VOLUME 14 . ISSUE 97 . YEAR 2019

DEFENCE TURKEY

TANK HUNTERS
KAPLAN & PARS 4X4 STA

2019 OUTLOOK
FOR THE TURKISH DEFENCE & AEROSPACE INDUSTRY AND GOALS FOR 2020

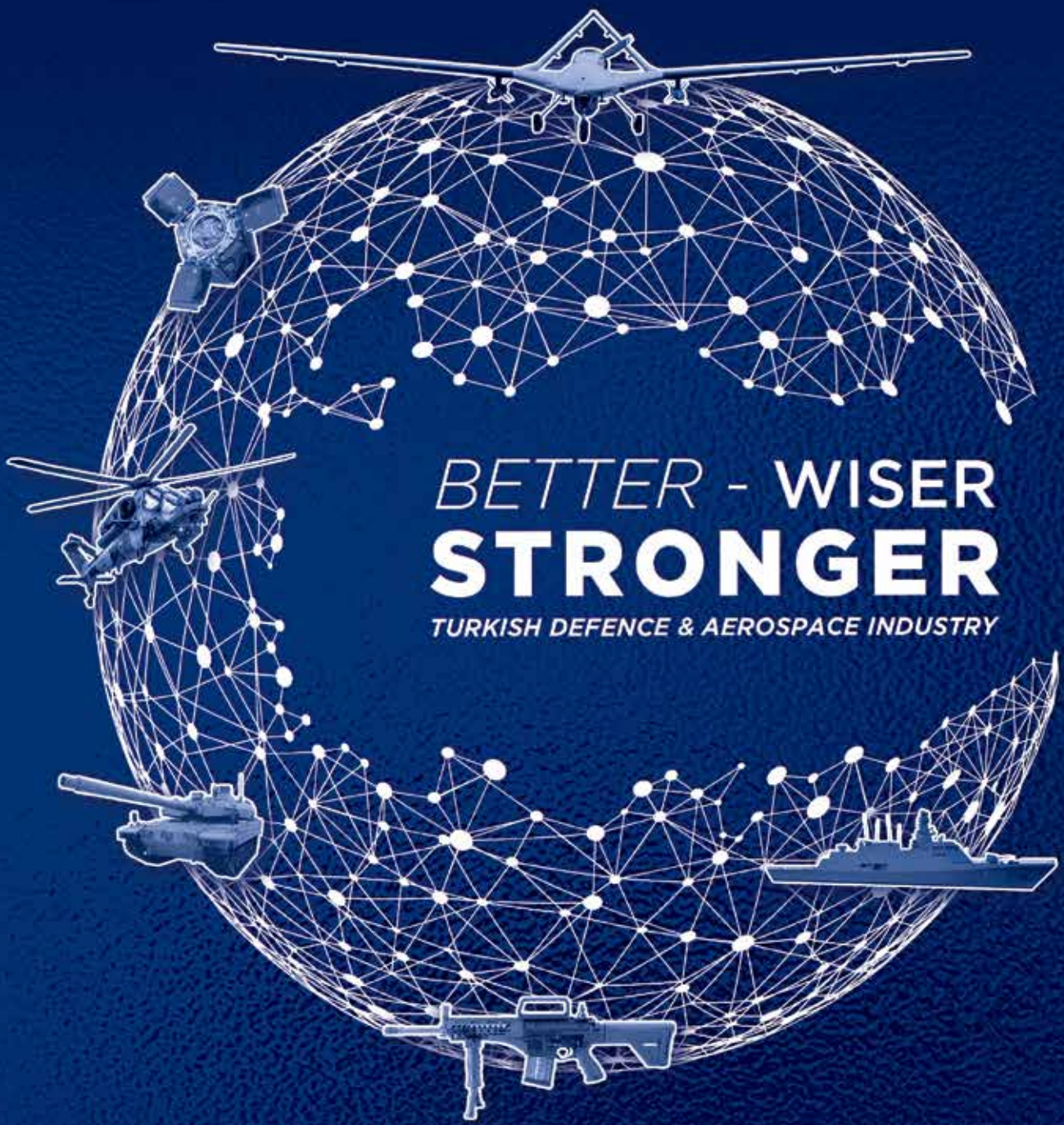
TYPE 214TN
REİS CLASS TCG PİRİ REİS SUBMARINE LAUNCHED

ALP AVIATION
DELIVERED DYNAMIC COMPONENTS & LANDING GEARS UNDER THE TUHP PROGRAM

CES ADVANCED COMPOSITES & DEFENCE TECHNOLOGIES
EXPORTING HIGH TECHNOLOGY SOLUTIONS TO THE WORLD

TEI-PD170
TURBO DIESEL AVIATION ENGINE SERIAL PRODUCTION DELIVERY CEREMONY

ISSN 1306 5998



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Basım Tarihi
Aralık 2019

Yayın Türü
Süreli

ISSN 1306 5998
VOLUME: 14 • ISSUE: 97 • YEAR: 2019
DEFENCE TURKEY

DEFENCE TURKEY

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Turkish Defence Industry – Reached US$60 Billion with its 700 Projects!

