AMT in the air with the help of the high technology radar it features and destroys them at an optimum distance before they hit the tank. Aselsan displayed the M60T AMT equipped with the AKKOR PULAT APS in the outdoor exhibition area during IDEF' 19.

FIRAT - M60MT MBT that fitted with AKKOR PULAT APS and TEPES was displayed Aselsan's outdoor static diplay area at IDEF'19

According to the information on the product's brochure, the AKKOR PULAT APS contains three critical sub-systems: The Control Panel, Power Distribution Unit and the Anti-Threat Module. A maximum 8 Anti-Threat Modules composed of a high technology product Triggering Radar and Anti-Threat Ammunition could be installed in every tank. However, we learned that recevied feedback from the Turkish Armed Forces following the operations in Syria, and as no Anti-Threat Module placement was planned over the turret, only 6 Anti-Threat Modules (2 on each of the sides, 1 on the front and 1 at the back) exist over the M60TM. The system can be switched on and off with the help of the Control Panel at the driver's cab and the Anti-Threat Modules can be activated upon request only towards the direction of the threat while other Modules could be deactivated. When the module is activated, the Anti-Threat Ammunition over it in the form of a cylindrical stick emerges out of its socket and remains outside the hull at a distance of 30-40cm. The sensor of the Triggering Radar remains on the tip of the Anti-Threat Ammunition. The Triggering Radar has 180 degrees of angle visibility and is capable of detecting the approaching threat up to 50m and calculating its angle of approach. After the estimation of the optimum intercept point, the warhead right at the back of the radar is activated for interception. The small particles emerging at the explosion of the bomb scattering around in the shape of a ring due to the cylindrical form of the ammunition directly shoots the warhead of the ATGM that constitutes a threat. After the crash, either the warhead is disabled or the formation of the gel effect (at the HEAT type warhead) is prevented. As the explosive moves 35 degrees upwards after the explosion, it could prevent the ATGMs capable of vertical shooting to a certain extent hitting the turret even if it is installed to the AMT's hull. In one of his remarks, the former Minister of Defence Nurettin CANİKLİ stated that interception up to 8-10 meters was possible with AKKOR PULAT while with AKKOR APS interceptions up to a distance of 100 meters of could be conducted. In the field tests executed with AKKOR PULAT APS, over 400 ballistic tests were conducted against various threats such as RPG, Kornet-E, Konkurs and TOW.

With the help of the **Telescopic Periscope System (TEPES)** integrated to the M60TM AMT, secure surveillance and target acquisition capabilities at the defilade position are gained. On account of Aselsan's TEPES vision system to be integrated to a total of 73 M60TM AMTs, superior target acquisition and surveillance capabilities with high precision are gained to the tanks, under all types of weather and geographical conditions.

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The capabilities of TEPES such as motion detection, target tracking, sectoral scanning, integrated operation with other systems (Laser Warning System, Remote Commanded Weapon System, etc.), acquisition of the target coordinates and video/ image recording will increase the survivability of the M60TM dramatically. The system capable of capturing thermal images and TV images via its E/O sensors is capable of conducting laser distance measuring up to 20 kilometers. TEPES could reach to a height of 2.5 meters with the telescopic elevation system (mast) over the M60TM turret and is capable of calculating the coordinates of the target detected through the INS integration and then submits them to the operator.

Aselsan also covered the **IIR and RF Seeker** capabilities as part of the missile systems in its stand. Within this scope, while uncooled IIR seekers and detectors are being utilized in UMTAS, OMTAS and KARAOK (with a better resolution due to technological developments), IIR Seekers with cooling type detectors are being used by the HİSAR-A/O air Defence missiles due to the demand of snapshots at high speeds. The IIR detectors utilized in the UMTAS and OMTAS Missiles were developed locally, and the activities towards the indigenization of the IIR detectors imported for HİSAR Ground-to-Air Guided Missiles. A quite different technology is being used in the detectors employed by the KARAOK Missile and the indigenization of these imported detectors is planned as well. The representatives from Aselsan underlined that the development process was about to be completed in the HİSAR-A/O Project and stated that the preparations towards the Serial Production process scheduled to take place in 2020-2021 were ongoing. RF Seekers manufactured by Aselsan are being used in the TÜBİTAK-SAGE's Medium Range BOZDOĞAN-BVR [Beyond Visual Range] Air-to-Air Missile and Roketsan's ATMACA Ground-to-Ground Guided Missile as well. BOZDOĞAN-BVR carries Ku-Band solid state array RF antenna on mechanical gimbal seeker (in reflector structure) head. In line with an alteration of the contract, Aselsan is also developing an RF Seeker for the HİSAR Ground-to-Air Guided Missile and the first ballistic test with the new missile named HİSAR-RF as part of the urgent demands of the Forces is planned to be accomplished within less than a year. It is mentioned that the propulsion system of the HİSAR-A/O was maintained in the HİSAR-RF-RF while certain differences in terms of aerodynamics were made. Flat plate slot antennas and steerable gimbal mechanisms are being used in the HİSAR-RF, GÖKTUĞ-BVR and ATMACA RF Seekers that feature similar technologies. The RF Seeker will remain also in the HİSAR-U/GUMS Missile named the SİPER. According to the data we received, the intercept range and altitude of the SİPER Missile were increased. Previously, the Ministry of National Defence of the period stated that SİPER would be able to reach a range of 70km-90km. SİPER will be used merely against the Air Breathing Targets (ABT) in the first stage, Ballistic Missile Interception capability is not planned for the initial stage and this capability may be added to the missile in the future in line with the TurAF's demands. We were informed that SİPER was physically compatible with VLS utilization and a series of modifications will be needed for the utilization in the ships. Aselsan's Passive RF Seeker (not under delivery stage yet) remains in the KARGI Expendable Unmanned Combat Aerial Vehicle developed for the TurAF. Both the passive (broad band, a type of EDT sensor) and active RF Seeker (will operate at a different frequency band compared to the existing RF Seekers, not AESA type mechanically controlled) will be carried by the AKBABA Anti-Radiation Missile. Aselsan has been working on a millimeter wave (MMW) type RF Seeker concept however it has not productized the concept yet.

At the Naval Systems Technological Demonstration Concept ship model displayed by Aselsan, HİSAR Surface-to-Air Missiles existed in vertical launch configuration at the 16 cellular Indigenous Vertical Launch System right at the back of the 76mm gun at the fore ship (we assume it is the SİPER/HİSAR-U) and the launcher placed next to the ATMACA Surface-to-Surface Missiles in the pool behind the mast, aligning with the projectile motion. A total of 12 HİSAR Surface-to-Air Missiles at each of the six-pack launchers for projectile motion and 16 ATMACA Surface-to-Surface Missiles in the eight-pack launcher configuration were carried on the model.

One of the new products displayed at Aselsan's stand was DASS EO Reconnaissance, Surveillance and Targeting System, which is the new and higher resolution version of the CATS EO Reconnaissance, Surveillance and Targeting System. Aselsan launched development activities regarding the new generation vision system DASS at the end of 2018 and planned to start Serial production in 2020. The DASS System has a SWIR Camera, Laser Tracer and Acute Angled Day Vision Camera options. On account of its distributed sensor architecture, additional sensors may be integrated to DASS and critical conveniences may be provided during the production and test stages of the system.

Aselsan has been operating as the Main Contractor as part of the **Integrated Air Defence Command Control System Project of the Azerbaijan Air Forces.** The Project aims for the command control of Azerbaijan's air space and the integration of a total of nearly 70 air surveillance/early warning radar systems in 13 types procured from various countries such as Belarus, Ukraine, Russia, Israel and Spain to all of the air Defence missile systems

HAKİM - Integrated Air Defence Command Control System

in different types (i.e. Russian origin [S-300 PMU2] and Israel origin [Barak 8]) across the country. The Project will be launched in phases and the contract for the initial phase covering radar integration and forming the air picture was signed at ADEX 2018 Fair in September 2018. However, according to the information we received, the contract has not entered into effect as of May 2019 as the approval of the Council of Ministers was awaited. As part of the Project, Aselsan introduced a new generation Integrated Air Defence Command Control System named **"HAKİM"**. The system contains the Air Defence Early Defence Command Control System (HERIKKS) and Radar Network (RadNet) capabilities that have been used successfully by the Turkish Armed Forces yet has a higher level than HERIKSS and features capabilities of strategic and operational level. The technical activities regarding the Project continued as of May, though the contract did not enter into force. The bases of Azerbaijan's Air Forces related with radars were visited in the previous period and certain installations were made and tests were run. An Aselsan representative pointed to the similarity of the infrastructure to be established as part of the HAKİM System with the NATO MASSE System presently utilized by the TurAF and noted that the activities under the first phase that covered the radar integration and formation of the air picture would be realized in a schedule of 18 months (T0+18 months). Today, Aselsan is one of the very few Defence industry companies in the world capable of integrating NATO, Israel and former Soviet Union radars and weapon systems. The know-how and experience gained through this project is expected to be utilized in the integration of the air Defence radar and missile systems of the Turkish Air Forces to the S-400 Triumph Systems procured from Russia for the TurAF.

Radar Jamming and Deception Simulator (RAKAS) and Communication Jamming and Deception Simulator (MUKAS) displayed in the outdoor exhibition area by Aselsan were among the products unveiled at the Fair. Both systems are formed over the 6 wheeled tactical vehicles manufactured by BMC, developed for the TNFC RAKAS is colored in grey while the MUKAS developed for the Land Forces Command (KKK) is colored in khaki.

TNFC RAKAS - Radar Jamming and Deception Simulator

Aselsan is the Main Contractor as part of the contract signed on 7 September 2012 for the RAKAS and MUKAS Procurement Projects and the delivery of one RAKAS and one MUKAS System formed over tactical vehicles will be accomplished. Mobile generator systems (to provide the required power in places without network) installed over 4 wheeled tactical vehicles, one for each RAKAS and MUKAS and 10 mobile OPKAR Electronic Attack Systems will be delivered to the KKK with the MUKAS. An Aselsan representative with whom we had the chance to interview at the stand defined these systems as "Turkey's first Electronic Warfare Training Simulators" and RAKAS could be deployed over both naval and land platforms. On the ship, RAKAS will be deployed over the helicopter pad. Though it is qualified as the Radar Jamming and Deception Simulator, in addition to radar jamming, deception, interception and position finding capabilities, with the help of the small MUKAS installed within the system RAKAS is capable of communication/ interception, jamming and deception. Therefore, RAKAS is not merely a simulator but also a product that could be used operationally in the tactical field. At the same time, RAKAS is capable of simulating the radars operating at different frequency bands. A communication position finding capability is not required in MUKAS. MUKAS is capable of signal analysis at both HF and UHF bands via ground wave and sky wave antennas. There are quite few extensive systems in the world such as these systems.

The **OPKAR Electronic Warfare Systems** that will be provided to the Turkish Armed Forces with MUKAS could be utilized without operators; each could communicate with each other via the "mesh network" or could be remotely controlled via MUKAS. We were informed that the most critical feature of OPKAR is its capacity to perform its tasks very effectively since it is a reactive system. The delivery of the OPKAR will be accomplished in two different configurations composed of G-3 and G-1 (contains field unit). OPKAR systems are at the same time Turkey's first training simulators in the tactical field. In the meantime, the contract on the Mobile EW System Project for the KKK to be used against radio frequencies was signed between the SSB and Meteksan Savunma at the Fair. Though it contains certain alterations, development of a system that will perform in similar bands with the OPKAR is expected in line with the contract.

RAKAS is a system that could be used against land, air and naval targets and with the help of its automatic tracking system it is capable of detecting and tracking air targets. There are attack antennas and an E/O system over the turret at the back of RAKAS. The missiles could be detected via the radar or the EDT system over the vehicle and they could be jammed via the antennas over the turret. However, since RAKAS is a training simulator as is, more effective tactical systems capable of electronic warfare against missile threats may be required. Still, tests towards identifying the frequency band at which a guided missile seeker in the inventory operates and performance measurement could be conducted with RAKAS.

Roketsan

Turkey's major rocket and missile manufacturer Roketsan participated in IDEF' 19 several new products including directed energy weapons, indigenous micro-satellite launching system, and various types of guided missiles. Turkish defence contractor exhibited ALKA Directed Energy Weapon System, ATMACA Surface-to-Surface Missile, CIDA Missile System, KARAOK Short Range Anti-Tank Guided Missile System, Micro-Satellite Launching System (MSLS), TANOK 120mm Laser-Guided Anti-Tank Ammunition, and YATAGAN Missile System. Additionally, Roketsan signed several cooperation agreements with many companies during the event including:

- A cooperation agreement with TÜBİTAK SAGE for the development and production of TST 101 Fuses of the MK80 Series General Purpose Bombs.
- A cooperation agreement with Aselsan for the development of a Kamikaze Multi-Rotor Unmanned Aerial Vehicle (UAV) System.
- The ALTAY Serial Production Project Main Subcontractors Contract between the main contractor BMC and the subcontractors Roketsan, Aselsan, Havelsan, and MKEK.
- SavNET Connection Protocol between SSB and Roketsan, Havelsan, Aselsan, TUSAS, TÜBİTAK SAGE, STM, and TEİ.
- Cooperation intention agreements with ATA Arms and AKDAŞ Arms for YATAĞAN Missile system.

At IDEF' 19, Roketsan exhibited its cutting-edge products at its impressive booth and attracted significant attention. Aside from its wide range of missile and rocket solutions, the company also introduced a directed energy weapon system, further expanding its product portfolio. Unveiled at IDEF' 19 for the first time, ALKA DEW (Directed-Energy Weapon) locally developed by Roketsan to destroy or disable hostile drones. ALKA can be equipped with both laser and electromagnetic jammers and is capable of neutralizing both drone groups and Improvised Explosive Devices (IED) from a safe distance. The system can also track multiple targets with its onboard radar and E/O camera systems. Roketsan developed ALKA in five years and spent the last two years to make it a portable system. It can be used as a mobile system or in a fixed position. ALKA can disable drones up to 4 km (2,4 miles) and destroy drones from 500 m (1,600 feet). The system has successfully passed its preliminary tests and is expected to be deployed to defend critical facilities such as military bases, ports, and airfields.

YATAĞAN - Laser Guided Miniature Missile System

Roketsan's indigenous ATMACA Anti-Ship Guided Missile was also displayed for the first time at the exhibition. Designed as a long-range weapon system to be used onboard modern naval platforms under any weather conditions, ATMACA guided missile can be used against both surface and fixed targets providing high-precision strike capabilities. The missile has a range of 220 km and uses GPS (Global Positioning System) and INS (Inertial Navigation System) guidance. Equipped with an Active Radar Seeker, ATMACA missile has the sea-skimming capability and uses Barometric and Radar altimeters to navigate towards its target. The missile can also update targets, re-attack and terminate its mission with modern data link subsystems. Another missile exhibited at the fair for the first time was the CIDA system. Roketsan developed the CIDA as a lightweight, cost-effective system to be used in urban warfare. The shoulder-launched system designed to provide rapid and easy-to-use smart guidance capability to soldiers during urban warfare. Ensuring high accuracy at very short ranges, the system lowers the risk of collateral damage. CIDA exhibited at the fair with its specially developed launcher. The concept development and verification phase of the CIDA system is still underway.

Laser-guided anti-tank ammunition TANOK also made its debut at IDEF' 19. TANOK was designed by Roketsan to be used primarily on ALTAY T2 configuration (but for this T2's Fire Control System should be improved, and laser designator device should be integrated on it). TANOK weighs 11 kg, has a diameter of 120 mm, and is 984 mm long. The missile uses semi-active laser (SAL) guidance and can be employed against stationary or moving targets up to 6 km. It has both direct and top-attack capability and follows an encoded laser beam emitted from the laser designator on the tank. The target can also be illuminated by another source. One of the most innovative products at IDEF' 19 was the YATAGAN Laser-Guided Miniature Missile system. Designed to be used by a single infantryman, the missile can be fired from existing or new generation 40 mm grenade launchers. The easily operated and man-portable system can be used against different types of threats such as snipers or group of soldiers, especially in urban areas. Equipped with a semi-active laser seeker, the miniature missile has a maximum range of 1,000 m with a maximum CEP value of 1 m. The lightweight and compact missile can be easily integrated onto unmanned aerial vehicles or unmanned ground and surface vehicles.

Anadolu Isuzu & Anadolu Savunma

One of the leading manufacturers of the commercial vehicle sector, Anadolu Isuzu, carries its know-how and assertiveness in the Defence industry under the brand "Anadolu Savunma". Anadolu Isuzu revealed its heavy trucks towards military utilization developed under the brand "Anadolu Savunma" for the first time at IDEF' 19. At the Fair, the 8x8 tank carrier vehicle, 8x8 tactical wheeled vehicle and 4x4 tactical wheeled vehicle models named "SEYİT" were introduced. The 8x8 Partially Mine Resistant Recovery Vehicle designed especially for diffracted heavy armored vehicles with Anadolu Isuzu's infrastructural facilities was displayed at the stand of MPG Makina İmalat San. ve Tic. A.Ş. President Recep Tayyip ERDOĞAN visited Anadolu Isuzu's stand and received information on the indigenous and national Seyit product group.

Anadolu Isuzu company conducted exports of US$ 109 Million in 2018 and aims to double its exports until 2023. The SEYİT Military Truck Product Group of the company displayed at IDEF' 19 for the first time was named after Seyit Onbaşı (Corporal Seyit) who was one of the heroes of the Çanakkale Victory. The SEYİT Military Truck Product Group was revealed as a result of the partnership between Anadolu Savunma and Czech Tatra Group. Support regarding infrastructure was received from Tatra but the design of the vehicles, the armored cabin being at the first place, were conducted completely by Turkish engineers at Anadolu Isuzu's R&D Center. Designed in a way to enable operation under very challenging circumstances and tough geographical conditions, SEYİT series vehicles can be manufactured in different configurations ranging from 8x8 to 20x20 and with various engine alternatives.

One of the companies competing for the 8x8, 10x10 and 12x12 Wheeled Tank Transporter, Container Transporter and Recovery Vehicle Project launched by the Land Platforms Department of the SSB, Anadolu Isuzu placed its proposal to the SSB on 16 April 2018. Within the scope of the Project, a total of 476 vehicles composed of 134 Tank Transporter Vehicles (TTV), 65 DROPS Container Transporter Vehicles

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and 277 Recovery Vehicles will be procured. Anadolu Isuzu signed a Sub Contractor Contract with a total value of US$ 4,580 Million (VAT excluded) with the MPG Makina İmalat San. ve Tic. A.Ş. as part of the Partially Mine Resistant Recovery Vehicles Project and on 10 May 2019 the company notified the Public Disclosure Platform of the fact that the contract value reached US$ 13,312 Million (VAT excluded) as a result of the additional firm orders it received. According to the aforementioned contract, the deliveries will be made in lots until the end of 2019. Anadolu Isuzu will also deliver 8x8 tactical wheeled vehicles to fulfil TAF's demands as part of the project being executed by the SSB and Aselsan. To this end, a Sub Contractor Contract with the value of EUR 4,598.400 Million (VAT excluded) was signed by Anadolu Isuzu/Savunma and Aselsan on 2 May 2019. The vehicles are planned to be delivered in lots by 2022.

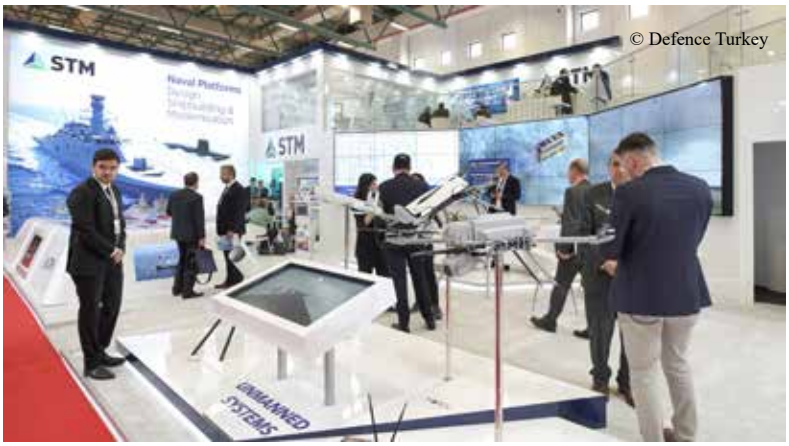
Displayed at Anadolu Isuzu's stand at the Fair, capable of operating with the 8x8 traction system under all types of land conditions, the SEYİT 8x8 Tank Transporter Vehicle (TTV) stands out with its towing capacity of 70,000 kg. This 8x8 tank transporter vehicle with the climbing ability at the slopes inclined over 30%. The vehicle is able to reach a maximum speed of 80 km/h. SEYİT TTV features a Cummins X15 99EPA 600 engine and capable of generating 600 hp power and maximum 2.770 Nm torque with the engine volume of 14,9 lt. SEYİT 8x8 tank transporter vehicle can easily pass through 1,100 mm deep water and has a range of 800 km. Accomplished by Anadolu Isuzu R&D engineers, the cabin of the tank transporter vehicle could also be manufactured alternatively in the armored configuration and the cabin is capable of providing STANAG 4569 Level 2 and Level 3 Ballistic Protection. The SEYİT 8x8 Tank Transporter Vehicle draws attention as the only indigenously manufactured vehicle in its class that contains all the features capable of fulfilling the demands of modern armies, the Turkish Armed Forces being in the first place.

The task equipment of the 8x8 Partially Mine Resistant Recovery Vehicle displayed at IDEF' 19 by MPG Makina İmalat San. ve Tic. A.Ş. was designed by MPG Makina. This vehicle is capable of successfully performing the tasks under tough land and road conditions and was manufactured in a way to be able to recover the malfunctioned large tonnage vehicles and armored vehicles. Weighing 43,000 kg, the Partially Mine Resistant Recovery Vehicle features a climbing ability of 60% inclination, and it is capable of passing 1,100 mm deep waters as well. Featuring a 14,9 lt volume with the Cummins X15 99EPA 600 engine, the 8x8 partially mine resistant recovery vehicle has 600hp and it can reach a speed of 80 km/h. With a range over 500 km, the aforementioned vehicle will be included to the inventory soon and start to operate in the TAF.

ASFAT Inc.

Presently authorized to utilize 27 Military Factories and 3 Military Shipyards and labor capacity of nearly 20,000 people, ASFAT Inc. attended IDEF' 19 at the Ministry of National Defence's stand in order to develop its relations with international institutions and associations as well as introducing its products and services. The latest status reached by the military factories and military shipyards that play a critical role in Turkish Defence and Aerospace Sector was revealed at a sizeable stand. An actual FIRTINA II K/M

Howitzer and F110-GE-100 turbofan engine was displayed at the stand where many products such as ADA Class Corvette, GABYA Class Frigate, BARBAROS Class Frigate, TF-2000 Anti- Air Warfare Destroyer, GÜR Class Submarine, REİS Class Submarine, Floating Dock, Poyraz Ammunition Vehicle, Atılım Engine Test Cell, Flight Simulator and Ballistic Helmet and Protective Vest were displayed with their scaled versions. ASFAT Inc. conducted one on one interviews with international delegations and companies during the Fair and at the same time signed international agreements with the Defence Ministry of Montenegro, Vard from Canada, Damen from Netherlands, UkrObronProm from Ukraine and Airbus Defence while signing strategic cooperation agreements with local companies such as Meteksan, Best Grup, YDS, Alp Aviation and BITES.



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STM

Providing effective solutions in the field of autonomous systems as a pioneer in the Turkish defence industry, STM exhibited its broad range of autonomous drone systems developed with domestic and national resources at IDEF' 19. STM added new and improved features to its kamikaze drones to effectively use these systems in coordination with other autonomous drone systems for reconnaissance-surveillance purposes. STM unveiled the first indigenous fixed-wing kamikaze drone ALPAGU, rotary-wing kamikaze drone KARGU, and autonomous TOGAN Reconnaissance UAV System at IDEF' 19 with newly added features.

KARGU is an indigenous rotary-wing UAV that can be deployed and operated by single personnel in both autonomous and manual modes. The system was designed specifically for asymmetric warfare scenarios and currently remains at the inventory of Turkish Armed Forces. Capable of rapidly engaging both stationary and mobile targets, the new lightweight design of KARGU provides extended endurance and task duration capacities. The indigenous TOGAN multi-rotor rotary-wing UAV solution for general-purpose reconnaissance and surveillance missions was upgraded with a new electro-optical pod system, which increases the image resolution quality. TOGAN was also updated with a new automatic assignment change feature that enables the execution of joint operations with the KARGU UAVs. STM also introduced a lighter version of ALPAGU. Its weight reduced from 3,9 kg to 1,9 kg while maintaining the existing ammunition capacity and thus providing easy portability. Improved image processing and target detection capabilities were also added to the system. Conducting studies on studies on implementing artificial Intelligence-supported swarm technologies to its platforms, STM displayed the first examples of the multi-drone operation performed with around 20 kamikaze KARGU platform at IDEF' 19.

During the fair, STM signed various protocols and agreements with different institutions for new defence projects. Under the leadership of the Presidency for Defence Industries, STM has signed a protocol on the "Development of Electric Propulsion System in Speed Boats" with Aselsan at IDEF' 19. With the protocol, STM and Aselsan will work in collaboration on the development of the electric propulsion system, which has become important for ship technologies and to create a unity of experience by bringing together know-how and experiences. STM signed the TOGAN Goodwill Protocol with FNSS for the integration of fixed and rotary-wing unmanned aerial vehicles developed by STM for reconnaissance and surveillance missions onto the manned and unmanned armored combat vehicles, armored personnel carriers, reconnaissance surveillance vehicles and turret systems designed and manufactured by FNSS

ASİSGUARD

ASİSGUARD, the latest Defence organization of Asis, which has been active in the area of smart cities in Turkey for many years, introduced its system solutions regarding military drones and land vehicles developed through indigenous resources to the sector at IDEF' 19.

SONGAR is an automatic shooting stabilized armed drone system developed by ASİSGUARD in order to be used efficiently in

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all day and night, military and security-based operations. Capable of operating simultaneously with single or multiple drone systems, SONGAR fulfils many critical tasks such as the detection of the target area, neutralization of the threat, post - operation damage detection and real time image transferring.

The **SALGUR Striking Micro Drone System** is another product of the Drone Group and it is capable of performing tasks in four different operation modes composed of reconnaissance, surveillance, listening and striking in covert operations or special operations. Performing its tasks quite silently, SALGUR offers a great advantage to the armed forces in terms of time and intelligence during critical operations.

Another product of ASİSGUARD displayed at IDEF' 19 is the **YAZGUR Electro-Optical Camera Systems**. This product group is composed of thermal camera systems enabling remote monitoring both at bright and dark external environments and a video management system that maintains 360-degree viewing.

The vehicle electronics group **SADAK** is composed of an In-Vehicle Intercom System, Siren Announcement System, Driver Information System, ASIS Blackbox, Central Tire Inflation System and Military Vehicle In-Vehicle Health and Usage Monitoring System. Developed by ASİSGUARD, the SADAK product group enables the more efficient utilization of land vehicles and the reduction of maintenance costs.

BMC

One of Turkey's leading commercial and military vehicle manufacturers and as one of the greatest participants of the Fair, BMC displayed its 11 military vehicles at its stand of nearly 1,500 m2. Hosting the TUĞRA 8x8 Tank Transporter, Kirpi II, Kirpi II Ambulance, Amazon Versatile Armored Vehicle, Howitzer and Standard Multi-Purpose Armored Vehicles, 5 Tons of TTV Armored Cabin, AKTAN (Battle Field Fuel Tank for Land Vehicles), Container Transporter and Riot Control Vehicles in addition to the T1 Technology Demonstrator

ALTAY MBT was displayed over the TUĞRA TTV on BMC booth

with many dummy sub-systems and changes over the ALTAY PV2 prototype, the BMC stand welcomed the notable interest of the participants.

BMC stand was visited by President Recep Tayyip ERDOĞAN and the accompanying high level delegation on the first day of the Fair and the latest version of the 'AMAZON Multi-Purpose Armored Vehicle with Remote Control' which was introduced in the presence of President ERDOĞAN at the beginning of this year, during the BMC Karasu's Groundbreaking Ceremony and new versions of the tactical wheeled vehicles equipped with state-of-art technologies. The tactical wheeled vehicles were also exhibited at various events in the past.

As one of the companies competing in the tender 8x8, 10x10 and 12x12 Wheeled Tank Transporter, Container Transporter and Recovery Vehicle Project launched by the SSB's Land Platforms Department in order to increase the operational capabilities of the maneuver units of the KKK and to provide combat service support, BMC submitted its proposal to the SSB in the first half of 2018. A total of 476 vehicles composed of 134 Tank Transporter Vehicles (TTV), 65 DROPS Container Transporter Vehicles and 277 Recovery Vehicles will be procured as part of the Project. The first contract regarding the demand for Tank Transporter Vehicles in 8x8 configuration was signed between the SSB and BMC, and the delivery of the 72 TUĞRA TTVs is planned to be launched in August 2019. At IDEF' 19, BMC displayed the ALTAY T1 Technology Demonstrator over TUĞRA TTV with an engine of 620hp and with a towing capacity of 120 tons.

According to the information we received from the representatives of BMC with whom we had the chance to interview on 30 April 2019, 100 professional BMC staff have been working on the ALTAY Project as of April and this number is planned to be increased to 300 by the end of the year. Nearly 1,300 people are expected to be employed within the scope of the Project during the Serial Production Phase with nearly 1,000 blue collar staff. If the company also wins the tender launched for the 8x8 New Generation Light Armored Vehicles of which the RFP is expected to be published by the SSB, BMC plans to conduct the activities at the same facility with the ALTAY Serial Production Project. We were informed that at the tender BMC will be competing with the indigenous design in 8x8 configuration. Despite the fact that the ALTAY Serial Production Contract valued at Euro 3,5 Billion signed with the SSB still did not enter into effect (T0 did not start), BMC already launched its activities at an area of 5,000 m2 at the 1st Main Maintenance Factory Directorate in Arifiye. According to the information we received, depending on the result of the privatization process of the 1st Main Maintenance Factory Directorate, whether the facilities at Arifiye or the facilities at Karasu will be selected for the execution of the Serial Production activities. In case Arifiye is selected, installation of additional benches will be required since the benches at this facility are insufficient in numbers and in terms of technology. Since

BMC committed to manufacture 6 ALTAY MBT per month during the Serial Production Phase, modern benches enabling the achievement of this production will be required.

The ALTAY MBT T1 Demonstrator shown over the TUĞRA TTV at the FAIR was in the form of T1 systems installed over the PV2 prototype and as a dummy product due to the fact that many systems over the T1 Demonstrator prepared within 2 months by the BMC staff at 1st Main Maintenance Factory Directorate were not yet ready. We were informed that the main difference between the PV2 prototype and T1 originates from the Aselsan product AKKOR AKS and Roketsan's product the reformed armor box. Over the T1 Demonstrator, there is slat armor and thicker ERA package at the sides of the hull and a new armor box at the top of the turret. 4 AKKOR AKS radars surround the Turret, moreover there many electronic units within the tank for AKKOR AKS, therefore the back of the turret is slightly expanded. Manual utilization of the AKKOR AKS is not considered since it is a system reacting in a duration measured with milliseconds. The tank commander will be switching the system on and off via the user interface (control panel) and receive data on whether the launchers (two launchers each with two cells) are full or empty. The weight of the ALTAY MBT in the existing configuration is 63.5 tons and 25 tons of this is the weight of the turret. In response to our question on whether the increase in the tank due to the additional armor box in the T1 version will affect the performance of the power pack or not, BMC representatives stated that extra changes were not necessary since the weight in the T1 configuration remained within the weight limits they projected. AKKOR AKS will also be in the 210 T2 model to be manufactured after the 40 T1s, but a completely different armor box will be used in this tank. BMC representatives underlined that a significant amount of weight change will be faced as the main armor of the tank will also be different and added, "We cannot state a figure yet, but the first 40 tanks are T1, so we have a long time before the T2 schedule. We will proceed step by step, upon the approval of the SSB". The same power pack will exist in the ALTAY MBT T2 model.

BMC signed a contract on the ALTAY MBT Power Pack with the SSB on 13 June 2018. The name BATU was given to the ALTAY MBT Power Pack to be composed of the diesel engine and automatic transmission that will be developed by BMC Power Company.

SDT

SDT (Space & Defence Technologies Inc.) develops indigenous software, hardware and integrated solutions for Defence, Space and Aviation areas since February 2005. The company possesses special expertise in radar-EW signal processing, image processing/pattern recognition, embedded software/systems, avionic systems, land system electronic units, RF jammer systems, satellite technologies, and simulation & training systems. SDT participated at IDEF' 19 with its reliable Electronic Warfare & Communication Systems products and exhibited the AVCI Anti-Drone system, Communication Monitoring and Localization Systems, Weapon Control & Interface Units, and Air Combat Training (ACT) Solutions.

The SDT AVCI Anti-Drone System is designed to detect, track and defeat Micro and Mini Unmanned Aerial Vehicles (UAVs) and Unmanned Aircraft Systems (UAS) engaged in hostile airborne surveillance and potentially hostile activity. AVCI is a smart-sensor and countermeasure package capable of remotely detecting small UAVs and then tracking and classifying them before providing the option to disrupt their activity. The system combines electronic-scanning radar target detection, electro-optical (EO) tracking/classification and directional RF jamming capability. The detected drones can be defeated using directional / omnidirectional jamming solutions or hard-kill solutions. AVCI system employs PESA (Passive Electronically Scanned Array) radars, which operate in Ku-band frequency. The radar is modular non-rotating, electronic-scanning (e-scan) system which is capable of detecting UAVs with a radar cross-section of 0,01 m2 at ranges up to 10 km. The radar covers 180° and can be used in back-to-back configuration to provide 360° surveillance. Target tracking software and extensive zone filtering features allow drones to be detected while reducing false alarms from birds.

The new generation of Communication Monitoring and Localization System was developed to respond to all the needs of Electronic Warfare (EW) in the most efficient way. SDT also delivered a similar system called Radio

Frequency Signal Analysis System (RFSAS), which was developed under the KILAVUZ Project in September 2014. The system detects narrowband and wideband signals (0,4-18GHZ) 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 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.

Among SDT's Embedded Simulation System (ESS) solutions, Airborne ESS was the first air combat training system development back in 2007. The system is fully integrated into aircraft Operational Flight Program (OFP) and has gone through several ground and flight tests before final deployment. One of the important elements of SDT's Embedded Simulation System (ESS), is the Air Combat Maneuvering Instrumentation (ACMI) system. SDT's ACMI system (pod and ground system) was successfully certified via flight tests conducted together with TAI and the Turkish Air Force on F-16 aircraft. SDT ACMI System is mounted on F-16s and similar airborne platforms in external pods and provides effective Air-to-Air and Air-to-Ground training opportunities. SDT ACMI System has advanced combat capabilities such as real-time autonomous position generation, weapon simulations and Real-Time Kill Notifications (RTKN) thanks to its long-range and high throughput RF data link and integrated processors, which provides a Live-Virtual- Constructive (LVC) training infrastructure. The system has mission planning, live monitoring, and post-mission analysis capabilities. SDT ACMI can also simulate both RF and IR guided missiles and enables fighter pilots to train in a multi-participant threat and target environment.

SDT also produced the Weapon Control & Interface Units of the ARCT (Anti-Tank Remote Controlled Turrets) designed and developed by Roketsan for the Anti-Tank Vehicle Development Project carried out by FNSS as the main contractor. SDT oversee the integration of KORNET and OMTAS missiles to the vehicles and ensures that the turrets function according to the requirements of the project. The products which were designed and integrated into the vehicles by SDT includes; 15" Multifunctional Gunner Display (NE), Platform Interface Unit (PAB), Gunner Interface Control Unit (NAKB), KORNET Missile Adaptation Unit (KOFUB), KORNET Range Selection Adaptation Unit (KOMSUB), and OMTAS Mission Unit (OGB). SDT manages all the servos on the turret, the thermal sighting system, the laser rangefinder, the inertial measuring unit, together with all of the subsystems inside the vehicle, which provide the necessary data to the main systems.

Dearsan

The mock-ups of the Tuzla Class Patrol Boats and Corvette, Offshore Patrol Boats and Fast Intervention Boats displayed at the stand of Gülhan & Dearsan Business Partnership drew great attention and Dearsan's stand was visited by many local and foreign companies and visitors. The most attention-grabbing products of the stand were the C92 Corvette which started to be built in Turkmenistan in line with the contract signed with the Turkmenistan's Ministry of Defence and the Norwegian Skjold Class Corvettes suggested as part of the Turkish Type Torpedo Boat demands of the TNFC. With a length of nearly 47.5m and height of 15m, the Skjold Class Torpedo Boats have an air - shield catamaran hull design and feature 8 Surface-to-Surface Missiles and the 76mm Super Rapid main with a range of around 12 km. The Skjold Corvettes with quite low RCS figure are capable of reaching a speed up to 60 knots in sea state 0 and 45 knots in sea state 3 with the help of the main propulsion system in CODAG configuration. We were informed that the speed requirement of the Turkish Type Torpedo Boat Project was decreased to 45 knots.

The C92 Corvette being built in Turkmenistan with the construction equipment and parts sent from Turkey weigh 1,600 tons and is capable of reaching a speed of 28 knots with the drive system composed of 4 diesel machines and two pivots. Dearsan will be conducting the sale of two C92 Corvettes to Turkmenistan; one of these two is a firm sale while the other is optional. Hull mounted DSH sonar, a helicopter pad available for the SeaHawk helicopter, two 12,7mm STAMP, VL Mica SAM system and 76mm Super Rapid gun will remain on the C92 Corvette.

The Computer Generated image of C92 Corvette

Meteksan Defence

Displaying its products that have proven themselves in the field and that are included in the inventory, Meteksan Savunma also conducted the launching of its new and updated products at IDEF' 19. The MİLSAR SAR/GMTI Radar, C-Band Data Link, new Retinar FAR and KAPAN Anti-Drone Systems, YAKAMOS 2020 Hull Mounted DSH Sonar, Submarine Intercept Bearing and Distance Identification Sonar, Helicopter MİLDAR-2 Fire Control Radar and KEMENT Indigenous Tactical Data Link of which the air-to-ground and air-to-air tests as part of Field Acceptance Activities were conducted successfully in June 2019 in addition to the final of the project were among the Meteksan Savunma products displayed at IDEF' 19 for the first time.