Ayşe AKALIN
Publisher & Editor in Chief

Turkish Defence Industry closed 2019 with new records in terms of both turnover and export figures. Several platforms, systems, and subsystems developed for the Turkish Armed Forces and Security Forces have entered the inventory, while the qualification and testing activities in various projects were successfully completed and started to wait for the serial production process. Today, our country carries out 700 different programs worth US$60 billion under the coordination of the Turkish Presidency of Defence Industries. Thanks to the growing capabilities of its main contractors, SMEs, and sub-industry companies, the Turkish Defence Industry continues to meet not only the needs of the Turkish Armed Forces and Security Forces but also the defence needs of friendly and allied nations. Pushing toward the US$3 billion target set for 2019, Turkey has increased its export revenues to US$2,74 billion in 2019, while its total sales revenues amounted to US$9 billion.

According to the 2019-2023 strategic plan published by the Presidency of Defence Industries in December, the total turnover of the sector in 2023 is expected to be US$27 billion, while the export revenues are planned to reach US$10,2 billion. The domestic contribution ratio, which increased to 68% in 2019, is aimed to reach 75% in 2023. In line with the revised 2023 targets, it does not seem very far to reach the targeted figures with an annual increase of 35%-40% in total turnover and export revenues in the four years. However, we should also consider that the restrictions and hidden embargoes experienced and may be experienced in the supply of critical systems and subsystems from abroad may lead to delays for some projects or extend the project schedule. Consequently, it is necessary to develop new and different strategies in the short and medium-term, to solve the problems that may arise in the supply of these systems above. Parallel to all these developments, the Turkish Defence Industry, which has shown a successful performance in the projects carried out in Turkey and abroad in 2019, will be more effective and more competitive especially in the export market by increasing this performance even more in 2020 with the critical support of the decision-makers.

In this issue, we would like to thank CES General Manager Selçuk ŞENTÜRK, Director of HENSOLDT Turkey's Ankara Liaison Office Levent DÜNYA, HENSOLDT Director of Sales for Maritime Optronics Harald HANSEN, and Founder of SEMPRO Semiha YAŞAR for their valuable contributions and taking the time for our pleasant interviews. In the following pages, you will find the latest Defence Industry news about the international and domestic performance of the Sector in 2019 and its planned works in 2020 as well as the exclusive articles we have reviewed for you.

Enjoy this issue...

by Cem Akalın

Crucial Programs Scheduled for 2020 in the Defence Industry!

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President of Defence Industries Prof. İsmail DEMİR and Vice Presidents Dr. Celal Sami TÜFEKÇİ, Mustafa Murat ŞEKER, Serdar DEMİREL, Harun ÇELİK and Prof. Faruk YİĞİT, came together with members of the media at the Ankara campus of the Presidency in order to make an overall assessment of 2019. SSB President Prof. DEMİR also shared critical information with the media about the activities scheduled for the upcoming year.

Emphasizing the importance of sustainability in the defence industry, Prof. DEMİR said that they, as an institution, aim to cater to the Turkish Armed Forces (TAF) and that a continuous structure for export has to be achieved because domestic consumption in the defence industry is, in a sense, limited. Prof. DEMİR stated that they have cooperated with many countries in the defence industry and that they have contributed to the participation of companies in international fairs and they have taken part in interstate export agreements when necessary. He noted that they have provided critical support to companies when the creation of a credit mechanism was needed in this context.

Stating that they are open to various collaborations in the defence industry which require considerable resources, Prof. DEMİR said, "When we talk about domestic and national products, we don't think that we should possess all products and not share anything with anyone. I would like to express that we are open to collaborations with allied countries as long as it does not restrict us and does not interfere with our free will and technology participation."

Underlining the need to ensure the effectiveness of the lower and middle tier companies forming the defence industry pyramid in advanced technologies by strengthening them via the Presidency of Industries (SSB), Prof. DEMİR said, "In order to create competent companies, we have taken important steps to support various investments, to be partners and to invest in fields where we are insufficient in terms of technology with SSTEK that is a 100% SSB company. Our most important company here is ULAK. This company has been developing notable R&D products that will overcome foreign dependency by teaming up with other defence industry companies such as Aselsan, Havelsan, etc."

Giving brief information about the investments made and to be made by SSTEK Company, Prof. DEMİR said, "There is still existing external dependency in the antenna field. We have founded a company related to the MAST system. There is no company dealing with sophisticated braking systems. We accompany our companies to support new technologies in the fields of boron, satellite imaging and nano-technology."