Within the scope of the TÜBİTAK SAVTAG project contract signed between TÜBİTAK BİLGEM and Meteksan Defence, the acoustic sensor arrays performing at the 1-100 kHz band, frontal electronic units and internal ship components with real time signal processing software were designed and manufactured for the Submarine Intercept Bearing and Distance Identification Sonar. The Intercept Passive Sonar - IPS features its own operator console in order to display the detection and evaluation results and enabling user entries. The IPS System is capable of operating integrated to the existing acoustic sensor array in the submarine in addition to its own acoustic unit; and is able to continuously conduct real time data flow, analysis and display from both sonar arrays simultaneously. The Submarine Intercept Bearing and Distance Identification Sonar manufactured by Meteksan Defence was installed to one of the four AY Class submarines in the TNFC's inventory and launched into service. The aforementioned submarine performed in the Deniz Kurdu 2019 Military Practice. The ASIST Intercept Sonar System manufactured by Aselsan is employed in the remaining three submarines. The Intercept Sonar System remains at the back part of the sails in AY Class Submarines and in PREVEZE and GÜR Class Submarines it is located inside the hatch bulging out at the ship's nose.

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Otokar

Leading the sector in land systems and breaking a lot of new ground, Otokar presented its 10 armored vehicles and its BAŞOK, MIZRAK, BOZOK, ÜÇOK and KESKİN turret systems to users at its stand at the Fair. Turkey's first electrical armored vehicle AKREP IIe, TULPAR Light Tank, mine resistant Armored Emergency Response Ambulance of COBRA II, URAL Special Operations Vehicle at the stand were the vehicles introduced at IDEF Fair by Otokar. The vehicles and turret systems of Otokar displayed at the 7th hall and at the stand numbered 713 were as follows:

- TULPAR Light Tank
- TULPAR S Tracked Armored Vehicle, with BAŞOK turret system
- ARMA 8x8 Armored Combat Vehicle, with MIZRAK-30 mm turret system
- ARMA 6x6 Armored Combat Vehicle, with BOZOK-25 mm turret system
- COBRA II Mine Resistant Armored Emergency Response Ambulance
- COBRA II 4x4 Armored Personnel Carrier, with ÜÇOK turret system
- COBRA 4x4 Armored Personnel Carrier, KESKİN turret system
- URAL 4x4 Armored Personnel Carrier with Otokar BAŞOK turret system
- URAL 4x4 Special Operation Vehicle
- AKREP IIe Electrical Armored Vehicle

Designed by Otokar as an armored reconnaissance and weapon platform, the AKREP IIe 4x4 New Generation Armored Vehicle Product Group is manufactured to fulfil the contemporary and future demands of armies with its low silhouette. In addition to its operational performance under all types of field conditions the vehicle has high maneuver capability and has an infrastructure that could enable the utilization of alternative power packs such as electricity, diesel and hybrid. The power generation and transmission systems, sensors, computers, communication and targeting systems are integrated within a single system in the AKREP IIe and the vehicle provides an infrastructure that will accelerate the transition to autonomous vehicles. Different configurations of the AKREP IIe such as the Armored Reconnaissance Vehicle, Fire Support Vehicle (90mm gun), Light Weight Infantry Support Vehicle (25mm gun, the model displayed at the Fair) and Laser Gun Vehicle were designed. Two NMC540 Series new generation Li-Ion battery pack manufactured by Altınay Company are included in the Light Weight Infantry Support Vehicle with a hybrid propulsion system were displayed at the Fair. The product AxleTech an independent suspension system is also present in the vehicle. The AKREP IIe Fire Support Vehicle to be equipped with a 360 hp power capacity diesel engine and CMI Cockerill CSE90LP 90mm automatic gun is expected to be revealed at the EuroSatory 2020 Fair.

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TÜBİTAK

The Miniature Precision Guided Ammunition Family named KUZGUN (RAVEN), the Air Defence Missile named G-40 both of which are being developed by TÜBİTAK SAGE and currently at their conceptual design phase and the MÜREN Integrated Underwater Combat Management System (CMS) developed by TÜBİTAK BİLGEM and already integrated on Turkish Navy's AY Class Submarines TCG Doğanay (S-351) and TCG Dolunay (S-352) were the products that were revealed for the first time during IDEF '19, grabbed our attention at the TÜBİTAK stand.

KUZGUN is a filterable smart ammunition group that could be equipped with laser, IIR and radar (RF) seekers with motorized and non-motorized versions dropped from the aircraft. Resembling the SPEAR III Missile manufactured by MBDA with such features, KUZGUN's design enables discharge from naval platforms and land vehicles in addition to air platforms.

The G-40 missile in which components such as the rocket engine of the GÖKTUĞ-BVR air-to-air missile, warhead and seeker head is a vertically launched air Defence missile system that is launched from a VLS type launcher by a launcher mechanism called "soft cold launch". The range of the G-40 is 40 km, and its maximum altitude is stated as 40,000ft. KUZGUN may be installed instead of the G-40's warhead; therefore, it could be utilized for attacking ground targets from the ground or from the sea. With the help of the internal data link system of KUZGUN, it will be possible to adjust routes and targets until the point of impact with the target.

A contract regarding the MÜREN CMS Ay Class Implementation Project was signed in 2016. Within the scope of the Project conducted under the cooperation of the Research Center Command (ArMerKom) of the Naval Forces Command, Gölcük Shipyard and TÜBİTAK, modern heavy weight torpedo discharging capability, sensor data such as sonar, periscope and electronic support and indigenous target motion analysis, track management and indigenous weapon control unit capabilities were added to the AY Class Submarines. The Project was completed in 2,5 years and the activities under warranty are presently continuing. MÜREN CMS is actively utilized on the TCG Doğanay (S-351) and the TCG Dolunay (S-352) Submarines at present. According to the information we received, 8 torpedoes were launched in 2018 as part of the test campaign. As Mark 48 Mod 6AT and AKYA Heavy Weight Torpedoes are not identified within the scope of this project, only DM2A4 SeeHecht Heavy Weight Torpedoes could be launched by MÜREN CMS. In line with the 'MÜREN CMS PREVEZE Class Implementation Project' contract signed in August 2017, MÜREN CMS will be implemented over a PREVEZE Class submarine until 2023. In addition to DM2A4 SeeHecht, Mark 48 Mod 6AT and AKYA Heavy Weight Torpedoes could be launched by MÜREN CMS in this Project. In respect with the MÜREN CMS PREVEZE Project ongoing since 2017, the tests will be launched after nearly one and a half years from May 2019.

With MÜREN CMS, not only modern heavy weight torpedo launching capability but also a critical capability called Target Motion Analysis - TMA bearing vital

KUZGUN Technical Features

Type of Air Platform	MMU, F-35, F-4E/2020, HÜRJET, HÜRKUŞ, Miscallenous UAVs
Mission Type	Air-to-Ground, Ground-to-Ground, Surface-to-Surface
Guidance Type	INS, INS/GPS, (common interface and integration facilities for LAB and IIR) INS,
Warhead Used	Custom Design 25-60 kg (depending on the warhead type)
Range	40-60 nm (74-111 km) for 0,9 Mach launch speed at 40,000 ft altitude
Deflection from the Target	<1-10 m (CEP)(Depends on the Seeker and Guidance Type)
Striking Angle	10°-90°
Targets Used	Spread Targets, Particle Disintegrator Warhead and Staff - Light Armored Components (Particle Disintegrator Warhead) Static Air Defence Units (Particle Disintegrator Warhead) Industrial Facilities (Piercing or General-Purpose Warheads) Military Buildings (Piercing Warhead) Embedded Targets (Piercing Warhead) Caves (Piercing or Thermobaric Warhead) Mobile Targets (Laser Seeker and Particle Disintegrator Warhead)
Weight	100 kg
Length	1,800 mm

importance for the submarines was acquired. There are fewer monitors than planned in the consoles utilized on the MÜREN CMS due to the lack of space on the submarine. Though there are mainly two consoles, all consoles could replace each other. When there is a breakdown in one of the consoles, the software could be transferred to the other. These consoles are manufactured by AYESAŞ. In this Project, for the AY Class Submarines, AYESAŞ designed and delivered a special console that needed to fit into a very limited area and upon the success it achieved another contract was signed in 2018 under the MÜREN CMS PREVEZE Class Implementation Project. As the sub-contractor of TÜBİTAK BİLGEM, YALTES will be developing and delivering the demanded consoles, electronic cabinets, combat data/video networks and Local Launching Panels for PREVEZE Class Submarines. The cabin called Combat Management Center on PREVEZE Submarines will be emptied completely, the ISUS-83/2 CMS will be detached, and the MÜREN CMS will be replacing it. The MÜREN CMS is capable of managing 4 different heavy weight torpedoes engagements simultaneously.

Two different modernization projects composed of MLU and MÜREN CMS are being conducted in parallel for PREVEZE Class Submarines. Initially the MÜREN CMS PREVEZE Class Implementation Project was launched, and this Project covers a total of four submarines.

Vestel Defence Industry

This year, Vestel Defence Industry displayed the KARAYEL-SU UAV Systems and fuel cell technologies at the Fair. The company has been developing and manufacturing Unmanned Air Vehicles in various segments since 2005 and KARAYEL-SU is the most improved model of these. A model enhanced with new capabilities and painted with digital camouflage was presented at IDEF' 19. Vestel Defence Industry's KARAYEL Tactical UAV was developed by Turkish engineers, fully with local facilities and it was exported to a Gulf country in 2018. On account of the 'substantial amount' of sales


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achieved, the company received the grand prize on the Highest Amount of Foreign Sales among the companies with the SME status, at the Defence Industry Awards Ceremony held by SASAD in April 2019. We have been informed that KARAYEL UAV Systems continue to fulfil their tasks successfully in the country in question at present. According to the data provided by Vestel Defence Industry, over a total of 15,000 hours of flight was accomplished by KARAYEL UAV as of April 2019. The single CİRİT missile launcher under the wing of KARAYEL-SU UAV colored with digital camouflage displayed at the stand drew attention. According to the information we received, at the ballistic test conducted with KARAYEL-SU at Acıkıran in January 2019, the target was successfully shot with the CİRİT Missile at a distance of nearly 8 km.

Investing approximately US$ 30 Million in the field of fuel cell technologies since its establishment, Vestel Defence introduced the latest level it has reached in this area at IDEF' 19. Revealing products in this area as a result of many successfully completed R&D projects and the cooperation activities between university and industry, Vestel Defence stands out with its capabilities in PEM (Proton Exchange Membrane) type fuel cell technologies. Vestel Defence is currently one of the three companies that received RFPs to place a proposal for the Air-Independent Propulsion Submarine Project launched in 2018 by the SSB for the establishment of an indigenous infrastructure in respect with the PEM Fuel Cell and Fuel Reformer (Methyl Alcohol will be used and only for MİLDEN) demands towards the Type 14TN Reis Class and MİLDEN Submarines. The bids of the companies were received in autumn 2018 and the selection of the Main Contractor company is expected to be accomplished by the end of this year. Vestel Defence, Aspilsan and Roketsan were the bidding companies and since it cannot place a bid due to its institutional identity TÜBİTAK MAM Energy Institute submitted a proposal enabling its collaboration with these three companies as a Sub Contractor.

The fuel cell technology and the power capacities utilized in submarines are way over the fuel cells (capacity of 5Kw) currently manufactured in Turkey. Therefore, the tender was launched aiming a capacity over the power capacity owned by PEM fuel cells on Reis class submarines at present and also for developing and strengthening the indigenous fuel cell technology and the existing infrastructure, as well as to utilize it in the MİLDEN - National Submarine platform. The aim from MİLDEN is a net of 300 Kw and a nearly 360-370 Kw gross capacity. A total of 6 PEM fuel cell modules each with a power capacity of 60 Kw will be utilized. While in the Reis Class, 4 of these modules are planned to be used for the power requirement of 240 Kw. You can read a comprehensive report on the current status of indigenous PEM Fuel Cell and Reformer development efforts for submarines in our next issue

Turkish Companies Sign over 100 Contracts at IDEF'19

This year, a total of 1,061 companies from 53 countries (481 local and 580 international companies) attended the IDEF'19 event which is the most crucial platform where small and medium sized businesses contributing to the defence industry with their products and services as well as the major companies of the defence industry get the chance to introduce their facilities and capabilities to the procurement committees from Turkey as well as the world and 587 committee members of 151 committees from 70 countries and 3 international organizations were amongst the visitors of the event. Moreover, 100 signature ceremonies and 9 meetings/ launches were held at the IDEF'19 event closely followed by 394 local and foreign press members from a total of 26 countries. As Defence Turkey magazine, we gathered the highlights of the contracts signed throughout the event which lasted for 4 days.

Altay Serial Production Project Main Subcontractors Contract

The contract for the Sub Systems of ALTAY Serial Production Project for the serial production of Turkey's first Main Battle Tank ALTAY and the supply of the systems and sub systems that will take part in the tank was signed between BMC and the subcontractors Aselsan, Roketsan, MKE and Havelsan at IDEF'19 with the participation of the President of Defence Industries Prof. İsmail DEMİR.

President of Defence Industries Prof. İsmail DEMİR, Vice President of Defence Industries Mustafa ŞEKER, Head of the Land Platforms Department Ahmet Raci YALÇIN, BMC Chairman of the Board Ethem SANCAK, BMC Member of the Board Talip ÖZTÜRK, Aselsan Chairman & CEO Prof. Haluk GÖRGÜN, Aselsan Vice President Mustafa KAVAL, Roketsan's Deputy Chairman of the Board Mustafa AYSAN, Roketsan President and CEO Selçuk YAŞAR, MKE Deputy Chairman and CEO Mehmet ÜNAL, Havelsan Chairman of the Board Prof. Haci Ali MANTAR and General Manager of Havelsan Ahmet Hamdi ATALAY attended the signing ceremony held at the BMC stand.

Within the scope of the Project, Turkey's New Generation Main Battle Tank ALTAY will be manufactured in two configurations as T1 and T2 in accordance with the new concept of protection developed based on the recent combat experiences in our nearby geography and to meet the future demands of the Turkish Armed Forces.

40 ALTAY T1s will be manufactured and ALTAY T1 will be the Main Battle Tank with the most developed protection capacity with its all-round armor defence in combat fields composed of passive, reactive and active protection components developed by estimating all types of threats that may be encountered in combat fields. 210 ALTAY T2s will be manufactured and ALTAY T2 will feature the advanced armor system developed over the ALTAY T1, isolated hull-ammunition configuration, laser guided tank gun firing capability, crew training mode and mobile camouflage net-signature management capabilities. Additionally, an ALTAY T3 with an unmanned turret will be developed within the scope of the Project.

BMC unveiled the ALTAY T1 demonstrator at IDEF'19 for the first time. Certain improvements were made over the tank in line with the new demands emerged during the prototype stage throughout the design of the Altay T1 Main Battle Tank (MBT) as well. The survivability level of the ALTAY tank was increased with the components added in line with the updated demands.

- Improved Explosive Reactive Armor (ERA) added to the side protections of the fuselage
- Turret Top Armors with increased protection level
- Active Protection System Radars positioned around the turret
- Active Protection System Launchers installed at the ceiling of the turret
- Extended turret rear compartment
- Caged armors enabling protection against the anti-tank missiles at the hull and rear compartments of the turret
- Explosion retardant measures at the ammunition compartments of the hull

In accordance with the contract signed on 1 May 2019, on the second day of the event, the following companies will be in charge of the production of the below systems and will be delivering them to the main contractor: Aselsan - Electronic systems of the tank, including fire control and active protection systems, Roketsan - Armor System, MKEK - Main Weapon System and Havelsan – Training simulator systems for the tank. The share of

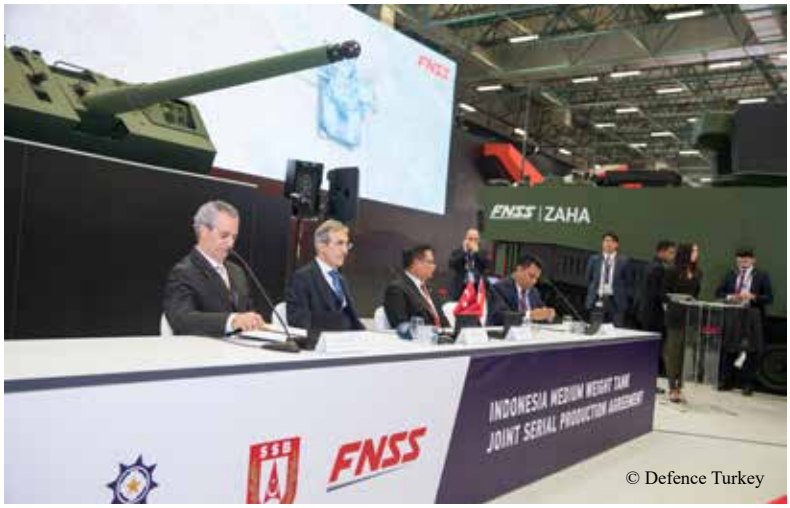
the signed subcontractor contracts over the total size of the Project will be nearly 40%. The total contract value of only the portion of Aselsan as part of the ALTAY Serial Production Project was declared to be EUR 840,986,250. The delivery of the products required for the training tools that will be formed for the user/ maintenance training of the sub systems to be delivered within the Project is aimed to be accomplished as part of the contract as well.

Kaplan MT Medium Weight Tank Serial Production Contract

The Long-Term Contract on the Serial Production of Kaplan MT (Harimau) Medium Weight Tank Serial was signed on the first day of the fair, on April 30, for the Indonesian Land Forces between FNSS Savunma Sistemleri A.Ş. and PT Pindad. The signature ceremony was held with the participation of the high - level officers from the Presidency of Defence Industries, Indonesian Ministry of Defence and Indonesian Armed Forces. The serial production of the vehicles to be delivered to the Indonesian Army as part of the contract will be jointly accomplished by FNSS and PT Pindad.

The development period of the Kaplan MT (Harimau) Medium Weight Tank Prototype was completed as of 2018 and the development activities were launched at the end of 2015 by FNSS and PT Pindad in accordance with the defence industry cooperation agreement signed by the Indonesian and Turkish governments. KAPLAN MT was developed with a technology transfer model in a period shorter than 3 years and the production of its two prototypes was completed. KAPLAN MTs' prototypes went through very comprehensive and challenging tests run by the Indonesian Army and Ministry of Defence both in Turkey and Indonesia.

The tests of the Kaplan MT (Harimau) were completed successfully and it is the first medium weight tank to be certified by the Indonesian Army and qualified for serial production. Kaplan MT is the only medium weight tank which is qualified and certified by a user on the global market. The long-term cooperation agreement for serial production signed at IDEF'19 by



the two companies covers the production of 18 tanks within two years.

Low Altitude Radar System Project Signed by the SSB and Aselsan

The Contract on the Low Altitude Radar System Project was signed between the Presidency of Defence Industries (SSB) and Aselsan on May 1st. President of the Defence Industries Prof. İsmail DEMİR, Aselsan President & CEO Prof. Haluk GÖRGÜN, Vice President of Defence Industries Mustafa ŞEKER, high ranking commanders of the Air Forces Command and many sector representatives were present at the signing ceremony.

Within the scope of the Project, the aim is the effective inclusion of the low altitude and medium/long range areas that are not covered by the Early Warning Radars in air surveillance and the areas that could not be covered in times of the

breakdown of Early Warning Radars. The first system delivery will be taking place in 2022 and 5 AIR Systems will be procured as part of the project.

The aforementioned radars will be procured to fulfill the demands of the Air Forces Command and with the help of these radars will enable effectiveness against fighter aircraft, helicopters, UAV systems, stealth aircraft and anti-radiation missiles, covering the zones that could not be covered by long range radars, and will have high maneuver capability and acquisition of targets with a low radar cross section likely to emerge from low altitudes.

The IFF of the targets identified and tracked with the Indigenous Mon5/S IFF system over the radar and the data regarding friendly elements will be able to be monitored instantly over the radar terminals. The system will also be able to be integrated with the air defence systems located nearby. To this end, search functions for the early warning and land positioned air defence systems will be fulfilled by the radar and the target data will be directly transferred to the weapon systems. In this way, the duration for the integrated air surveillance and reaction time of the defence system will be reduced as well.

Transportable Electronic Warfare System to be Procured for the Land Forces Command

On the third of the fair, the contract on the Transportable Electronic Warfare System Project was signed between the Presidency of Defence Industries and Meteksan Savunma

A.Ş. with the participation of the President of Defence Industries Prof. İsmail DEMİR, Meteksan General Manager Selçuk ALPARSLAN, Bilkent Holding Chairman Tunç BATUM and SSB officials. In line with the demands of the Land Forces Command, the deliveries are projected to be completed in 2021 within the scope of the project where transportable Electronic Warfare (EW) Systems with the capability of jamming the frequencies used by the enemies' radios. The systems to be delivered can be back carried by the staff and they will be delivered in two different configurations; fixed or positioned over the vehicle.

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The Contract of SPTWAV program was signed during the IDEF' 19

PARS Scout 8x8 and 6x6 to Enter into the Turkish Armed Forces' Inventory

FNSS Savunma was selected as the main contractor company upon the decree of the Defence Industry Executive Committee (SSIK) with the tender launched to fulfil the Special Purpose Tactical Wheeled Armored Vehicle (SPTWAV) demands in two different configurations - 8x8 and 6x6 - of the Land Forces Command and Gendarmerie General Command and contract negotiations with the company were launched in this direction. To this end, the project contract launch ceremony was signed on the third day of the fair, on May 2nd, by FNSS President & CEO K. Nail KURT and Vice President of the Presidency of Defence Industries Mustafa Murat ŞEKER.

The vehicle will be developed in five different configurations in the initial stage of the project in line with the indigenous development model and a total of 100 vehicles will be manufactured. Within the scope of the Project, Command and Radar Vehicles and Sensor and CBRN Reconnaissance Vehicles will be delivered to the Land Forces Command and Armored Combat Vehicles will be delivered to the Gendarmerie General Command.

Within the scope of the SPTWAV Project, the new member of the PARS group Scout 6x6 and 8x8, specifically designed by FNSS for the reconnaissance operations, with their superior maneuver capability enable a comfortable and secure drive, a steady drive at high speeds at straight roads, low yaw risk on curved roads, transparent armor (ballistic window) integration and high situational awareness. Indigenous sub systems will be used in the main automotive equipment such as the engine and power train equipment in the PARS Scout 6x6 and the 8x8 Tactical Wheeled Armored Vehicles that were designed and manufactured fully through indigenous facilities and will be entering into the inventory of the Turkish Armed Forces for the first time.

Local and International Cooperation Agreements from ASFAT

With 30 years providing modernization, repair, maintenance to the Turkish Armed Forces, ASFAT A.Ş. offers these services to all friendly and allied nations with the approach of a solution partner, and signed strategic cooperation agreements in many areas at the IDEF'19 14th International Defence Industry Fair by negotiating one-on-one with international delegations and companies. As part of the Ministry of National Defence's stand during IDEF'19, ASFAT became the party to sign the greatest number of agreements at the fair by signing 20 agreements with local and international companies.

ASFAT A.Ş. General Manager Esad AKGÜN was present at the ceremonies where ASFAT signed international agreements with Vard from Canada, Damen from Netherlands, UkrObronProm from Ukraine and with Airbus Defence while the company signed many strategic cooperation agreements with local companies such as Meteksan Savunma, Best Grup,

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ASFAT and Airbus signed an agreement at IDEF' 19

YDS, Alp Havacılık, Istanbul Defence and Aerospace Cluster (SAHA), OSTIM Defence and Aerospace Cluster (OSSA), METU Teknokent Defence Industry Cluster (TSSK), Eskişehir Aviation Cluster (ESAC), Izmir Aerospace Cluster (HUKD).

This company containing 27 factories, 3 shipyards and a labor power of nearly 20 thousand people will conduct its retrofit activities that will enable the accomplishment of the final configuration of the aircraft as part of the Airbus MRO within the scope of the A400M Project at the Kayseri 2nd Air Supply Maintenance Factory Directorate as of 2020. On account of the acquired capability, the retrofit activities of other countries that use the A400M are aimed to be conducted in Turkey.

Cooperation Agreement on the Development of Kamikaze Multi-Rotor UAV System Signed between Roketsan and Aselsan

On the 2nd day of the fair, a Cooperation Agreement on the development of Kamikaze Multi-Rotor Unmanned Aerial Vehicle (UAV) System was signed between Roketsan and Aselsan, which are the two major institutions of the Turkish Defence Industry. Through this agreement, Roketsan's UAV Ammunition (RİHAM) would be integrated to Aselsan's Multi-Rotor UAV, thus meeting an important requirement of Turkish Armed Forces.

6 Cooperation Agreements for Local Production on Defence and Aerospace Area Led by SAHA Istanbul

At the signing ceremony organized by the Defence and Aerospace Cluster Association (SAHA Istanbul) at IDEF' 19, a protocol was signed regarding indigenous production in 6 project groups in areas of defence and aerospace. With the help of these 6 agreements signed under the guidance of SAHA Istanbul established to render Turkey capable of manufacturing its own aircraft, vessels and strategic products through indigenous resources, Turkish companies will develop sub systems in areas of defence, aerospace Moreover, 2 international cooperation protocols were announced and signed at a ceremony for projects that would make a crucial contribution to the indigenization of the aerospace and defence industry.

Deputy Minister of Industry and Technology Hasan BÜYÜKDEDE, Deputy Minister of Industry and Technology Faith KACIR, TÜBİTAK President Prof. Hasan MANDAL, SSB Vice President Celal Sami TÜFEKÇİ, Deputy Director General of the Turkish Armed Forces Foundation Sadık PİYADE, SAHA Istanbul Chairman Haluk BAYRAKTAR and members of the TÜBİTAK SAYEM consortium participated in the signing ceremony taking part at the SAHA Istanbul stand at IDEF' 19. TAI Chairman Prof. Oğuz BORAT, TAI CEO Temel Kotil, Aselsan President & CEO Prof. Haluk GÖRGÜN, Roketsan President and CEO Selçuk YAŞAR, TÜBİTAK BİLGEM President Prof. Hacı Ali MANTAR, Ermaksan President and CEO Ahmet ÖZKAYAN, President of the Gebze Technical University Prof. Hasan ASLAN, President of the Fatih Sultan Mehmet University Prof. Fatih ANDI were amongst the names making their mark on the projects.

SAHA Istanbul focuses on establishing consortiums by gathering sub system manufacturer companies and universities active in the same areas and facilitates the production of the sub systems available in Turkey by building production groups for the sub systems that cannot be manufactured in Turkey and launches cooperation activites between industry-universities. In line with this target, these 6 projects developed by SAHA Istanbul member companies and universities will contribute greatly to Turkey's national defence industry and their tests have already been completed. The aforementioned projects were accepted to the 1st Phase call of the TÜBİTAK SAYEM Program.

The 6 projects to be executed as part of the program are listed as follows: the project on "Laser Air Defence System Development" against artillery, mortar and missiles with air - to - ground ammunition under the guidance of the consortium composed of Aselsan, Roketsan, Ermaksan, Saver, TÜBİTAK BİLGEM and Gebze Technical University; the "Air Conditioning Systems Used in Flying Platforms" project to be used for the first time in the HÜRKUŞ under the lead of the consortium established by Gökser Havacılık, Anova, Friterm, Gürmetal, CES companies and Marmara University; the "Development of the Nickel Metal Powder Eligible for Additive Manufacturing for Aviation Applications – ATOM" project for the manufacturing of the parts to operate at turbine engines led by the consortium consisting of Ermaksan, Aluteam, Mayıs Tasarım, Toyotesu and Fatih Sultan Mehmet Foundation University; the "Road Map on the Development of Measuring, Testing and Navigational Control Unit for the Autonomous Operation of the Unmanned Naval Platforms (İDA-OTO SEVK)" conducted by

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Steve HILLS - AIOLOS CEO, Prof. İsmail DEMİR - President of SSB, Temel KOTİL - President & CEO of Turkish Aerospace

the Elkon company and TÜBİTAK MAM; the "Satellite Communication Terminal Systems" project executed by the consortium of NETA, Profen, ICT, NETPA and Istanbul Technical University, and last but not least the project on "Nano Particulate Reinforced Composite Material with High Performance in High Temperatures" executed with the cooperation of Marmara University and Altıgen Panel.

Memorandum of Understanding Between Havelsan and Environics

Havelsan and Environics have signed a Memorandum of Understanding (MoU) to co-operate on identifying and developing mutual opportunities for the CBRN Sector in Turkey on the 2nd of May at IDEF' 19.

According to this MoU Havelsan and Environics intend to establish a new Joint Venture entity in Turkey. Before entering into the Joint Venture agreement, Havelsan and Environics will finalize a business plan and complete market analysis for the CBRN sector together.

The scope of the intended Joint Venture co-operation will include identifying opportunities, carrying out pre-sales actions, preparing technical and commercial offers and supporting such proposals until the contracts are awarded and they will collaborate in the execution of such awarded contracts and identify working conditions.

Agreement on Major Subsonic Wind Tunnel by Turkish Aerospace and AIOLOS Engineering

The "Major Subsonic Wind Tunnel Contract" signed between Turkish Aerospace and Canada based company AIOLOS Engineering was one of the most critical agreements signed at IDEF'19. The signatures were made by Turkish Aerospace President and CEO Temel KOTİL, Space Systems Vice Director General Selman NAS and AIOLOS CEO Steven HILLS at the ceremony taking place on May 2nd.

The facility to be established at the edifices of Turkish Aerospace is aimed to become one of the top three subsonic wind tunnels in the world. Signed by AIOLOS Engineering CEO Steven HILLS and Turkish Aerospace President and CEO Temel KOTİL, the "Major Subsonic Wind Tunnel" is expected to be launched to service by 2023. The tunnel is expected to provide services primarily to Turkey and then to the aerospace, defence, automotive, environment and urban planning sectors across the world.

Critical Protocol of STM and Aselsan on Vessel Technologies

At the IDEF'19 defence fair, under the guidance of the Presidency of Defence Industries, a crucial protocol on the "Development of the Electrical Drive Systems at High Speed Boats" was signed by STM and Aselsan. The goodwill protocol signed by Savunma Teknolojileri Mühendislik ve Ticaret A.Ş. (STM) and Aselsan took place on April 30th at the 14th IDEF International Defence Industry Fair. STM Chairman Celal Sami TÜFEKÇİ, STM CEO Murat İKİNCİ, Aselsan Chairman and CEO Haluk GÖRGÜN and Aselsan Executive Vice President İbrahim BEKAR attended the signature ceremony.

With the protocol, execution of the joint activities by STM and Aselsan on the development of electrical drive system beginning to gain importance for vessel technologies and their joining forces by gathering their know - how and experiences area aimed. In this way, development of cooperation and generation of fully indigenous solutions on the electrical drive systems that are expected to become more critical in the future are planned.

STM and Aselsan was signed a protocol for Vessel Technologies at IDEF' 19

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Asisguard and Dahua Technology's Public Security Systems Technology Transfer Agreement

Established by Asis Electronics and Information Systems with the vision of developing indigenous systems for the defence industry, Asisguard signed a technology transfer agreement at the IDEF'19 defence fair in order to manufacture mainly thermal solutions and Dahua's high technology products indigenously in Turkey with the technology partnership of Asisguard. At the signature ceremony held on May 1st, Asis Electronics and Information Systems Chairman Salih GÜÇBİLMEZ underlined that Asisguard worked in order to develop innovative technologies that will undertake critical tasks in public security and noted that as a result of the strategy and technology transfer agreement they made with Dahua Technology, the cooperation of the two companies will increase in the upcoming period along with increasing dialogue and R&D activities.

As part of the agreement, Asisguard will be benefiting from Dahua's experiences in thermal solutions area in the projects it will be developing in thermal technologies area. The facilities for the indigenous production of the products on which the parties agreed in Turkey and their integration will be assessed and projects in commercial sense will continue to be worked on for the benefit of all parties.

The Signing Ceremony was held on IDEF'19 between Asisguard and Dahua Technology

Aspilsan Enerji A.Ş. and Sabancı University's Cooperation Protocol on R&D

A "Protocol on the Framework Agreement on Cooperation in R&D and Mentorship" regarding the joint scientific and technological researches in "Energy Storage Technologies" was signed between the Aspilsan Enerji A.Ş. which is one of the Turkish Armed Forces Foundation affiliates active in energy storage, and Sabancı University was signed at IDEF'19. The signing ceremony for the cooperation protocol was realized with the participation of Aspilsan Chairman İlhan BÖLÜK, Turkish Armed Forces Foundation Deputy Director General Sadık PİYADE, Sabancı University President Prof. Yusuf LEBLEBİCİ, Aspilsan Enerji CEO Ferhat ÖZSOY and Vice President of the Sabancı University Prof. Fuat KEYMAN.

The aforementioned protocol covers the execution of graduate, post graduate and doctorate level activities at Sabancı University in areas where Aspilsan Enerji is in need. One of the main elements of the protocol is the focus on conducting joint activities that will benefit from the know-how, experience and resources of Sabancı University, within the scope of the projects to be developed by Aspilsan Enerji. Additionally, as part of the protocol, opportunities to work and conduct research at the R&D Centers of Aspilsan Enerji will be provided to the academicians of Sabancı University.

STM and FNSS Sign a Goodwill Protocol

At IDEF'19 land systems manufacturer FNSS and STM, making a mark on critical projects for autonomous systems, signed a crucial protocol for executing joint activities under the guidance of the Presidency of Defence Industries. The signing of the TOGAN Goodwill Protocol took part on May 2nd between STM and FNSS companies. STM Chairman Celal Sami TÜFEKÇİ, STM General Manager Murat İKİNCİ and FNSS CEO Nail N. Kurt and FNSS Marketing and Programs Group Head Aybars KÜÇÜK attended the signing ceremony.

The Protocol contains the activities for the integration of manned/unmanned armored combat vehicles, armored personnel carriers, reconnaissance and surveillance vehicles and turret systems, that are

Aspilsan Enerji A.Ş and Sabancı University were signed a protocol agreement at IDEF'19

being designed and manufactured by FNSS, to fixed and rotary wing smart ammunition systems, reconnaissance and surveillance purposed mini unmanned air vehicles developed by STM. To this end, STM and FNSS aim to conduct joint activities, joining forces by gathering know-how and experience and cooperate on potential future projects that may be jointly realized in the future.

Export Agreement Between Alp Aviation and Kidde Dual Spectrum

An Export Agreement regarding the Fire Suppression System Components was signed between Alp Aviation and Kidde Dual Spectrum during the IDEF' 19 International Defence Industry Fair. The signing ceremony took place on May 1st with the participation of Alp Aviation Chairman Tuncer ALPATA and Kidde Aerospace & Defence General Manager Erin McCLEAVE.

Within the framework of the agreement, Kidde Dual Spectrum will supply the components of the Fire Detection and Prevention Systems that will enable fires to be extinguished that may emerge at critical military and civilian facilities, shelters and sites which will maintain the survival of the staff.

Altay Software and Konsgberg Signed MoU on Software Export

Altay Software and Norwegian Kongsberg signed a cooperation agreement with the participation of President of Defense Industries Prof. İsmail DEMİR, Altay Software Chairman Murat DURAL, and Hans KONGELF - VP at Konsgberg Defence Systems. In his statement at the signing ceremony, Altay Software Chairman Murat DURAL pointed out that they first started working with Kongsberg in 2001 and that the first export from Turkey in the field of military software was to Kongsberg. "Since then, we have exported military software to around ten countries. The MoU we signed today covers four years. Our export target has already been set, and we aim for three countries. This agreement is considered as part of Kongsberg's eco-system. As a Turkish company, this makes us very proud." The MoU agreement covers integrated software packages for Naval Platforms.

Murat DURAL - Altay Group Chairman, Prof. İsmail DEMİR - SSB President and Hans KONGELF - VP at Konsgberg Defence Systems

Logistical Support Cooperation Protocol for the Airborne Early Warning and Control System

At IDEF' 19, a Cooperation Protocol was signed between the Presidency of Defence Industries and Turkish Technic as part of the Airborne Early Warning and Control Aircraft System Logistical Support Project. President of Defence Industries Prof. İsmail DEMİR, Turkish Technic CEO Ahmet KAHRAMAN, officials from the Air Forces Command and the SSB as well as sector representatives attended the signing ceremony.

Procurement of all products and services that may be required by the Air Forces Command including all kinds of support equipment, technical documentation, maintenance and repair user and maintenance training and calibration are planned with the aforementioned project.

TÜBİTAK SAGE and Roketsan Signs Protocol on the Production of TST 101 Plugs

On the second day of the event. TÜBİTAK Defence Industry Research and Development Institute (SAGE) and Roketsan signed a cooperation protocol on the development and production of the TST 101 Plugs which are used.

Roketsan Chairman Prof. Faruk YİĞİT, TÜBİTAK President Prof. Hasan MANDAL, TÜBİTAK SAGE Director Gürcan OKUMUŞ and Roketsan President and CEO Selçuk YAŞAR signed the protocol.

As a result of this cooperation which will contribute to indigenous and national production, Turkey's position in the international defence industry market is expected regarding general purpose bomb plugs launched from the MK-80 series aircraft.

TRNC City Security Management System and License Plate Recognition System

The City Security Management System and License Plate Recognition System Project TRNC Package Contract was signed on May 2nd by the Presidency of Defence Industries, Aselsan, the Turkish National Police and the TRNC Police Department.

According to the demands of the Turkish National Police, within the scope of project the City Security Management System and License Plate Recognition System was installed in all cities and provinces of Turkey in order to contribute to the fight against terrorism and the security and safety. A total of 45,000 cameras and nearly 7,500 license plate recognition systems were launched into service so far and the management of all systems occur from a single center and it is maintained with the help of the indigenously developed software.