SSB President Prof. DEMİR: "T_0 will initiate following the finalization of the engine supply process"

During the Q&A session, Prof. DEMİR shared crucial information about the latest status of the ALTAY MBT. Prof. DEMİR said that there is a (T_0+18) month schedule for the delivery of the first tank, however the project schedule has not yet started due to restrictions on engine and transmission. Prof. DEMİR: "We made an application to the company for the powerpack but the T_0 process cannot initiate because the company does not have engines and transmissions. We publicly declared the project schedule for the first tank as T_0+18 months. We were expecting the application to be finalized, but we did not receive any positive or negative response, yet. This issue is pending, but the seeking of alternative engine options is still going on. We expect that this will also be finalized soon. After the finalization of the powerpack and the qualification of the production line, the T_0 process will become effective". For the question of whether there is a deadline to initiate the ALTAY serial production project, Prof. DEMİR said that giving a deadline to the company would be an ultimatum due to parameters beyond the company's power. "The restriction here is the situation of the country, so we do not speak of any deadline. We can say that it will start whenever we get results. We have four powerpacks available from the prototype stage. We will start the first part with them, but it is not very feasible to produce merely four Tank and then wait. We will pass this stage very quickly, because really positive developments are available."

Prof. DEMİR: "The first system will be installed and ready in April 2020."

Also providing information on the S-400's test process and the delivery of the second system, Prof DEMİR said, "The first system will be ready in April 2020 after the related training and integration are complete. We declared to the public that the second system will be delivered in the coming period. Co-production, etc. we don't mean history at the moment because some details have been studied. But this system will come in the coming period. We don't want to set a deadline at the moment because some details are being reviewed, such as co-production, which is a corequisite for giving a deadline. But this system will materialize in the coming period."

Prof. DEMİR:
"No substantial development regarding SU-35 yet."

Making statements on the F-35 program, Prof. DEMİR said that any unilateral decision would be illegitimate. Prof. DEMİR: "We stand behind our signature and insist that a unilateral decision would be illegitimate. There is an approach here like 'I did it and it was done'. We have always said that we are a partner who fulfills all the obligations related to this program and we would like to remain in this program. Our companies have been continuing their production activities as if we didn't hear of those who said, many months ago that they have taken this decision and would block the supplying activities. At that time, when we heard this, if we would have pushed the companies to stop production, the entire program would have confronted many problems. We haven't taken any negative steps against production in order to demonstrate Turkey's positive approach and good faith."

Answering a question on the deployment of F-35B STOVL aircraft on the TCG Anadolu Multipurpose Amphibious Assault Ship (LHD) and whether there are any alternatives, Prof. DEMİR said, "We have never received an official request for the deployment of F-35B aircraft on this ship. This idea might have been discussed within the Navy General Staff in-house but it wasn't something that they contacted us with as an official request. There is a wide variety of aerial platforms that you can deploy on the flight deck. At the moment there may not be a problem with deploying UAV systems having various capabilities. There are so many alternatives instead of going to an expensive alternative like the F-35B, it is possible to utilize Unmanned Systems that can perform missions to a certain degree, there will be some initiatives in this regard in due time."

Answering the question on the latest status of negotiations regarding Turkey's procurement of the SU-35 from Russia, Prof. DEMİR said, "Russia has made an offer to us. We discussed this offer and we continue to negotiate. It needs to be discussed from a broad perspective. If you ask whether there has been a positive development regarding this offer, I say no."

Clarifying the issue on SSIK's no decision on the serial production of 3 ships within the scope of the I-Class frigate project; Prof. DEMİR said the decision will be taken at SSIK meetings to be held in the coming period, but it is not possible to give an exact date of the meeting for the time being. Prof. DEMİR: "As it is known, the construction for the first ship of the I-Class has been initiated. The decision for the construction of other ships could also have been determined. However, the end-user decided to initiate the activities for the first ship because there may be some additional systems input for the other ships. When they are finalized, the Defence Industry Executive Board decision will be taken. However, it is difficult to declare an exact date for now."

Prof. İsmai DEMİR - President of SSB

Prof. İsmail DEMİR:
"France's recent stance has also affected the SAMP/T program."

Stating that they signed an agreement with EUROSAM about the SAMP/T program for system definition studies in the previous year, Prof. DEMİR said, "Such definition studies are almost finalized. After such studies, a tangible long-term activity catering to the requirements of the defined parties would be launched. But France has adopted a particular attitude in the last period and this approach has also affected this project adversely. If this attitude persists, we may keep going with the other partner (Italy). The blockage here isn't only related with us. France's negative attitude

following the finalization of this definition process unfortunately lead to difficulties in progressing to the next stages of the program."

Prof. DEMİR: "In Pakistan the T129 ATAK Program, the Pakistani side has consented to give an additional 1-year period."