Within the scope of the City Security Management Systems TRNC Package decisions were made regarding the installation of 345 Steadicams, 94 Mobile Cameras, 22 Laser PTZ Cameras and 237 lanes of

License Plate Recognition Systems at 161 points as per the requirements, essential modernization operations at the building to be used as the City Security Management System (CSMS) Center, and accomplishment of the adaptations over the central software for their utilization at the TRNC. The SSIK decree on the launch of the CSMS TRNC Package was adopted following the field trip made to the TRNC in February 2019 in response to the request for the installation of the City Security Management Systems and License Plate Recognition Systems at the points that were provided by the TRNC authorities. Within the scope of the Project, system acceptance is planned to be completed within 12 months following the start of the activities for the installation and field operation launch.

Nero Industry's Laser Warning and Smoke Grenade Launcher Export Agreement

Ukraine was the first customer for the Smoke Grenade Launcher and Laser Warning Systems that was indigenously developed by Nero Industry. Within the scope of the contract signed on May 1st is valued at nearly over EUR 1 million. The product contains 90 sets of Smoke Grenade Launchers and Laser Warning Systems will be manufactured by Nero Industry in line with the demands of the Ukrainian army.

The Laser Warning System developed by Nero Industry increases the defence capability of armored land vehicles against laser guided missiles through an effective solution as it perceives the laser signals directed towards the vehicle and automatically fires towards the point the laser is directed, the point at which the potential threat is located. In this way, the contact of the laser with the vehicle is disconnected and the guidance characteristics of the missile is neutralized. Additionally, the Smoke Grenade Launcher system obstructs enemy surveillance and tracking of the vehicle with night and day vision devices. This system costs 4 - 5 times less than its rivals on the market and offers effective solutions and could be integrated to all types of land vehicles, beyond critical platforms such as main battle tanks.

Ali Can ÖKÇÜN - Chairman of the Executive Board at Nero Industry and Executive of Ukraine Company signed a cooperation agreement at IDEF' 19

On account of the system which will be initially used by the Ukrainian Army, Nero Industry aims to increase the qualification level through the experiences it will gain. The systems will be integrated into 30 vehicles at the initial stage and this figure is expected to increase in the upcoming period.

Delivery Ceremony of the Rotary Wing Attack Drone System KARGU

The announcement regarding the delivery of the 105 KARGU Rotary Wing Attack Drone Systems developed by STM was made on the second day of the fair. According to the announcement, the delivery of the 105 Rotary Wing Attack Drone System KARGU was accomplished as part of the "Equipment and Service Procurement Contract for Homeland Security, 5th Special Purposed Equipment Package ANNEX-C Appendix-70 Deliveries" with the Unmanned Air Vehicles Department of the Presidency of Defence Industries. Deputy Director General in Charge of Technology at STM Ömer KORKUT, STM Information Systems Manager Aydın KARA, Unmanned and Smart Systems Department Head Gökhan UÇAR and Unmanned and Smart Systems Department Project Manager Hakan ÖZBİLGİN attended the ceremony.

KARGU is an indigenous rotary wing UAV solution that can be deployed and operated by single person in both autonomous and manual modes, and it is engineered specifically for anti-terror and asymmetric warfare scenarios. The KARGU can rapidly and effectively respond against stationary or mobile targets through its embedded real-time image processing capabilities and deep learning algorithms. The system is comprised of the rotary wing attack drone (RWAD), a ground control unit, and a UAV recharging station component. The KARGU is capable of reaching a maximum altitude of a thousand meters and a speed of 72 kilometers per hour. The drone system with a range of 5 kilometers featuring a laser range finder, mission aborted function, and emergency disposal characteristics is expected to stand out at asymmetrical war and border security areas.

Goodwill Agreement on IoT Security

At IDEF'19 a Goodwill Agreement by Vestel Elektronik one of Turkey's greatest electronic manufacturers and member of the cluster was signed on the Security of the Internet of Things (IoT) with the Turkey Cyber Security Cluster which performs services under the auspices of the Presidency of Defence Industries which was established for the development of the cyber security eco-system in Turkey.

The objective of the agreement is the establishment of an IoT ecosystem and the analysis of the sector through the organization of workshops and meetings. The agreement was signed by the Vice President of Vestel Burak SAVAK and officials of the Presidency of Defence Industries

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Turkish Aerospace's Unique Platforms were on Stage at IDEF'19

Turkish Aerospace showcased its unique platforms that are included in the Turkish Armed Forces inventory and the development processes of which are still ongoing at the 14th IDEF International Defence Industry Fair. Turkish Aerospace revealed the T625 GÖKBEY helicopter at IDEF' 17, and at this year's exhibition, the ANKA AKSUNGUR MALE Long-Endurance UAV as well as the 10 Ton Class ATAK-2 Attack Helicopter was unveiled by Turkish Aerospace. The HürKuş-B New Generation Basic Trainer Aircraft, which is still under the procurement process in line with the requirements of the Turkish Air Force, took part in the exhibition with its new generation cockpit equipped with Aselsan military avionics for the first time. The T129 ATAK helicopter, HürJet Advanced Jet Trainer & Light Attack Aircraft and 6 Ton Class T625 GÖKBEY Helicopter were also displayed in Turkish Aerospace's closed static display area.

During the three-day fair, Malaysia Air Force Commander 1st Army Commander Gen. Musa AVSEVER, Combat Air Force Commander Gen. Atilla GÜLAN and the Pakistani delegation together with Turkish Chief of General Staff Gen. Yaşar GÜLER and the accompanying delegation visited Turkish Aerospace's booth on the first day of the exhibition. During the visit, detailed information about the platforms was presented by Temel KOTİL, President & CEO of Turkish Aerospace. Turkish National Defence Minister Hulusi AKAR was amongst the visitors of the stand in the following days. During this visit, AKAR and the accompanying delegation closely examined the ANKA AKSUNGUR and the T625 GÖKBEY helicopter. The Commander of the Turkish Air Forces Gen. Hasan KÜÇÜKAKYÜZ and Gendarmerie General Commander Gen. Arif ÇETİN also received information from executives about the 10 Ton Class ATAK-II Helicopter

as they visited the Turkish Aerospace booth. During IDEF'19 more than ten high-level official delegations from Turkey and abroad as well as thousands of visitors visited the company's booth.

President & CEO of Turkish Aerospace Temel KOTİL gathered with the correspondent and editors of media on the third day of the exhibition. He shared his assessment of the exhibition with the media and shared details about the latest status of the development programs that are under the charge of Turkish Aerospace.

At the press meeting, KOTİL mentioned that Turkish Aerospace assumed a critical role in the development and production of unique national platforms and added that existing capabilities and ongoing development projects were under the charge of Turkish Aerospace.

KOTİL: "Our major project as Turkish Aerospace will be our 5th Generation fighter jet project dubbed as TF-X. The date of its rollout will be 2023. We are aiming for its maiden flight in 2026 (this schedule was revised as 2025 at the Paris Air Show TF-X Launch ceremony). The delivery of the first lot of these fighters will be projected in 2029 (also revised as 2028 at the Paris Air Show). There were no infrastructures for massive wind tunnels in Turkey, so we are establishing a subsonic and supersonic wind tunnel infrastructure within the scope of the program. We will be establishing the entire infrastructure such as lightning test facilities, electromagnetic interference tests, and composite facilities within our organization. The number of our engineers has reached 300 and also 100 engineers are employed at BAE Systems. We will increase the number of our engineers to 3,000 from the existing total of 400".

KOTİL: "Turkish Aerospace will be increasing its annual production volume of Helicopters to 120 within the five helicopter projects"

Underlining that to date Turkish Aerospace has mostly been competent in helicopter platforms fields, KOTİL added that they were working on the development projects such as GÖKBEY in a 6-ton class, ATAK-2 in 10 ton-class and 10 ton class Unique Utility Helicopter and when the T129 ATAK helicopter serial production and the T70 helicopters to be manufactured under Sikorsky License are added,

they will be considered among the world's greatest OEMs. KOTİL continued, "As Turkish Aerospace, we are focusing on completing these five programs within five years. We will be manufacturing two platforms each month, and this will be nearly 120 helicopters on an annual basis. I presume Leonardo Company is the 3rd or 4th greatest helicopter manufacturer of the world, manufacturing 150-160 helicopters per year. We will become the fourth or fifth greatest helicopter manufacturer on a global scale. Helicopters are one of our strongest departments. 400 employees are currently employed just in our Helicopter Department".

Stating that Turkish Aerospace achieved crucial progress in Space programs as well, KOTİL said, "Within the scope of space programs, the development and production process of GÖKTÜRK 6A is ongoing. The B model of this satellite will be manufactured in the aftermath and it will be launched and placed into orbit in 2020. For the first time Turkey is building its own satellite within these projects. Three satellites are being manufactured in our plant. The first one will be utilized for mechanical testing, the second one will be the satellite where all systems will be integrated and tested following the engineering model and the third will be the one to be launched into space. Presently, we are manufacturing the 2nd satellite. On the other hand, we teamed up with a satellite company from Argentina for a communication satellite which is a small GEO that will operate in a commercial orbit. We built a partnership with this company to this project. These Small GEO satellites in the 1-2 ton class are lighter than the conventional satellites, yet they feature a different technology, chemical fuels are being used in regular, classical satellites for commanding the satellite. Whereas, in small GEO satellites, there are ion thrusts operating the satellite with the electrical energy absorbed from solar panels. Our Argentinian partner owns such technology and we possess other technologies. Therefore, we are quite good at satellites as well".

Bertan KURT- Chief of Staff to CEO, Fahrettin ÖZTÜRK - VP, R&D and Prototype Operations, Temel KOTİL - President & CEO and Yusuf EKİZ, Executive Corporate Communications Manager of Turkish Aerospace

Pointing out that they exceeded the limit of US$ 500 million in the export of aerostructure parts, KOTİL dded that they aimed to increase the aforementioned figure to US$ 2 billion in the upcoming period. KOTİL shared that as a company building its own platforms, Turkish Aerospace would always stick with manufacturing structural parts of aircraft and underlined that they will never pull out of the production of structural parts to the original equipment manufacturers such as Boeing and Airbus. Stressing that they invested heavily in composite production KOTİL said, "We are making a major investment regarding composite. We are building the world's fourth greatest facility that occupies an indoor area of 95 thousand square meters. We need to utilize the cutting-edge technologies of Europe and Turkey's low-cost labor".

Making statements upon a question on how their production will be affected if Turkey was removed from the F-35 Joint Strike Fighter Program, KOTİL said, "We are in charge of the production of F-35s center fuselage. Additionally, we integrated all equipment such as the hydraulics and pipes inside the fuselage. These center fuselages are then dispatched to the Northrop Grumman facility and after that they are dispatched to Lockheed Martin for the final assembly. This production process does not have a major share within our portfolio of US$ 500 million. It is not my place to comment on how both countries will come to a decision, or which consequences we may face, but our department for aerostructures has already ramped-

10 Ton Class - ATAK-II Helicopter mock-up was unveiled at IDEF' 19

up its production capabilities. We have been receiving huge demands and are producing in three shifts. We are having a hard time catering to the requests in the production of aerostructures and eventually, founding a new plant is inevitable. We are investing in this composite facility".

Turkish Aerospace to Establish the World's Fourth Largest Composite Facility

Aerospace will establish Turkey's largest and the world's 4th largest composite facility under a single roof. The facility, which will be built with an investment of US$ 181 million, will occupied an indoor area spanning 95 thousand square meters at the company's central campus in Kahramankazan. The giant plant, where structural components of aircraft and helicopters will be manufactured, aims to supply 2 percent of global aerostructure composite requirements.

In addition to high-level technological production, new product designs and product developments will be performed at the facility. High accuracy and efficiency will be achieved by utilizing the autonomous devices in all processes in the plant. Preparing its infrastructure for Industry 4.0, Turkish Aerospace will actualize its composite facility as a smart digital factory and support production with VR/AR (Virtual and Augmented Reality) applications. According to the composite type, precision and faultless production will be made with customized robotic, autonomous equipment. Machine to Machine communication will also be actualized in the facilities. The facilities will be equipped with thousands of sensors and communication systems and the entire production process and efficiency can be monitored in real-time. Advanced cutting and measuring systems will be used in the facility. Produced parts will be subjected to quality control processes by means of nondestructive testing methods with ultrasonic and x-ray systems and their assembly will be completed. Dyeing houses will operate autonomously with artificial intelligence and all parts will be handled in an untouched method and made ready for shipment.

ANKA AKSUNGUR Advanced Long-Endurance UAV

Conveying information on the development process of ANKA – AKSUNGUR, KOTİL stated that the platform was developed over the ANKA platform and was completed in a short period of 18 months and continued: "The test flights of the first platform are still going on. We are displaying the second platform here at IDEF. We will be delivering the third aircraft to the Turkish Armed Forces this year. We have been funding this project through our own resources and have allocated a modest budget to this program. It will be delivered to the end-user within two years".

ANKA AKSUNGUR Advanced Long-Endurance – Multirole Intelligence, Surveillance, Reconnaissance and Attack UAV will be on Duty by 2020!

Upon the launch of the serial production of the ANKA product family, in August 2017, the Turkish Aerospace Unmanned Systems Department started to work on five different alternatives to develop an Unmanned Air Vehicle that can carry more payload and munitions. Following the presentation on this subject, the program was launched through company's own funds in line with the Board decision. The conceptual design activities were accelerated in September 2018 over the selected design within the scope of the program. The System Requirements Review Meeting was completed on 18 October 2017 and the pre-design review meeting was held on 13 February 2018. Eventually, the review meeting for the detailed design took place on 20 June 2018. According to the 17 month program schedule, Turkish Aerospace launched the prototype production in a short span of time. To this end, a new wing was swiftly designed for AKSUNGUR, the software and hardware of which were based on the ANKA configurations. These wings were designed within a group concept by Turkish Aerospace engineers. The wings are in forms of mid and outer wings enabling both portability and fitting in the hangar.

The prototype was first powered on 4 December 2018 and AKSUNGUR was eventually rolled out on 28 January 2019. Following this, the ground tests of the platform were launched on 17 February 2019. The ignition of engine run-up on 28 February 2018, and the taxi tests were launched on 7 March 2019. On 20 March 2019, AKSUNGUR which has a 24-meter wingspan and is powered by twin engines, successfully accomplished its maiden flight which lasted 4 hours and 20 minutes.

Two turbocharged PD170 diesel engines developed by TEI powered the platform in the maiden flight of ANKA AKSUNGUR and thus the platform is the first user of the PD170 engines in Turkey. AKSUNGUR is projected to complete its certification and qualification flights with the PD 170 engines. But the serial production

ANKA AKSUNGUR was accomplished its maiden flight on 21th March, 2019

configurations are going to lift-off with a pair of PD222 (165 KW) engines that are an upper version of PD 170. TEI continues to develop PD222 over the PD170 engine.

Within the scope of the program in which a total of three prototypes are to be manufactured, the first prototype accomplished its debut flight in March 2019, and it is currently under flight tests, the second prototype is expected to become involved in the test campaign at the end of July. The third AKSUNGUR to be built as part of the program will be directly delivered to the end-user at the end of 2019. The two platforms cumulatively are expected to complete about 50-60 hours of test flights by the end of 2019. AKSUNGUR is also planned to be qualified in way to be able to drop at least one of the unique heavy munitions by the end of 2019. In the shared data provided by Turkish Aerospace, if no delay occurs, AKSUNGUR's qualification will be finalized in February 2020 and its serial production will be launched in the first quarter of 2020.

AKSUNGUR has an endurance capacity of 40 hours with 750 kilograms of payload at a 40.000ft altitude as well as 3.3-ton maximum take-off weight. Thanks to the open system architecture, allowing different operation concepts, the platform is capable of carrying various payloads and ammunition. For Maritime Patrol Missions, it will have an endurance capacity of 12 hours at an altitude of 25.000ft with a 750 kg payload. Throughout SIGINT Missions its endurance capacity will be 24 hours at 40.000ft with 150kg payload. The platform is capable of carrying EO/ Infrared/ Laser Designator/ Laser Range Finder Camera, SAR/GMTI-ISAR Camera, Wide Area Surveillance, SIGINT, COMINT/DF and ESM/ELINT payload options in respect with the Imagery Intelligence mission. Last but not least, regarding Maritime Patrol Missions, the platform features SAR/GMTI-ISAR, automatic identification system, sonobuoy mission pod and MAD Boom payload options. In terms of communication systems payloads, the platform contains SATCOM Satellite Communication, Personnel Locator System (PLS), V/UHF Radio Relay and communication service pod as well. In terms of ammunition, AKSUNGUR features 3 weapon stations at each wing with capacities of 500 Kg, 300 Kg and 150Kg. TEBER -81 (laser guided MK-81), TEBER-82 (laser guided MK-82), LUMTAS, MAM-L, CİRİT, MAM-C, HGK-3 (Precision Guidance Kit) and KGK (82) (Winged Guidance Kit) and Smart Bombs could be carried within these stations.

Temel KOTİL - President & CEO of Turkish Aerospace

KOTİL: "We Aim to Increase our Consolidated Turnover to US$ 11 Billion in Ten Years"

Adding that they will be launching the GÖKSUNGUR project which will be capable of reaching higher levels of speed in the next stage of AKSUNGUR, KOTİL also spoke about the turnover and staff aspects and their objectives for the upcoming period in the final part of the Q&A session.

KOTİL stated that they employed 1000 engineers at their organization each year and said, "We employ about 1000 engineers each year and we aim to set up a robust eco-system. To this end we are particularly engaging with the high school students. There is a technical high school in aviation in Kızılcahamam and we are engaged with this school via the Ministry of National Education. Gazi University has a two-year aviation academy in Kahramankazan, we are engaged with this school as well and 400 students have been involved in our internship program. We have a good cooperation with İTÜ, METU, Yıldız Technical University, Bursa Uludağ University and other universities across Turkey. Because we need the young people to work for us starting from high school. We currently have 1000 intern engineers. They are 3rd and 4th year university students, and they come and work for us at minimum once a week. Currently, many students from various cities such as Gaziantep and Trabzon are coming to our company. The Credit and Dormitories Directorate are providing them accommodation. And we pay them a salary of approximately TL 1200. We made protocols with 45 universities. In addition to 1000 engineers being trained at our facilities, there are 1000 technicians and at least half of them will be working for us when they graduate in two years".

Telling that they planned to achieve a consolidated turnover of US$ 2.6 billion in 2019, KOTİL stated they targeted US$ 11 billion in turnover in next decade

The Next Level of Training - Leonardo Offers IFTS to Turkey

Delivering proven integrated training solutions, the world-renowned International Flight Training School is set to become an international reference for advanced lead-in fighter training

The Italian aerospace company Leonardo promoted the International Flight Training School (IFTS) at the IDEF '19, 14th International Defence Industry Fair to meet the pilot training needs of the Turkish Air Force. Leonardo Aircraft Division Head of Sales Engineering, Carmine RUSSO and Test Pilot Giacomo IANNELLI attended a conference held on the second day of the fair and introduced the IFTS to the Turkish officials and members of the press.

Headquartered in Rome, Leonardo is an Italian multinational company, which specializes in aerospace, defence, and security, with 180 sites worldwide and is the ninth largest defence contractor in the world. Leonardo has designed, manufactured and supported over 2000 trainers sold to more than 40 nations. The company has a product range that covers the entire training syllabus from basic with the new M-345 to advanced fighter training with the M-346. Leonardo's range of solutions also includes a Ground-Based Training System (GBTS) fully integrated with the aircraft and is able to provide high-quality training while improving efficiency. These platforms and systems allow Leonardo to offer a turnkey training solution for customers worldwide, delivering the highest quality standards at all stages.

International Flight Training School Sets the New Standards of the Future

The IFTS was launched by Leonardo together with the Italian Air Force and is based on the M-346 advanced jet trainer. The collaboration agreement was signed at the Farnborough International Air Show in London, UK. The school is currently located at the Galatina Air Base of the Italian Air Force in Lecce, Italy. The base hosts 18 M-346 aircraft (designated T-346A by the Italian Air Force) as well as four additional aircraft supported by Leonardo. The flight training school at the 61st Wing Galatina Air Base delivers flight training courses including; Phase II-Primary Pilot Training (Flight Line Selection) for all trainees intended to identify their future assignment to different types of aircraft (fighters, remotely piloted aircraft, rotorcraft, transport), Phase III-Specialized Pilot Training (Fighter Pilot License) involving fighter and remotely piloted aircraft pilots, Phase IV-Lead-in Fighter Training (LIFT) to allow the transition to fighters, and Pilot Instructor Training (PIT) to become jet instructors. The Galatina Air Force Base is also equipped with live-virtual-constructive (LVC) training technologies including advanced CAE (Canadian Aviation Electronics) M-346 full-mission simulators. Leonardo's LVC enables trainees on the ground to interact with pilots in the air, flying real aircraft, during the same training missions. Thanks to the LVC (Live, Virtual and Constructive Simulation) technology featured by the advanced simulation system of the T-346, trainees can interact with pilots in flights during the same training mission.

The IFTS leverages the existing training assets and expertise in advanced military pilot training of the Italian Air Force. It combines Leonardo's technological and product capabilities with the experience of the

The Italian Air Force Chief of Staff, Lt. Gen. Enzo VECCIARELLI and Leonardo's CEO, Alessandro PROFUMO signed collabration agreement that will establish an all new "Professional Flight Training School" (IFTS) to support military pilot training during the FIA' 18, London

Italian Air Force in the field of military flight training, to ensure the further growth and internationalization of the Italian Air Force's (ItAF) training school while at the same time increasing its capabilities and the range of pilot training solutions offered to the customers. Starting from 2021, the IFTS will be able to deliver courses for Italian Air Force and international Air Force crews, fulfilling the training demands for military pilots worldwide. In order to maximize the success of this initiative, the Italian Air Force's entire advanced and pre-operational training syllabus will be moved to a new, dedicated facility. The advanced training syllabus, based around Leonardo's integrated training system, is designed to be modular and versatile to train the student pilots of several nations for 4th and 5th generation fighters.

M-346 - Lead-In Fighter Trainer for Advanced Pilot Training

Leonardo's integrated training system is based on the M-346 jet, designated the T-346A by the Italian Air Force. It is the backbone of the 61st Wing, which trains pilots and instructors from Italy and nations such as the USA, Spain, France, Austria, the Netherlands, Poland, Singapore, Argentina, Greece, and Kuwait. The T-346A is the cornerstone of operational training allowing the introduction of the ITS (Integrated Training System) and prepares pilots to transition to the latest-generation combat aircraft including the Eurofighter and the F- 35. The M-346 has already been purchased by Italy, Israel, Singapore, and Poland for a combined order of 72 units. The Leonardo M-346 is used in the entire training system at Phase IV Lead-in Fighter Training (LIFT) stage, allowing new military pilots to be trained in complex scenarios thanks to its exceptional avionics and aerodynamical performance.

The M-346 Master is a military twin-engine transonic trainer aircraft. Originally co-developed with Yakovlev as the Yak/AEM-130, the partnership was dissolved in 2000 and Alenia Aermacchi (merged into Leonardo) developed the M-346 Master separately. Powered by a pair of Honeywell F124 turbofan engines, the M-346 is designed for the principal role of lead-in fighter trainer and is capable of transonic flight without using an afterburner. The M-346 Master is the central element of an Integrated Training System (ITS) and is designed to provide knowledge, skills and the practice needed for the effective use of modern combat aircraft. The M-346 was purpose-built for a wide range of training capabilities, long-term reliability and to provide cost-effective operations.

M-346 Full Motion Simulator

The M-346 has a four-channel Fly-By-Wire Flight Control System, redundant main systems, state-of-the-art avionics with the latest human-machine interface with Multi-Function Displays (MFD), Head-Up Displays (HUD), Hands-On Throttle And Stick (HOTAS) controls, in-flight safety features like PARS (Pilot Activated Attitude Recovery System). An APU (Auxiliary Power Unit) provides autonomous operations. The Embedded Tactical Training Simulation (ETTS) allows the M-346 to emulate on-board sensors, weapons, Computer Generated Forces (CGF) as well as allowing pilots to interact in real-time with a virtual tactical scenario in a Live (aircraft in flight), Virtual (simulators) and Constructive (ETTS) - LVC environment, further enhancing flexibility and cost reduction. The wide flight envelope, high thrust-to-weight ratio and unmatched maneuverability allow the M-346 to offer handling similar to those of next-generation combat aircraft, like Eurofighter Typhoon or the F-35. Thanks to its integrated Helmet Mounted Display, Night Vision Goggles (NVG) fully compatible cockpit, Voice Command, in-flight refueling probe and five hard-points for different external loads both air-to-air and air-to-ground, the M-346 can carry out a complete tactical training syllabus for military pilots. The M-346 can also carry out effectively aggressor and companion training roles, ensuring maximum efficiency, effectiveness, commonality, operational flexibility and combat training capabilities to Air Forces worldwide.

A Unique Opportunity for the Turkish Air Force

Considering the Turkish Air Force (TurAF) will have to withdraw the T-38 Talon from service, the IFTS offers an exceptional opportunity for the Turkish Air Force. Currently, the TurAF operates a mixed fleet of KAI KT-1 and TAI Hürkuş turboprop aircraft for basic training, however, the T-38 Talon covers the advanced phase of Lead-in Fighter training. As a possible replacement of the aging Talon, TAI is developing the Hürjet as Advanced Jet Trainers (AJT) but the aircraft is expected to make its first flight in 2022, and the first aircraft is planned to be delivered in 2025. Having an aircraft with similar characteristics to those of the F-16 during the advanced phase of pilot training is quite an important factor. In this regard, the M-346 offers unique capabilities such as Embedded Tactical Training Simulation (ETTS), Integrated Training System (ITS), and LVC (Live, Virtual and Constructive) simulation environment. Choosing the proven M-346 as the next jet trainer aircraft until the Hürjet becomes operational will not only allow Turkey to fill a critical gap in advanced fighter training but also bolster its cooperation with Italy in the defence sector.

FNSS Launches Marine Assault Vehicle (MAV) at IDEF' 19

With ZAHA, FNSS takes armored amphibious assault vehicles into the 21st century. Venturing outside the classical approach within defence projects, FNSS developed the Marine Assault Vehicle (MAV) to meet the amphibious armored vehicle requirements of the Turkish Navy

With a 30-year heritage in the defence industry, the world-renowned land systems company FNSS displayed its wide range of solutions and unveiled its latest platforms at IDEF '2019. At the fair, the company exhibited the KAPLAN 10 Anti-Tank Vehicle (ATV), the KAPLAN MT PULAT, the Marine Assault Vehicle (MAV), the PARS III 8x8 Combat Engineering Vehicle, the AV-8 CBRN vehicle, the Shadow Rider Concept, the Anti-Tank Remotely Controlled Turret (ARCT) and the Armored Remote Weapon System (ARWS) solutions for the first time this year.

IDEF' 19 also witnessed the unveiling of the much-anticipated Marine Assault Vehicle (MAV) or ZAHA (Zırhlı Amfibi Hücum Aracı in Turkish). FNSS revealed the first full-featured prototype of the Marine Assault Vehicle at IDEF '19 on the 1st of May with the participation of Vice President of Defence Industries Mustafa Murat ŞEKER and General Manager and CEO of FNSS K. Nail KURT. The sector had been awaiting this vehicle with great anticipation due to its special place in the military inventory, derived from the highly challenging and specialized mission requirements. Because of its unique nature, only a handful of nations have such vehicles in their inventories, and within NATO only one company (Bae Systems) other than FNSS produces comparable vehicles (AAV7A1 family) in the same class.

FNSS's 21st Century Armor Protected Amphibious Fighting Vehicle Concept

FNSS initiated the development of the MAV in March 2017, as part of the ZAHA project carried out by the Presidency of Defence Industries to meet the amphibious armored vehicle requirements of the Turkish Naval Forces Command with a primary role to support the combat capabilities of marine forces. Under the agreement, FNSS will deliver a total of 27 vehicles to the Turkish Naval Forces Command, including 23 personnel carriers, two command & control (C2) vehicles and two recovery vehicles.

© Defence Turkey

FNSS completed the evaluation of the prototype design and the project reached the Critical Design Review (CDR) phase in the first half of 2019. The CDR phase will be conducted on the prototype vehicle which was exhibited by FNSS at IDEF' 19.

The Marine Assault Vehicle features a water-resistant hull which demonstrates superior amphibious characteristics. The completely sealed unique hull design offers self-righting capability and improves mobility in water. It doesn't utilize a double or V-hull as that would drastically affect the performance of the vehicle at sea. The MAV weighs 30 metric tons and is equipped with a 600hp front-mounted diesel engine power pack. The engine has a fully automatic transmission system. The vehicle is propelled by two powerful rear-mounted water jets in amphibious mode, which can handle up to a sea-state of 4. The maximum amphibious speed of the vehicle is 7kt, while the maximum road speed is 70km/h.

Compared to Similar Systems, MAV contains Superior Design Aspects

The MAV is designed to operate with Turkey's Landing Helicopter Dock (LHD) ship that is now in production.

© Defence Turkey

The vehicle has a maximum ship-to-shore swim distance of 15 nautical miles and can be launched from Landing Helicopter Docks (LHD) to enable the safe landing of marine units during the amphibious assault phase of an operation. The vehicle covers the distance between the vessel and shore in the shortest time possible, allowing marine units to land under armor protection with minimum delay. The vehicle can also serve as an armored combat vehicle after reaching the shore and effectively operate alongside other armored vehicles.

The Zaha MAV is manned by a crew of three members including a commander, a driver, and a gunner. The driver sits in the front and the commander is positioned behind the driver. The gunner's compartment is located in the middle of the vehicle and offers the gunner a clear view of the surroundings to track down enemy movements. The MAV can carry up to 21 (18 dismounted infantry + 3 crewmembers) troops as well as cargo in a large compartment at the rear of the vehicle. The vehicle is also fitted with a hydraulic ramp at the back.

The MAV is equipped with a remote-controlled turret carrying a 12.7mm M2 heavy barrel machine gun and a 40mm automatic grenade launcher (AGL). Designed and developed by FNSS, the turret features a thermal sighting system, which allows day and night operations. Compared to similar examples, the MAV is expected to be superior in both ballistic and mine/blast protection. The vehicle is built from 5000 series military-grade aluminum armor, which is alloyed with magnesium. The aluminum is used to form the structure of the hull and offers protection against ballistic threats and explosions. The vehicle features a reinforced hull bottom armor and the thickness of the bottom plate is adjusted to maximize energy absorption. The protection level of the MAV can be further improved with add-on applique armor plates. The vehicle is also fitted with a coaxially mounted smoke grenade launcher and a dedicated CBRN (Chemical, Biological, Radioactive, and Nuclear) protection system.

General Manager and CEO of FNSS K. Nail Kurt: "Until the MAV made its appearance, there was no such vehicle on the market"

Designed to support dual operations based on mission requirements, armored amphibious assault vehicles need to exhibit superior performance both at sea and on land.

Speaking at the launch event, the Vice President of Defence Industries Mustafa Murat Şeker said: "This event has a special meaning to me. Four or five years ago, when I was Head of the Naval Platforms Department, I had the honor of signing the contracts of our large LHD vessel that we have just seen on the screen. At that time, we were wondering whether we should buy a MAV off the shelf or build it ourselves, then we showed determination and decided to do it. Seeing the embodiment of this determination made me even more proud."

Emphasizing that the MAV is a very special vehicle, General Manager and CEO of FNSS K. Nail Kurt said: "the MAV has to make sure that marines reach the shore in the shortest time possible, both to ensure rapid movement and to minimize their exposure to threats while at sea. Once ashore, it should be able to operate effectively as an armored combat vehicle, while also safeguarding the troops inside with superior ballistic and mine protection. To put it briefly, until the MAV made its appearance, there was no such vehicle on the market. We are developing the MAV in response to the requirements of the Turkish Naval Forces, which carried out one of the most important amphibious operations in the last 50 years with great success. We are confident that friendly and allied nations with high amphibious operational requirements, particularly island countries like Indonesia, will also look to take advantage of the MAV's superior characteristics; and we look forward to working with them in the future."

by Saffet UYANIK

Meteksan Defence Exhibits Game Changing Solutions at IDEF 2019

At IDEF 2019, Meteksan Defence showcased its new solutions and updated products that have proven themselves in the field. President of Meteksan Defence Selçuk ALPARSLAN also shared information about the company's participation in IDEF during his meeting with members of the press at the fair

Meteksan Defence was established in 2006, bringing together, under a single roof, defence and aerospace sector-related projects and activities of high-tech companies operating within Bilkent Holding. In line with the vision laid out by the Presidency of Defence Industries, the company continues its works in the defence and aerospace sector towards the development of independent and indigenous high technology products and subsystems for the Turkish Armed Forces, allied and friendly countries.

Operating in six primary areas – radar systems, perimeter surveillance systems, laser and electro-optic systems, communication systems, underwater acoustic systems and platform simulators – Meteksan Defence takes part in many of Turkey's main platform projects, such as those with a focus on national ship, helicopter and unmanned aerial vehicle (UAV) developments. The company is also taking part in many critical projects, including those involving the development of anti-tank and air defence missile systems. The main indigenous and national products developed by Meteksan Defence include radar systems for helicopters and UAVs, perimeter surveillance radars for border and critical facility protection, data links for tactical and strategical missiles, sonar systems, underwater early warning and communication systems and training simulators.

Meteksan Defence joined IDEF 2019 as a company that has an established product range, and that has products that are already in service. Speaking at IDEF 2019 about the company's participation in the fair with new and updated products, 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 sharing 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 on display products and solutions that are likely to have an impact in the upcoming period. Meteksan is now transitioning from technology development to product development. We are trying to move beyond R & D to productization, marketing, and sales. By directing the capabilities and technology we have acquired from state-funded projects to areas that are currently procured from abroad, we provide solutions to meet the needs of the Turkish Armed Forces with our own resources."

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Since the last IDEF in 2017, products of Meteksan Defence, in particular, the Retinar Perimeter Surveillance Radar Family, have entered the inventories of both domestic and foreign users. The Meteksan Defence products which were showcased for the first time at IDEF 2019 include, MİLSAR which is a Synthetic Aperture Radar (SAR) and Ground Moving Target Indicator (GMTI) radar developed for unmanned aerial vehicles (UAVs), the C-Band UAV Data Link, the KAPAN Anti-drone system, the Retinar FAR which is a new perimeter surveillance radar, the new & improved YAKAMOS 2020 sonar, the New Helicopter MİLDAR fire control radar for attack helicopters, and KEMENT which serves as the infrastructure of network-enabled operations.

KEMENT Tactical Data Link System

KEMENT, which was showcased at IDEF 2019 for the first time, is a network-based ammunition data link a system. Meteksan developed KEMENT to provide network-enabled capabilities to SOM missiles and other cruise missiles developed by Turkey as part of network-centric warfare and to serve as the infrastructure for Turkey's National Data Link needs. Turkey currently uses the Link-16 tactical data link system allowed by MIDS-IPO (Multifunctional Information Distribution System- International Program Office) for network-centric

operations. Network-enabled operation capability allows cruises 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. This capability greatly enhances the effectiveness of the missile and permits the updating of mission parameters.

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. With the KEMENT system Meteksan aims to lay the groundwork for the National Tactical Data Link named T-Link by the Turkish Air Force. 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 bandwidth, 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, due 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 said: "Although the KEMENT system was developed for cruise missiles, it harbors all the functions of a National Data Link that can be used by the Turkish 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 (T-Link) in a swift manner. Showcasing KEMENT at IDEF 2019 is a strong indication of our resolve in this regard."

KAPAN Anti-Drone and Retinar FAR Radar Systems

The KAPAN Anti-Drone system developed by Meteksan Defence made its appearance at IDEF 2019 together with the novel Retinar FAR sensor. Perimeter surveillance radars stand out as an effective solution for the detection of drones, which are a prominent and present day asymmetrical threat, within the scope of critical infrastructure and border

Cem AKALIN - Managing Editor of Defence Turkey Magazine, Selçuk ALPARSLAN - President of Meteksan Defence and Burak AKBAŞ - International Sales, Marketing and Corporate Reputation Director of Meteksan Defence

security applications. Using such radars as a starting point, Meteksan Defence developed the KAPAN Anti-Drone System within a short span of time using its own resources. At IDEF 2019, the KAPAN Anti-Drone System was showcased together with the new Retinar FAR radar system, which greatly enhances its performance. 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 KAPAN Anti Drone System offers superior drone detection and tracking performance with a radar system and thermal cameras and allows the destruction of drones with an RF jammer and an optional laser system. Different systems have been appropriately integrated into the KAPAN Anti Drone System with standard interfaces and scalable architectures to create an effective solution against drone threats in different situations and scenarios. The Retinar FAR can detect aerial targets at longer ranges (9 km) and scan a broader area (40°), thus turning 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.

Selçuk ALPARSLAN emphasized how the KAPAN illustrates its ability to rapidly respond to newly-emerging threats: "We have developed the KAPAN Anti-Drone System as a scalable solution that can handle various missions. At IDEF 2019, we are demonstrating our ability to update the Retinar radar in line with evolving threats. We accomplished this within a period of only one year following the launch of the KAPAN system. At the various events we have joined over the past year, we have exhibited the KAPAN system equipped with different countermeasure systems, thereby demonstrating its scalability."

C-Band UAV Data Link

After indigenously developing data links for several missile systems, Meteksan Defence rolled out an indigenous and innovative solution for the data links of unmanned aerial vehicles (UAVs). Meteksan Defence developed the C-Band UAV Data Link with its own resources. The system, which was showcased for the first time at IDEF 2019, has already completed various tests and was introduced as a fully 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

Meteksan Defence's C-Band UAV Data Link Solution was first-time demonstrated on the company's booth at IDEF' 19

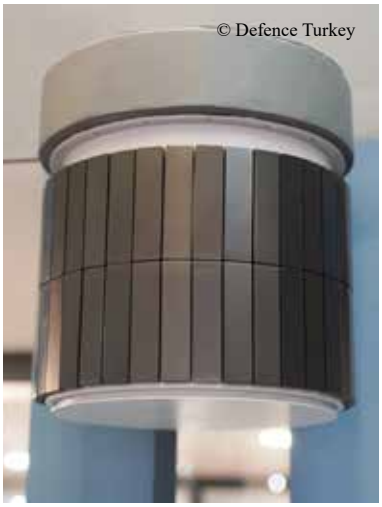
control station. The data link transfers the necessary commands from the ground control station to the UAV, while conveying status and payload-related information and feeds from the UAV to the ground control station. The most important requirements of a data link are its bandwidth, reliability, and secure uninterrupted data transfer capability.