Providing information on the Pakistan T129 ATAK Helicopter Program, the contract of which was signed in 2018 but no progress has been achieved regarding the export license of the engine to be procured from the U.S., Prof. DEMİR said, "The procedures of export license application for the engine are in progress. Pakistan has agreed to grant an additional one-year period regarding the export license. We're on standby. Could there be a solution of an alternative engine? We continue our efforts with the claim to meet this requirement with a unique engine (national engine development program). Could there be a quicker solution? Turkish Aerospace continues its negotiations on this issue. Export license is an issue that also concerns Pakistan as well as the U.S., and the Pakistani side continues to negotiate with all parties. We anticipate achieving a positive result. However, if no positive result is accomplished in one year and Pakistan sees the point that we reach in the development of the unique engine (TS1400) and if the all parties are willing to face all of the challenges and compromise over the unique solution, the national engine can be replace the existing engine. There are quality, test and certification processes in the development projects in respect to the schedule. Those processes can take much longer than expected for air platforms. The core engine was ignited .We're talking about an aggressive two-year schedule. Even when the engine is ready, there are certain extensions in the test and qualification processes. Since it is an air platform, we should not take risks. When setting the two-year schedule, we have always said that the issues that may arise in such a process should be severely scrutinized. In this respect, we can conclude that the next two-year process is a process in which all requirements and conditions need to be fulfilled."

Prof.DEMİR emphasized the need to attend to value-added areas for the sustainability of the Defence Industry and said that they are trying to closely comprehend the capabilities of the sector by visiting various cities. "Since the Defence Industry became popular, various investors and industrialists have become much more interested in this sector. There is a certain level of maturity in some regions of Turkey. We come together with the Organized Industrial Zones, Chambers of Industry and related institutions in these cities and we have the opportunity talk face to face on the competencies of such cities and how such competencies are developed. We take along our main contractor companies on such visits. We emphasize the necessity of added value to the industrialists; for example, if a company says they're good at metal cutting, we tell them that we have a large number of companies in this regard and that a saturation point has been reached. The added value achieved by the metal processing machines that we bring from abroad decreases, if the material also comes from abroad. So, let's rely on value-added areas. We don't underestimate the counter/machine. We see that there is has been a cutback in the world in the area of sophisticated machines capable of precision machining. In order to avoid obstacles in this regard, we also emphasize that we need to have the infrastructure and capabilities of production systems in Turkey. We believe there should be activities focusing on technology and niche areas. Companies and organizations in these cities say that if there is a request for them to complete activities that contain technological depth, then they will need close cooperation for niche areas, and they want us to coach them on these niche areas. With this approach, we will be able to communicate with these structures more easily by establishing clusters in cities and we consider that this will be beneficial. The establishment of the HUB Aerospace Zone continues in the Ankara Kazan region. We consider Turkish Aerospace to be an important driving force in aerospace in this region, and we will create an eco-system in this region, we will establish a Technopark, and we will establish a center of excellence in manufacturing technologies. Efforts in the field of manufacturing technologies must be exerted very scientifically and we should not fall behind in this important field and Ankara will be a pilot region in this context."

Following the Q&A session, the meeting ended with a photography session.

In light of the information shared by the SSB, our editor İbrahim SÜNNETÇİ prepared a comprehensive article for our readers entitled "How was the sector's export performance in 2019? Which platforms, systems and subsystems were delivered in 2019? What progress was achieved in R&D projects and system test processes? What awaits the Turkish Defence Industry in 2020?" Please be sure to check it out in the following pages of this magazine

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Güven Veren Teknoloji

by İbrahim SÜNNETCİ

2019 Outlook for the Turkish Defence & Aerospace Industry and Goals for 2020

The Turkish Defence and Aerospace Industry, breaking new records in terms of turnover and export figures in 2019, has successfully accomplished critical stages and reached delivery phases in Land, Naval, Air, Weapon/Ammunition/ Missile and Electronic System projects, which were initiated under the coordination of the Presidency of the Defence Industries (SSB) as per the needs of the Turkish Armed Forces (TAF) and the Security Forces, and carried out under the leadership of the Turkish Armed Forces Foundation (TSKGV) companies and in cooperation with TÜBİTAK Institutes (Informatics and Information Security Advanced Technologies Research Center – BİLGEM, Marmara Research Center - MAM, Defence Industry Research and Development Institute -SAGE and Space Technologies Research Institute - UZAY), private sector companies, SMEs and universities.

We, as Defence Turkey magazine, have prepared the 2019 outlook report for the Turkish Defence & Aerospace Industry and compiled major activities and deliveries planned to be realized in 2020.

Major Activities and Deliveries in 2019

LAND

• The first vehicles were delivered within the scope of the **Weapon Carrier Vehicles (STA) Project**, the contract of which was signed between the SSB and FNSS. At the ceremony held on December 25, two KAPLAN-10 tracked weapon carrier vehicles were delivered to the Land Forces Command. The Weapon Carrier Contract covers a total of 260 vehicles, 184 of which are tracked (KAPLAN-10) and 76 of which are wheeled (PARS 4x4), and weapon turrets for use on these vehicles. The qualification activities of PARS 4x4 are planned to be completed in January 2020.