As a result of the know-how gained from 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 modular system (SWAP Design) has the capability to transmit data (both downlink and uplink) at a distance of 200 km (line-of-sight) with a minimum of 10 Mbps. The C-Band UAV Data Link also has low observable Frequency-hopping spread spectrum (FHSS) capability which provides protection against Electronic Warfare. The directional and non-directional antenna of the C-Band Data Link was produced by Meteksan Defence indigenously, making it possible to avoid any potential antenna procurement-related problems that may arise during serial production in the event of an embargo.

Selçuk ALPARSLAN described the C-Band Data Link as an example of Meteksan Defence's proactive product development approach: "The data link studies 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. 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."

YAKAMOS 2020 Sonar

The YAKAMOS 2020, which was unveiled at IDEF 2019, is the new version of the YAKAMOS sonar that was developed and produced as part of Turkish Navy's MİLGEM project, and that is currently serving commendably all over the world's



YAKAMOS 2020 Sonar

blue waters as the sonar aboard ADA-Class Corvettes. The YAKAMOS 2020 takes the YAKAMOS product family to the future, keeping pace with technological advances and evolving threats. The YAKAMOS 2020 is expected to be integrated first into I-Class Frigates. The YAKAMOS Sonar is currently serving with great effectiveness aboard ADA-Class Corvettes of the Turkish Navy. 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 one that will surpass its rivals on the global market through its superior capabilities. Due to the enhanced efficiency of its power modules, the system is capable of operating for longer periods, while the updates to its sensor architecture enable it to detect potential threats over much greater ranges.

The YAKAMOS 2020 has a much more efficient and improved performance thanks to its new sonar array. The YAKAMOS project was initially started as an industrialization project. The algorithm and design developed by the Turkish Naval Forces Command were industrialized by MEKETSAN. The YAKAMOS 2020 sonar incorporates the same electronic components used in the Intercept Passive Sonar (IPS) developed for the Ay Class Submarines in order to improve maintenance and serviceability. The renewed electronic systems are also retrofitted into ADA-class corvettes.

MİLSAR Synthetic Aperture Radar

Thanks to the technological knowledge acquired within the scope of the MİLDAR project, Meteksan Defence developed the MİLSAR product which was showcased for the first time at IDEF 2019. The MİLSAR was the result of a conjunction of the capabilities of Meteksan Defence and a requirement of the Turkish Armed Forces. The prototype MİLSAR with its weight, volume and power consumption is sufficiently low for the system to be a viable payload for tactical-class UAVs. The MİLSAR is a synthetic aperture radar (SAR) and a ground moving target indicator (GMTI) radar. The radar provides high-resolution images in adverse weather conditions in which electro-optical sensors become ineffective. 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. However, the volume, weight, and power consumption requirements of GMTI radars generally prevents their usage in smaller UAVs.

MİLSAR is the product of long-standing work by Meteksan Defence on radar technologies that was first launched in 2007 with the MİLDAR project. As a system developed by Meteksan Defence engineers, one of the main features that make MİLSAR stand out is its ability to be used effectively in tactical UAV-sized platforms. Based on advanced technologies and innovative architecture, MİLSAR is only 30 kg and sets itself apart by requiring only the level of power that a tactical UAV can generate. The system is also designed to be compatible with existing E/O (Electro-Optical) camera pods.

Noting that MİLSAR was developed as a solution to an emerging requirement of the Turkish Armed Forces, Selçuk ALPARSLAN said: "We allocated substantial resources on the development of millimeter-wave radar technologies, which were absent in Turkey. MİLSAR is a solution that we developed with our prior investments for newly emerging requirements. Electro-optical systems, which can be described as the principal sensors aboard UAVs, have certain weaknesses, such as their inability to function in adverse weather

conditions. However, these do not apply to the MİLSARproduct. MİLSAR can even be integrated into the small-sized UAVs that cannot use other systems."

MİLDAR Fire Control Radar

MİLDAR is a fire control radar, operating in Ka-band to support fire control capability and navigational aid for attack helicopters. As Turkey's very first fire control radar operating in the millimeter waveband, and equipped with Target Tracking and Terrain Profiling features, the newly modified and advanced version of the Helicopter MİLDAR was showcased at IDEF 2019 with its mast-mounted configuration. Following the integration of Helicopter MİLDAR into the T129 ATAK helicopter, Meteksan Defence developed an improved version of the Helicopter MİLDAR with its own resources according to evolving user needs. MİLDAR combines its high performance with a Low Probability of Intercept (LPI) feature. The system weighs only 35 kg and it can scan, detect, locate, and classify multiple moving targets in all weather conditions up to 20 km. MİLDAR is characterized by its small size, weight and low -power consumption (SWAP) properties.

MİLDAR rapidly detects ground/air targets and automatically tracks them. With its 360° angular scanning radius, it provides pilots with enhanced situational awareness and increases the attack helicopters' survivability and offensive power with weapon engagement for multiple targets in the battlefield. As an optional feature, the radar can provide terrain profiling when mounted to the belly of the helicopter. MİLDAR facilitates pilots in low visibility and low altitude conditions with terrain profiling for the area over which the helicopter will navigate. MİLDAR creates a terrain profile including the terrain topology and natural/artificial obstacles over the terrain and provides a significant contribution to the pilot's situational awareness during the low altitude flights. MİLDAR will also manage weapon engagement for RF guided missiles.

The Helicopter MİLDAR is expected to become one of the main sensors aboard the helicopter to be developed under the ATAK-II 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 one of the most difficult locations in terms of environmental conditions, and so can be considered indicative of the system's ability to be successfully integrated into other locations.

MILDAR Fire Control Radar and MILSAR SAR were unveiled at IDEF' 19

Selçuk ALPARSLAN 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 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 MİLDAR 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 different architecture and to roll out a solution that precisely met the needs of our users. In its renewed form, we anticipate that the Helicopter MİLDAR will come to occupy an important place in the future of attack helicopters."

The Intercept Passive Sonar (IPS)

The Intercept Passive Sonar (IPS) Development Project was initiated by Meteksan to develop and produce two different intercept sonars as part of the TÜBİTAK SAVTAG project agreement signed between TÜBİTAK BİLGEM and Meteksan Defence. Within the scope of the contract, Meteksan designed and produced the onboard electronic units with real-time signal processing software and cylindrical hydrophone arrays that operate in the 1-100 kHz band. The production model of the Intercept Passive Sonar (IPS) system was exhibited for the first time at IDEF 2019 at the Meteksan Defence booth. The Intercept Passive Sonar (IPS) has its own operator console to display detection results and provide user input. In addition to its own acoustic unit, the IPS System can integrate into the acoustic sensor array of the submarine, and it can stream, analyze and display data from both sonar arrays simultaneously in real time.

The IPS is a completely indigenous design and produced from beginning to end in line with the indispensable national and domestic design and production objectives of Turkey. Thanks to its innovative and unique technology, the IPS provides much more accurate results than its counterparts. Designed in coordination with the Turkish Naval Forces Command the IPS features an operator-friendly interface and is currently integrated into Turkish Navy Ay Class (Type 209-1200) submarines. Meteksan aims to use the knowledge and experience gained from the IPS project in the Intercept Detection and Ranging Sonar (IDRS) development project and similar modernization projects that may be initiated in the future. Equipping the surface and/or underwater combat platforms of the Turkish Naval Forces with national systems is critical for both the survival and the life cycle logistic support of these platforms ■

by Cem DOĞUT

International Anatolian Phoenix 2019 Military Exercise

Hosted by the Anatolian Eagle Training Center Command – AKEM, the International Anatolian Phoenix 2019 Military Exercise was executed on 13 – 24 May 2019 at the 3rd Main Jet Base Command/Konya with the participation of the Land, Naval and Air Forces units from Azerbaijan, United Kingdom, Qatar, the Turkish Republic of Northern Cyprus (TRNC), Pakistan, Romania and Turkey

AKEM, as the training center of the Turkish Air Force (TurAF), enables realistic training and military exercise opportunities for both national elements and to allied countries. With such features, the center hosts national and international military exercises such as Anatolian Eagle, Turaz Hawk, Anatolian Falcon and Pençe in addition to Anatolian Phoenix.

The International Anatolian Phoenix Military Exercises have been conducted biannually since 2009 at the 3rd Main Jet Base Command, for the training of the Personnel/Search and Rescue Task Force in an real-like operational environment and aims to improve the level of cooperation and interoperability of the units toward fulfilling the joint operation requirements essential for the combat field of today and the future. The International Anatolian Phoenix Military Exercises began in 2012 in two period intervals; one national and one international.

Hosted by the Anatolian Eagle Training Center Command – AKEM, the International Anatolian Phoenix 2019 Military Exercise was executed on 13 – 24 May 2019 at the 3rd Main Jet Base Command/Konya with the participation of the Land, Naval and Air Forces units from Azerbaijan, United Kingdom, Qatar, the Turkish Republic of Northern Cyprus (TRNC), Pakistan, Romania and Turkey

Combat Aircrafts Helicopters and Rescue Teams attend the Exercise aiming to operate the command control process effectively and Joint Personnel Rescue methods to be executed in the operational environment are experienced during training and developed. Within the scope of the Joint and/or Combined Operation, tasks such as Close Air Support

(CAS), Dynamic Targeting (DT) and Time Sensitive Targeting (TST) are being conducted by involving such elements in the exercise scenarios.

The participants of this year's International Anatolian Phoenix – 2019 Military Exercise are as follows:

- Four F-16C/D aircraft of the 132nd Squadron Command of the Air Forces Command (AFC),
- Three AS532AL helicopters of the AFC's 135th Squadron Command,
- Personnel Rescue Team of the AFC's 135th Squadron Command,
- ANKA-S Unmanned Air Vehicle of the AFC's 302nd Squadron Command,
- Two T129B Mk-I Attack and Reconnaissance Helicopters of the Turkish Land Forces Army Aviation Command,
- Naval Forces Command (NFC) Underwater Demolition Task Force (5 personnel),
- One S-70A-17D YARASA Helicopter and one Special Forces Team (7 personnel) from the Special Forces Command of the Turkish General Staff,
- One AS532AL Helicopter and a Personnel Rescue Team (14 personnel) from the Turkish Republic of Northern Cyprus,
- Two Mi-17 Helicopters from the 1st Squadron Command of the Azerbaijani Air Forces Command, 2 Mi-35M Attack Helicopters from the 3rd Squadron Command and 1 CSAR (Combat Search and Rescue) Team with a total of 57 personnel,
- One JTAC (Joint Terminal Air Controller) Team from the United Kingdom (4 personnel),
- One Qatari C-130J Transport Aircraft and 54 personnel,
- Four F-16A/B Aircraft and one CSAR Team (6 Personnel) from the 9th Squadron Command of Pakistani Air Forces Command and a total of 90 personnel composed of helicopter pilots with observer status,
- A total of 30 personnel with two IAR-330 SOCAT Helicopters (Sistem Optronic de Cercetare di Anti-Tanc) from the 952nd Assault Squadron Command of the Romanian Air Forces

The purpose of the exercise was determined to be experiencing and Rescue (PR) Operation. Within this frame, various scenarios were planned and executed to develop the interoperability capabilities of Air Force elements (Combat Aircrafts, Command Control Aircraft and UAVs) and Personnel Rescue Task Force elements (Helicopters, PR/CSAR Teams and JTAC/Advanced Air Controllers) operating on the battlefield and increasing their level of operability with different countries or task forces.

According to the planned scenarios, Close Air Support (CAS), Time Sensitive Targeting, Dynamic Targeting, Ground Based Air Interdiction, High Altitude Low Opening (HALO) Training and Casualty Evacuation (CASEVAC

Rescue and Penetration tasks were executed within the scope of the military exercise.

The Press and Distinguished Observer Day was held on 22 May 2019. Following the arrival of press members to the 3rd Main Jet Base, initially the air vehicles attending the Anatolian Phoenix 2019 Military Exercise that were displayed statically at the Alfa Ramp were introduced to the participants and photographs of the vehicles were taken. Afterwards, the airshow was performed with 6 aircraft of the Turkish Stars for training purposes was watched with 11 Distinguished Observers from 7 countries. Then the delegation moved onto the AKEM Main Briefing Hall and a briefing was held on Personnel Rescue – CSAR, HALO and Dynamic Targeting scenarios that the military exercise would realize at the Konya Fire Sector. Information was presented to press members, distinguished observers and participants.

Following the briefing, participants moved onto the Konya Fire Sector. According to the planned scenario of the military exercise, a border post was attacked, and a decision was made to evacuate four military staff injured in the attack from the region. For a rapid deployment to the region, a Personnel Rescue Team arrived at the border post with a HALO jump and responded to the injured staff. As a result of the ongoing attack to the border post, Close Air Support (CAS) was demanded. Within this scope, the targets identified by the ANKA-S UAV were successfully destroyed with the GPS guided GBU-38 JDAM ammunition launched from two F-16C aircraft belonging to the 132nd Squadron Command. The four injured staff at the border post were evacuated with the Special Forces Command's S-70A-17D, TRNC Security Forces' AS532AL and Mi-17 Helicopter of the Azerbaijani Air Forces in line with the CASEVAC training scenario. Two T129B Mk-I ATAK Attack and Reconnaissance Helicopters provided Close Air Support to the evacuation of the injured staff with 20mm artillery shooting. After the evacuation, in accordance with the scenario, PR/CSAR Operations were launched in order to rescue a falling F-16 pilot. Within the scope of the operation, initially the PR Teams were deployed in the region with an AS532AL of the TRNC Security Forces and Romanian Air Forces' two IAR330 SOCAT Helicopters. The teams first maintained the security of the region and then successfully accomplished the evacuation of the pilot. In order to ensure the safety of the PR Teams, two Mi-35M Attack Helicopters of the Azerbaijani Air Forces conducted flights over the region. During the evacuation, the hostile targets identified by the JTAC team positioned at the border post were attacked with the Mk-82 general purpose bombs with the F-16A/B aircraft of the Pakistani Air Force and the targets were destroyed successfully. At the end of the military exercise, the paratroopers jumping out of the Qatari C-130J Transport Aircraft opened the flags of the participant countries in the air. The event ended as all the air vehicles attending the exercise saluted the distinguished observers with a low altitude flight ■

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Technological Think Tank Center STM Thinktech Now Focuses on Energy Security

Turkey's first technology-oriented think-tank center STM Thinktech held its fourth panel under the title of "Energy Security: Opportunities and Threats". The issue of energy was discussed during the panel addressing aspects such as supply security, physical security and cyber security on a national and an international level.

Bringing together many industry players, the fourth STM ThinkTech panel took place in Ankara on July 4th under the title of "Energy Security: Opportunities and Threats".

Participants of the energy panel where the energy issue was discussed on a national and international level included Prof. İsmail DEMİR, President, Presidency of Defence Industries, Alparslan BAYRAKTAR, Deputy Minister, Ministry of Energy and Natural Resources, Prof. Gülnur AYBET, Senior Advisor to the President of Republic of Turkey, Fatih BİROL, Executive Direc and International Energy Agency and Prof. Oktay TANRISEVER, Faculty Member, METU Department of International Relations. Prior to the start of the panel, Executive Director of the International Energy Agency Fatih BİROL made a presentation about studies being carried out by various countries, the reflections of energy security on external security and potential prospects.


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Prof. İKİNCİ: "Protecting the energy infrastructure is of critical importance"

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Murat İKİNCİ - STM General Manager

In his opening speech, STM General Manager Murat İKİNCİ said, "As STM ThinkTech, we have been making efforts to develop regional and global security strategies by turning our 30 years of know-how and experience into technology-based forecasts. The investments we make in the field of technology are important for strengthening our defence industry with domestic and national products. In terms of national security, critical infrastructures regarding energy are amongst strategic systems that require protection and preventative measures must be taken against possible threats. Threats that the systems connected to information networks encounter cause data loss and pose serious risks from the loss of data. Within this context, we believe that an adoption of an integrated approach to ensure energy security is of critical importance. With the panel we organize today, we aim to contribute to the determination of future strategies and generation of solutions together by addressing energy security with different aspects."

Noting that today there are three major revolutions in the energy sector and the role of consumers in the energy field has changed, the keynote speaker Fatih BİROL, Executive Director of the International Energy Agency said: "Asian countries are becoming the center of energy production and

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Dr. Fatih BİROL - Executive Director of International Energy Agency

consumption. When we look at the second revolution, we see that the U.S., which was an importer ten years ago, is now the world's largest producer and exporter of shale gas, oil and gas. The third revolution is about renewable energy. Today, costs in wind and solar power generation have fallen dramatically. Solar and wind energy has come to the forefront and has made them the third revolution in terms of decrease in energy production costs."

BİROL pointed out that renewable energy is growing rapidly all over the world and added: "The renewable energy revolution started in Europe, but the current leader is China. There are significant subsidies. The more the use of renewable energy increased through these subsidies, the more the costs decreased accordingly. Currently, many renewable energy sources, especially in wind and solar energy, have reached a point that can compete with other sources without the need for government subsidies. Turkey has also taken important steps in renewable energy. Turkey has ranked third in Europe, after Germany and the U.K. within the last 5 years in installed power increase in renewable energy. We are ahead of Spain, France and others which have shown great interest in this matter since the very beginning".

Underlining the importance of energy efficiency, BİROL said: "In order to provide a more sustainable energy system in terms of environment and energy security, we think that the world's energy efficiency should be developed and improved by 3 percent every year, however when we look at the figures, unfortunately, the improvement in energy efficiency in the world is far below expectations".

Following the keynote speech, the panel session started with the participation of panelists.

Prof. DEMİR: "We need to increase our energy-related activities"

President of Defence Industries Prof. İsmail DEMİR underlined limited energy sources, the instability that has occurred in the regions where these sources exist and the energy problem that emerges due to the increasing demand for energy, he also emphasized energy security which is important both nationally and globally. DEMİR: "Acting with the awareness of the responsibilities of its geopolitical position, Turkey is amongst the key actors in the region in terms of energy. Today, we need to increase our activities related to energy security and take measures against the risks that may threaten energy flow. In line with 2023 targets, our country has adopted a strategy including strengthening energy supply security, using domestic and renewable resources and establishing predictable market conditions and """"also, we will take crucial steps to protect infrastructure and data security. STM's efforts in this area and ThinkTech's activities also contribute to the security of our country".


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Emphasizing Turkey's commitment in ensuring energy security, Deputy Minister of Energy and Natural Resources Alparslan BAYRAKTAR said: "Our priority and main objective is to provide energy to consumers in a sufficient, quality, continuous, low-cost and environmentally compatible manner. The policies we develop to this end are the outcome of a long-term, holistic and a comprehensive perspective. Investments continue to bring domestic and renewable resources to our economy at the maximum level, to declare mobilization for energy efficiency, oil and gas exploration in land and sea, development of domestic manufacturing in the energy sector also with R&D support. Besides, Turkey sincerely believes it has to handle the issue of energy with aspects which contribute to regional development and prosperity as well as produce solutions to conflicts".