• Within the scope of **FIRAT-M60T AMT Modernization Project,** modernization of 169 tanks was completed in 2019. Within the scope of the contract amendment signed on July 24, 2018, the AKKOR PULAT Active Protection System (AKS) is installed on 40 of 169 tanks and the Telescopic Periscope System (TEPES) is installed on 73 tanks, which were named M60TM after modernization. In addition, 90 40mm automatic grenade launchers were supplied in 2018 for use in tanks.

• Within the scope of the **Armored Combat Vehicle (ZMA/ACV) Platform Modernization Project Contract** worth TL 900 Million signed between the SSB and Aselsan on December 31, 2019, some of the ACV-15 ZMA Platforms in the inventory of the Land Forces Command will be modernized. The 25mm NEFER Weapon System, Laser Warning System,

The M60TM MBT fitted with TEPES and AKKOR PULAT APS displayed at outdoor exhibition area during IDEF '19 Fair

Close Range Surveillance System, Driver's Vision System, Direction Finding and Navigation System, to be used in vehicles within the scope of the project, will be provided by Aselsan. FNSS will provide the Air Conditioning System, Heating System, Fire Extinction System and Explosion Suppression System. FNSS will also upgrade the armor and mine protection levels of vehicles and provide maintenance services. Deliveries under the contract will be realized between 2021 and 2023.

• The **Special Purpose Tactical Wheeled Armored Vehicle (ÖMTTZA/SPTWAV) Project Contract** was signed. Within the scope of the contract signed between the SSB and FNSS, the FNSS will deliver to the Land Forces Command and Gendarmerie General Command a total of 100 8x8 (PARS-III) and 6x6 (PARS III SCOOTER) vehicles in 5 different types, through a domestic development model. Within the scope of ÖMTTZA project, 30 6x6 command vehicles, 45 8x8 sensor and reconnaissance vehicles, 15 6x6 radar vehicles, 5 8x8 CBRN vehicles, 5 8x8 Armored Combat Vehicles (ZMA) will be delivered.

• A total of 47 ATEŞ Armored Mobile Border Surveillance Vehicles (Lot-I: 20 units in May 2019 and Lot-II: 27 units in December 2019) have delivered under the **ATEŞ Mobile Border Security System Project** carried out by Aselsan, as the Main Contractor, and covering a total of 57 vehicles. As the ATEŞ Armored Mobile Border Security Vehicle platform, Katmerciler's HIZIR 4x4 MRAP was used. The electronic sensors on the vehicle and the security management software enabling interoperability of these sensors were provided by Aselsan.


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COBRA-II Tactical Wheeled Armoured Vehicles with Aselsan's L-Band SERHAT-II CMR System

• Acceptance tests of the second, third, fourth and fifth lot deliveries of SERHAT-II Radars were successfully completed within the scope of the **Counter Mortar Radar System (SERHAT-II) Supply Contract** worth US$ 40.320 million, signed between the Ministry of National Defence (MoND) and Aselsan on June 28, 2018 and such radars were delivered to the TAF. The first lot delivery had been realized after the acceptance tests made on December 10-18, 2018 and other deliveries under the contract are planned to be completed in 2020. The L-Band SERHAT-II Mortar Detection Radar, having a 360° detection capacity and fixed antenna of cylindrical phased array, was placed on an extendable mast on Otokar's COBRA-II Tactical Wheeled Armored Vehicle.

• At IDEF '19 (May 2019), a Memorandum of Understanding (MoU) was signed between Caterpillar Defence UK and MoND for the joint development of **a new diesel engine for use in the FIRTINA-II Self-Propelled Howitzer.** The new diesel engine will be developed based on an existing diesel engine of the company and will be V12 type and have a capacity of 1,200 hp. The development activities of the new engine will be carried out at the 1st Main Maintenance Factory Directorate in Arifiye with the technical support of Caterpillar Defence UK. The new diesel engine to be used in FIRTINA-II will be matched with Allison's X1100-5 full automatic transmission system in line with user's request. The production of 140 New Generation FIRTINA (II-II) Self-Propelled Howitzers, which were ordered as per the needs of the Land Forces, was started in 2018 Q4. The first batch of FIRTINA-II Self-Propelled Howitzer is planned to be delivered in 2020.

• Within the scope of the Serial Production Phase, the deliveries of the **KORKUT Self-Propelled Low Altitude Air Defence Gun System** were started on March 30, 2019. As of November 2019, the number of delivered vehicles reached to a total of 17 - composed of 4 Command & Control Systems (KKA) and 13 Weapon System Vehicles (SSA). 2 Weapon System Vehicles and 1 Command & Control Vehicle manufactured during the prototype phase had been delivered to the Turkish Land Forces Command (TLFC) in 2016. The Project covers the supply of a total of 42 Weapon System Vehicles and 14 Command & Control Vehicles from Aselsan through domestic development model. The 30-ton class and 6 wheeled ZMA-30 Tracked & Armored Combat Vehicle (ZMA/ACV) manufactured by FNSS is utilized as a carrier platform.

• Within the scope of the 8x8, 10x10 and 12x12 wheeled Tank Carrier, Container Carrier and Recovery Vehicle Project launched by the SSB Land Platforms Department, a total of 476 vehicles consisting of 134 Tank Carrier Vehicles (TTA), 65 DROPS Container Carrier Vehicles and 277 Recovery Vehicles will be supplied. As part of the demand for **Tank Carrier Vehicles (TTA),** the initial contract was signed between the SSB and BMC Company on August 10, 2018 and 72 TUĞRA TTAs were ordered in the first stage. The delivery ceremony of the TUĞRA TTAs manufactured by BMC and Öztreyler companies with indigenous and local facilities was held on November 26, 2019. BMC's TUĞRA TTA with an engine

of 620hp weighs 125 tons with its trailer and has the carrying capacity of net 70 tons.

• Prototypes of **Light Class Unmanned Land Vehicles** were developed.

• In 2019, the Tactical Wheeled Armored Vehicle **VURAN**, Land Vehicles Fuel Tanker **AKTAN**, **Modular Container and Carrier Vehicle** entered into the inventory for the first time.

• The delivery of the land platforms such as **KİRPİ-II, EJDER YALÇIN, VURAN, AKTAN, Masked Armored Bus (GİZKO), Armored Recovery and Maintenance Vehicle Aracı (ZKBA)** continued.

NAVAL

• The 4th vessel of the MİLGEM Project, **TCG Kınalıada Corvette** (F-514), was put into the service of the Naval Forces Command (TNFC) on September 29, 2019.

• The contract for the **Pakistani Naval Forces (PN) MİLGEM (Jinnah Class Frigate) Project** was signed on September 6, 2018 and the activities regarding the project were launched on March 11, 2019. The construction of the first ship as part of the project was officially launched with the ceremony for the first sheet cutting on September 29, 2019. The first ship is planned to be delivered in Turkey in August 2023 and the final ship is planned to be delivered in Karachi in 2025 within the scope of the PN MİLGEM Project that covers a total of 4 frigates. Due to the VLS integration at the back of the bow gun (for the LY-80/HHQ-16 Medium Altitude Air Defence Missile System) the Jinnah Class will be longer and heavier compared to the ADA Class.

A CGI of TCG Ufuk Test and Training Ship

• As part of the **I Class Frigate Project** that is the second phase of the MİLGEM Project, the contract signed in the beginning 2019 with STM Company, selected as the Main Contractor in 2018 by the SSB, entered into force on September 27, 2019. After the Sea Acceptance Tests to be conducted upon the launch of the TCG Istanbul Frigate (F-515) in the first months of 2021 and the equipping activities, the ship is planned to be put into the service of the Turkish Naval Forces Command (TNFC) in the second half of 2023.

• The **Test and Training Ship TCG Ufuk** (A-591) with intelligence capabilities (ELINT/SIGINT) was launched to sea at Istanbul Denizcilik Shipyard in Tuzla on February 9, 2019. STM Company is the Main Contractor of the project and the TCG Ufuk with a full length of 99.5 meters, 14.4 meters of width and 2,400 tons of displacement weight, is expected to be delivered to the DzKK on July 31, 2020. Capable of 18+ knots of maximum speed and featuring a helicopter platform of 10 tons, the TCG Ufuk Test and Training Ship is also the first intelligence ship of Turkey that is fully developed and built through indigenous facilities and capabilities.

• **TCG Anadolu Multi-Purpose Amphibious Assault Ship (LHD)** was launched to sea in May 2019. The equipping activities of the ship taken to the dry dock within a few days are ongoing. The TCG Anadolu aimed to be delivered by the end of 2020 is planned to be in the full displacement weight of 27,436 tons and with a length of 230.8 meters. The TCG Anadolu will feature a 202-meter long flight deck with 6 landing spots, its length at waterline will be 207.2 meters, maximum width will be 32 m, maximum speed is projected as 20.5 knots (at full weight displacement). The deployment speed of the ship is projected as 16 knots while its deployment speed and maximum cruising range is foreseen as 7.000 nm + 2.000 nm.

• One of the Type 214TN REIS Class Submarines that is being built at the Gölcük Shipyard Command as part of the New Type Submarine Project, the **TCG Piri Reis (S-330) Submarine**'s launch and first welding ceremony to the beam of the 5th submarine TCG Seydi Ali Reis (S-334) was held on December 22, 2019. The TCG Piri Reis Submarine that is presently being equipped will be put into the service of the TNFC in 2022, upon the completion of the Factory Acceptance Tests (FATs), Harbor Acceptance Tests (HATs) and Sea Acceptance Tests (SATs). Its full length is 68.35 m, height is 13.1 m (16.5 m when the periscopes are elevated), width 6.3 m, draft survey 6.0 m and surface weight approximately 1,850 tons. The submerged weight of the REIS Class Submarines are around 2,040-2,050 tons and are operated by 40 (27+13) personnel.