The first STM ThinkTech panel was organized in 2017 under the title of "The PrioritizedDefence Systems and Technologies of the Future Operating Environment" and then in 2018 "New Soldiers of a Digitalizing World: Unmanned and Smart Systems" and "A New Player in the Fight against Terrorism: Artificial Intelligence"

Prof. İsmail DEMİR - President of Defence Industries

Helicopter Survival Training to be Provided with the DUNKER Project

With the DUNKER Project signed between the Presidency for Defence Industries (SSB) and Meteksan Defence, a modern simulator system that has been established with national facilities for survival training after a helicopter crash into the water or aircraft ditching, will be delivered to the Naval Forces Command. The facility is to be established at Cengiz Topel Naval Air Base Command and is expected to become operational within two years. With the completion of the project, training which is currently being provided in 47 countries at 205 facilities, will begin to be offered in Turkey

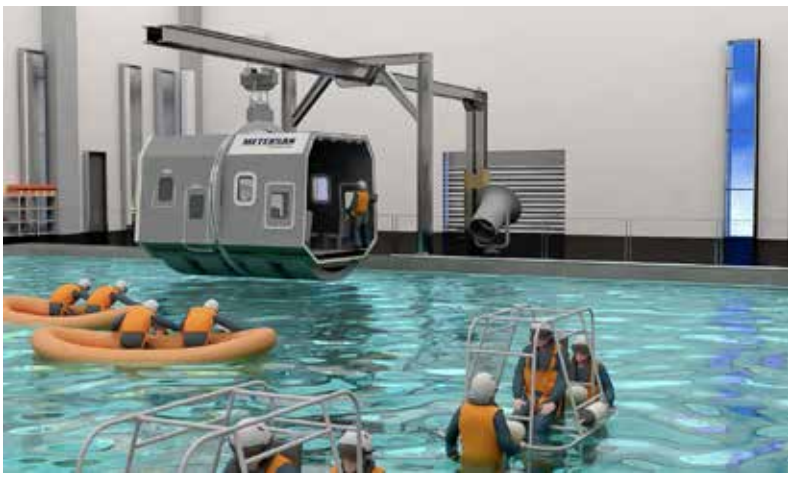
The contract for the "Survival Training after a Helicopter Crash into the Water/Aircraft Ditching" Project was signed between the SSB and Meteksan Defence on November 18, 2018.

The training is designed in a helicopter simulation which is rotated up to 180 degrees in a controlled manner in a custom-built pool for the rescue of the personnel inside the helicopter.

Meteksan Defence will provide a modern simulator designed according to international standards and OPITO criteria. Within the scope of the DUNKER Project, the simulation system consisting of crane(s), platforms and auxiliary equipment as well as the construction of the pool which is a complementary component of the system, and the building consisting of technical rooms and spaces will be provided. There will be different elements in the pool to create a realistic environment such as storms / wave simulations, lighting / dimming possibilities with adjustable light intensity. In order to simulate stormy weather, lighting, a sound system, wind effects, wave effects and rain effects will be used together or separately.

It is planned that the simulator will consist of four components where different types of training can be conducted. The components of the training that will be held independently and at different times are as follows:

- **Escape/Survival from a Helicopter Crash into the Water:** A platform consisting of a Generic Cabin and crane, where the Helicopter Escape/Survival training is given.
- **Rescue Helicopter:** Simulation of rescue training consisting of a



platform that simulates a helicopter performing rescue operations and a crane to allow the survivor to be taken from the pool to the platform.

- **Parachute Descent:** A platform consisting of a tower and a rail system to simulate a parachute jump where parachute descent and survival training is given. A tower, a wire sliding system and a parachute hanger system will be installed to simulate the parachute descent to allow the training of the personnel for parachute descent and survival.
- **Shipboard:** A platform to simulate the ship and a space consisting of a rope ladder system, rope, lifeboat and throwing mechanism where abandoning training and the training to allow survivors to be taken to the shipboard are given.

Capabilities Expected to be Obtained through the Project

With the domestic design and production of the main components of the DUNKER Project such as the generic cabin, crane carrying the cabin and the rescue crane, the diversification and development of current capabilities will be achieved in areas of processing composite materials, stainless/aluminum materials; development of design to enable the required Safe Working Load (SWL) with such materials; establishing personnel lift up/down systems; integration and automation of systems.

Training in accordance with OPITO standards which is among the training to be completed by personnel to be transferred by air to sea platforms will also be provided within the country and thus a savings will be achieved. With the launch of these simulators, the relevant training, which is currently being provided in 47 countries at 205 facilities, will begin to be offered in Turkey. This service will also be provided to NATO and other friendly-allied countries, institutions/organizations. In this way, also service exportation is expected to occur.

According to the project schedule, the finalization of the facility that will be established at Cengiz Topel Naval Air Base Command located in İzmit is expected to occur within two years.

GÖKBEY P1 Prototype Performs Maiden Flight

Following the first official flight of the P0 prototype on September 6, 2018, the P1 which is the first flying prototype of the GÖKBEY helicopter, the production of which was completed in April, completed its maiden flight on June 29 at 06:00 a.m. The flight had originally been planned for June 18, and was postponed for a later date. With a fresh coat of paint, the prototype successfully completed its first experimental flight early in the morning with the completion of the necessary permissions obtained from the General Directorate of Civil Aviation. The P1 prototype soared at 50ft for about 45 minutes within a 500-meter route. Following this flight, the flight and ground tests will continue with the P1 prototype through the summer period. The production of the P2 prototype is scheduled to be completed in August and is expected to become involved in the test campaign in September. A target total of 1,500 of flight hours are to be completed throughout the test campaign, which is planned to occur over a period of two years. A total of 3 prototypes (P1, P2 and P3) be involved in the test campaign and P3 will take advantage of optimization.

Öner TEKİN Elected as ASD Member of the Board

In a written statement made by SaSaD, which represented Turkey in the European Defence Industrial Group (EDIG) prior to 2004, and then in the European Aerospace, Security and Defence Association (ASD) formed by the merger of EDIG, European Association of Aerospace Industries (AECMA) and Eurospace in 2004, it was announced that the Chairman of the Board of Directors of SaSaD and AYESAŞ/Vestel Defence Companies General Manager Öner TEKİN was unanimously elected as a member of the ASD Board at the ASD General Assembly held in May 2019.

Within this context, SaSaD Chairman Öner TEKİN and SaSaD Deputy Secretary General Yılmaz KÜÇÜKSEYHAN attended the Paris Air Show that was held on June 17-23 this year for more active participation in the activities of ASD and participated in B2B events bringing Turkish and French Industrialists together held by the SaSaD and French Aerospace Manufacturers Association (GİFAS).

The first Helicopter Engine Produced in Turkey – the T700-TEI-701D Engine Delivered to Power T70 Utility Helicopter

The first batch of 4 T700-TEI-701D turboshaft engines to be used on T70 Utility Helicopter Platforms and produced within the scope of the Utility Helicopter Program, which is being conducted under the responsibility of the Presidency of Defence Industries (SSB) and the main contractor of the engine, TEI ,were delivered to Turkish Aerospace at a ceremony where President of Defence Industries Prof. İsmail DEMİR, Eskişehir Governor Özdemir ÇAKACAK and a large number of guests were in attendance.

The TEI-701D-T700 turboshaft engine to be produced by TEI will be a new milestone in Turkey's national aerospace history because it is the first helicopter engine to be produced in Turkey.

Considering the 30-year life span of T700-TEI-701D engines to be used on the T70 platform, it is aimed that TEI will make significant contributions for providing services in the fields of maintenance, repair, overhaul, training, technical support as well as supplying spare parts to domestic and foreign end users.

TEI will be able to provide maintenance, repair, overhaul, training, and technical support services to the T700 family of engines in more than 20 countries in Europe, Middle East and Asia within the scope of this project.

Future projections indicate that if the T70 helicopter is procured abroad and if the customer selects the T700-TEI-701D engine produced under license by TEI, these engines can be exported abroad.

In the serial production phase which is expected to launch between 2020 and 2025, a total of 248 T700-TEI-701D engines (236 committed and 12 optional) will be produced. Within the program the objective is also to achieve the capacity to produce 1 engine per week in the later stage of the serial production phase.

© TEI

Groundbreaking Ceremony held for the Construction of the Turboshaft Test Center Building (Phase-2) Project

During the event, the groundbreaking ceremony for the construction of the Turboshaft Test Center buildings was also held. TEI will produce a 1400 shp domestic and national turboshaft engine that will power the T625 GÖKBEY 6 Ton Utility Helicopter in line with the project initiated by the Presidency of Defence Industries signed on February 7, 2017 in order to meet the engine requirements of the helicopter developed for the Turkish Land Forces Command.

While the core engine designed by TEI runs stably at 28,000 RPM, during the project great progress has been achieved in understanding the engine's constant operation speed and idle speed.

The Turboshaft Test Center will have an area of 30,000 m2 with 19 different test rooms as well as workshops and offices with a 500 personnel capacity. With the launch of the building, the need for the TEI-TS1400 engine's overseas testing will be reduced, and with the development of domestic testing capability, the aim is also to reduce foreign dependency. With the activation of this facility, the tests for similar class engine projects to be developed will be completed and commissioned quickly and efficiently.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ATAK Simulator Delivered to Land Forces Command

The simulator to be utilized for the training of pilots to fly the T129 ATAK Attack and Tactical Reconnaissance Helicopter was delivered to security forces

The ATAK Helicopter Full Mission Simulator developed by Havelsan within the scope of the procurement project of the Presidency of Defence Industries (SSB) was delivered to the Turkish Land Forces Command.

The Full Mission Simulator will contribute to ATAK Helicopter pilot training especially in adaptation, activation, emergency, shooting, combat preparation and maintenance training. Thanks to the simulator, ATAK Helicopter pilots and technicians will be able to safely and cost-effectively receive training on tactics, weapons, avionics systems, flight and fault conditions under any weather conditions , day or night.

In addition to all kinds of flight training, the ATAK Helicopter Full Mission Simulator will also enable weapon systems and live-fire simulation training, while giving pilots the opportunity to engage in drills which normally require special shooting fields and incur high costs due to the high cost of the ammunition.

Simulators Can be Exported Together with ATAK Helicopters

ATAK Helicopter simulators will also be compatible with S70 Blackhawk and AS532 Cougar Helicopter simulators delivered by Havelsan to the Land Forces Command within the scope of HELSİM Project and provide an opportunity to perform joint training.

Due to the pilot and gunner's sitting position, one behind the other in the ATAK helicopter, the requirements of these two missions cannot be performed at the desired level in the same simulator. Therefore, two separate simulators are produced. These simulators can also be sold to other countries where ATAK helicopters are exported.

Satellite photographs and 3D modelling are utilized in the simulators. Every detail from electricity poles to terrain height is included in the system in a realistic way. Pilots will also be trained specifically on not getting caught in electrical wires as well as on engine failures, which are the two main reasons that cause helicopter accidents.

Towards 5G and Beyond – Press Conference of ULAK Communications Inc.

The press conference of ULAK Communications Inc. was held in Ankara on June 21, 2019 with the participation of President of Defence Industries Prof. İsmail DEMİR, ULAK Chairman and Vice President of Defence Industries Celal Sami TÜFEKÇİ, Vice President of Defence Industries Mustafa Murat ŞEKER, Vice President of Defence Industries Harun ÇELİK, Aselsan Chairman and CEO Prof. Haluk GÖRGÜN, Türksat CEO Cenk ŞEN, ULAK CEO Ali Metin BALCI as well as many sector representatives and press members.

© ULAK

During the press conference on "Towards 5G and Beyond" organized by ULAK Communications Inc. at Bilkent Hotel, President of Defence Industries Prof. İsmail DEMİR mentioned the importance of the ULAK Project and said: "When this topic comes up on the agenda, the global giants who have invested billions of dollars and are ready to invest have asked us many times the question of how competitive a company that we established would be with an R&D below a hundred million dollars and a modest budget. We need to do this securely by putting forth the most effective solution with the maximum use of national and local elements considering it in terms of infrastructure, operator and public institutions, rather than making the cheapest purchase and putting forth the most effective solution. Here, it is very important for the users to regard this product as a domestic product, to be encouraging and to demonstrate this will with this approach, even if it has deficiencies. As the parties releasing the product to the market, the feedback received from the field will be very important unrevealing any deficiencies and correcting problems. In this respect, the use of ULAK and extending its use is extremely significant". Expressing that they generally have been putting forth the will to keep this product even faced with the huge price cutting and competitive approach of many of the world's giant companies by providing certain subsidies, if necessary, as a government entity, Prof. DEMİR stated that another important aspect of ULAK is to move forward to an establishment of a company for an R&D Project and thus to accomplish a structure. Prof. DEMİR: "Another aspect of ULAK is its importance in terms of multi-use and sustainability. We not only have the elements that can be very effective in the field of defence and provide security in the operational environment, but also raise the sustainability topic related with civilian use. We do not claim that we are doing the best in the world right now, but we believe that we have to make efforts to be the best. We would like to point out that we are ready to cooperate with foreign companies whose products are currently being used in Turkey and which will support our technology roadmap, in good faith and with a win-win principle. In this process, there is a fact that approximately one billion dollars is spent annually on information processing projects for the public sector. In the meantime, we will continue our efforts to create incentive measures for the maximum use of domestic and national products in our IT infrastructures including data centers, commercial and public communication infrastructures".

Emphasizing that this is a journey of technology and they are determined on this issue, Prof. DEMİR continued: "When considering the rate of domestic goods involved in the 4.5G license agreement, and that operators' 4.5G base stations investments by 2025 will be an average annual investment of operators of one billion dollars, ULAK base stations and Milat Network Management and Analysis System appear as an historical opportunity in this context and we will continuously raise this issue on the basis of all public and private companies".

Çınar Project is about to be Completed

ULAK Communications Inc. Chairman of the Board Celal Sami TÜFEKÇİ thanked the institutions and stakeholders who supported them in their efforts. Metin BALCI, CEO of ULAK Communications Inc. shared information on the 'First 5G Data Transfer Demo' executed with Aselsan and other projects that have been developed. Stating that ULAK is ready for 4.5G, BALCI emphasized that Milat Network Management and Analysis System, which is the national and domestic network management infrastructure, is now in use and he also touched upon the R&D activities for 5G and beyond. BALCI pointed out that they are planning to make the ÇINAR Project available to operators by March 2021.

Damen Signs Phase-II Contract with IOM for 9 Additional SAR 1906 Search and Rescue Boats

At a signing ceremony held at the International Organization for Migration (IOM) offices in Ankara, Turkey, Vladimer GVILAVA, chief of mission IOM in Turkey, and Boran BEKBULAT, Damen sales manager Turkey, signed a contract for the building and delivery of nine Damen SAR 1906 search and rescue boats for the Turkish Coast Guard Command

Financed by the European Union, these 19-meter boats will be in addition to the six vessels of the same class ordered in 2016, which were delivered to the Turkish Coast Guard Command the following year. The first two of the new order will be delivered in the summer of 2020 with the remaining seven expected to come into service over the following 12 months. The state-of-the-art vessels will be built to the same specification as their predecessors with some additional fine tuning and will also be operated by the Turkish Coast Guard Command to support their ongoing migrant rescue operations.


© Damen

The SAR 1906 has been developed by Damen in close cooperation with KNRM (Royal Netherlands Sea Rescue Institution), TU Delft and maritime design bureau De Vries Lentsch, as a fast, harbour-based, all weather, self-righting rescue boat. The design has been further improved in close cooperation with the Turkish Coast Guard Team and modified for their specific operations. Turkish design office DzaynGate, located at TeknoPark in Pendik-Istanbul, also worked on the adaptations of the design for the new series.

The SAR 1906 has an aluminium hull and a composite wheelhouse. With its hull design based on Damen's Axe Bow technology with certain adaptations to optimize it for rescue operations, it can achieve a top speed of more than 33 knots and has a range of 300nm at full load.

The construction of the boats will take place at Damen's Turkish yard, Damen Shipyards Antalya. Located in the Antalya Free Zone, the yard has accomplished some significant export figures since its establishment in 2013, having delivered more than 70 vessels to international customers ranging from 10-meter fast boats to 80-meter RoRo ferries. The yard currently has 360 local employees plus an average of 200 subcontractors working on-site at any time. The yard's managing director, Auke VAN DER ZEE, who is notably the only foreigner amongst his Turkish colleagues, notes, "We kept our promises in delivering all the SAR 1906 boats for the first phase as quickly as possible in response to the need for ongoing migrant rescue operations, and we are dedicated to doing the same for this second phase."

"We are so proud and glad to receive a continuation contract from our client," added Damen's Boran BEKBULAT. "Cooperation among all the parties involved in the first phase was very successful. We are very excited to be teaming up again to make a new success story together."

Leonardo on the Landing Helicopter Dock of the Italian Military Navy

The Italian Navy's new landing helicopter dock (LHD) Trieste was launched at Fincantieri's Castellammare di Stabia shipyard on 25 May. The new LHD, which features dual-use capabilities for a wide range of military and humanitarian missions. The vessel will be delivered in 2022.

The Landing Helicopter Dock (LHD) is a new multi-role amphibious naval unit of the Italian Military Navy for which Leonardo has provided the core sensors and systems.

With a displacement of around 25,000 tonnes, the vessel enables amphibious operations to be conducted at long range in the "enlarged Mediterranean". The vessel can perform in a number of contexts with multi-national forces (joint or combined) such as crisis response operations as part of NATO, EU or multi-national coalitions. The LHD will be able to evacuate non-combatants from foreign territories as part of national or international initiatives, humanitarian operations and in the event of disasters, with the ability to coordinate and monitor relief efforts in collaboration with Non-Government Organisations (NGOs).

For the LHD, Leonardo will provide its open architecture Combat Management System, which is modular and reconfigurable and so ready to accept systems that the customer may wish to install in future as needs arise. Leonardo will also equip the LHD with a helicopter approach radar system, a multi-sensor fire control radar (X and Ka Band), a new multifunctional Active Electronically Scanned Array radar with four fixed-face arrays operating in the X-band and a rotating L-band radar for long-range surveillance), Identification Friend or Foe (IFF) sensors and, as with the PPA vessels, the innovative new 'static InfraRed Search and Track (IRST)' sensor.

The LHD's integrated communications system will include multi-band satellite systems, the new Software Defined Radio (SDR) and an integrated navigation system.

The main armament of the LHD will be a Leonardo 76/62 Super Rapid Multi-Feeding Strales gun. The 76/62 gun is equipped with a radar antenna, which can guide projectiles with a precise beam of radio frequency. This allows the vessel to fire DART ammunition (Driven Ammunition Reduced Time-of-flight) very accurately, reducing the risk of collateral damage. The speed of the DART projectiles, combined with their guided capabilities, allows the 76/62 system to counter fast-moving threats whether they be traditional or asymmetrical.

As with the PPA in its "full" configuration, the LHD will be equipped with the Leonardo ODLS 20 decoy launching system as well as the Black Snake towed array sonar and countermeasures, a lightweight and autonomous system for anti-torpedo defence. Leonardo will also provide the vessel's Obstacle Avoidance Sonar, BathyTermograph unit and Diver Detection Sonar.

Finally, the LHD will be 'fitted for' potential future air-defence missile systems by MBDA.


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