• A contract was signed on February 8, 2019 between the Aselsan-STM-Havelsan-ASFAT Partnership and the SSB on the **Half Life Modernization of 4 PREVEZE Class Submarines** that were put into the service of the TNFC in 1994-1999. According to the contract, which entered into force on July 17, 2019, the delivery of the submarines to be equipped with new generation Sonar, Surveillance and Attack Periscopes, Satellite Communication System, Integrated Communication System, Electronic Support

System, Marine Radar, WAIS System and Harpoon Fire Control System, will be accomplished in 2023-2026, respectively. According to the Project schedule, the TCG Sakarya – the first submarine will be delivered in 2023 after the SAT (Sea Acceptance Tests). Then, the modernization of the three remaining submarines will be completed at intervals of nearly 10 months. The ISUS-83/2 SYS in the submarines will be replaced with ADVENT based MUREN Combat management System (CMS) within the scope of the 'MUREN CMS PREVEZE Class Implementation' Project signed in August 2017 and conducted with the cooperation of the TNFC Research Center Command (ArMerKom), Gölcük Shipyard and TÜBITAK.

• The delivery of the 8 Fast Patrol Boats ordered as part of the **New SAT Boat (MRTP-24U) and Fast Patrol Boat (MRTP-12) Projects** conducted by Yonca Onuk Shipyard as the Main Contractor to fulfill the demands of the TNFC was launched in February 2019 and the boats were delivered in 2019. The first of the New SAT Boats with a total length of 26.3 m and width of 5.48m have been delivered to the TNFC in the last days of 2019 where the second boat is planned to be delivered in the first half of 2020. Armed with a 25 mm STOP naval gun system the New SAT Boat with the displacement of 55t+ is capable of achieving 54 knots of speed. The Fast Patrol Boats weigh 11 tons and are 12.65 m in length.

• The contract on the procurement of 105 ARES 35 Control Boats within the scope of the **Control Boat Project** of the Coast Guard Command was signed on February 17, 2019 between the SSB and ARES Shipyard. In order to keep up with the contract schedule, ARES Shipyard will be completing the construction and equipping activities of each of the ARES 35 Control Boats to be built with carbon reinforced composite with multiple molding technique in 10 days. 3 boats will be built every month and the SSB will be conducting the acceptance of 6 boats at the ARES Shipyard once every two months. According to the contract, the delivery of the 105 ARES 35 Control Boats will be completed within nearly 5 years. The delivery of the ARES 35 Control Boats will be launched in 2020. The boats will be 11m long, 3,30 m wide; they will weigh 85 tons and will be capable of reaching a 160 nm cruising speed.

• The **Floating Dock Supply Project** was launched for the supply of a floating dock weighing 10,000 tons, required by the MoND Shipyards Directorate General, to be deployed at the Izmir Shipyard Command at Alaybey, Izmir and a contract was signed by HAT-SAN Gemi İnşaa Bakım Onarım Deniz Nakliyat Sanayi ve Ticaret Anonim Şirketi and ASFAT A.Ş. on August 2, 2018. The keel laying ceremony of the floating dock was held on February 6, 2019 and the platform was planned to be completed in October 2019 and delivered to the Izmir Shipyard Command in December 2019. However, the aforementioned delivery could not be accomplished on the planned date and was postponed to January 2020. The completely built Floating Dock is expected to be delivered in the middle of January 2020. The deadweight of the Floating Dock, also capable of serving the platforms that will be included in the inventory of the TNFC in the upcoming period, is 10,000 tons. The full length of the dock is 175.60 m and its internal width is 35.54 m. The Floating Dock is capable of submerging or lifting within an hour. There are two electro-hydraulic type mobile cranes on the Dock. These cranes are capable of carrying 10 tons of weight in 10 minutes.

AIR

• The roll-out ceremony for the **ANKA-AKSUNGUR High Payload Capacity UAV** was held on January 28, 2019 and the maiden flight of the platform was conducted on March 20. The qualification process of the ANKA-AKSUNGUR High Payload Capacity UAV is planned to be completed by 5 February 2020 and the UAV is planned to be delivered to the Turkish Armed Forces (TAF) during the first quarter of 2020. The ANKA-AKSUNGUR High Payload Capacity UAV has two prototypes; 19-001 (T-01) and 19-002 (T-02) and the manufacturing activities of its third prototype, defined by the company as the "customer aircraft version" are expected to be completed soon. Powered with two water-cooled, turbocharged TEI-PD170 diesel engines each with 170 hp and 2.1 liter-volumes, AKSUNGUR's length is 12 m, height is 3 m and its wingspan is 24 m. There are 3 external load stations beneath each wing with load capacities of 500 kg, 300 kg and 150 kg. The Maximum Take-Off Weight of AKSUNGUR is 3,300 kg and the platform is designed to function with an external load of 750 kg in Attack/ Sea Patrol

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ANKA-AKSUNGUR UAV has successful performed live guided munition firing tests during the second half of 2019

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T625 GÖKBEY P1 TLUH prototype during flight test

Task configuration at an altitude of 25,000 ft for 12 hours, with 150 kg payload in Signal Intelligence Task configuration at an altitude of 40,000 ft for 24 hours.

• The contract on the **Heavy Class Attack Helicopter (ATAK-II) Project** was signed on February 22, 2019 between the SSB and Turkish Aerospace (TUSAS) to fulfill the requirements of the TLFC. The development activities of the T129 Mk-II Heavy Class Attack Helicopters continue, and the first test flight is planned to be conducted in 5 years (T+60 months) after the contract's entry into effect. According to statements, the helicopters will have a maximum take-off weight of nearly double of the capacity of the T129 Mk-I and will be among the attack helicopters of the highest class in the world in this area. The duration of the project is projected as 8.5 years (T+102 months). The 2 types (Sea and Land versions) of Heavy Class Attack Helicopters in the 10 ton class configuration are planned to be developed and the delivery of the 3 helicopter prototypes is planned to be delivered to the SSB along with the Technical Data Package. The TS3000 turboshaft engines with 3,000hp propulsion capacity to be utilized in ATAK-II Helicopters are developed by TEI.

• The first certification flight of **GÖKBEY Turkish Light Transport / Utility Helicopter (TLUH)**'s first flight prototype T625 P1 was conducted on June 29, 2019 at the facilities of Turkish Aerospace (TUSAS). The prototypes (civilian and military configurations) of the twin engine Turkish GÖKBEY Helicopter in the 5 ton class and with a passenger capacity of 2 pilots + 12 passengers is designed and manufactured by TUSAS. The CTS800-4A Turboshaft Engines with 1.361shp power capacity manufactured by Light Helicopter Turbine Engine Company (LHTEC), used in prototype helicopters, will be replaced with TS1400 engines produced by TEI in the serial production models. One of the GÖKBEY TLUH Prototypes will be equipped with TS1400 Turboshaft engines in 2020 and the ground tests will be executed in the first stage. Flight tests will be conducted following the ground tests (in 2021 according to my projections).

• The deliveries were completed in July 2019 with the delivery of the last four CH-47F Chinook Helicopters out of the 11 helicopters ordered as part of the **Heavy Lift Helicopter Supply Project**. 6 CH-47F Chinook Helicopters were ordered for the TLFC, 4 CH-47Fs were ordered for Special Forces Command and 1 Chinook was ordered for the MoND within the scope of the Project. 6 helicopters ordered for the TLFC were delivered in 2016 (in groups of three in July and November) and the 7th CH-47F Helicopter was delivered in August 2018.

• The 8th and 9th aircraft out of the 10 A400M Atlas Strategic Transport Aircraft ordered for the Air Forces Command (TurAF) as part of the **A400M Program** were delivered to the TurAF on June 21, 2019 and August 7, 2019. Presently 9 A400 Atlas Strategic Transport Aircraft are in the service of the 221st Air Transport Fleet Command under the 12th Air Transport Main Base Command at Erkilet, Kayseri and the delivery of the 10th aircraft is planned to be realized in 2022.

• The **A400M Aircraft Retrofit Contract** Signing Ceremony was held on October 3, 2019 at the 2nd Air Maintenance Factory Directorate by ADS and ASFAT A.Ş. With the Project, the 2nd Air Maintenance Factory Directorate will be acquiring a very critical capability and will be able to serve friendly and allied nations and our region in terms of the maintenance of A400M aircraft.

• The 3rd and 4th **F-35A Lightning II** jets manufactured for the Turkish Air Force (TurAF) with tail numbers 18-0003 and 18-0004 accomplished their maiden flights in February 2019. The delivery process of the jets was completed in March and the aircraft reached Luke Air Base in Arizona in April. There, the jets were operated by Turkish pilots attending the training activities at the air base. The fifth F-35A Lightning II manufactured at the Fort Worth Texas facilities of Lockheed Martin for the TurAF performed its maiden flight on October 1, 2019. After flying for nearly an hour, the 18-0005 tail numbered jet (call sign AT-05) landed at Fort Worth facilities where it took off from. Production of the TurAF's 6th F-35A jet with the tail number 18-0006 (call sign AT-06) was completed in November 2019. Our partnership in the F-35 Lightning II JSF Program which is the greatest Defence program in terms of both value and scope in the history of the Republic of Turkey was suspended on July 16, 2019 as a result of the S-400 crisis encountered with the US Government. Our exclusion from the program

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started officially. The local companies presently conducting production and deliveries according to their work shares as part of the program with the best value approach will be excluded from the program after March 2020. In line with the National Defence Authorization Act for the Fiscal Year 2020 (Defence Budget) acknowledged on December 17, 2019, the US Department of Defence was assigned as part of the Countering America's Adversaries Through Sanctions Act (CAATSA) to transfer the 6 F-35-A Jets manufactured for Turkish Armed Forces to a storage zone for long term storage. In the "Modernization Programs as part of National Defence Strategy" section of the budget, it was stated that a fund of US$ 440 Million would be allocated for the procurement of the F-35A jets ordered by Turkey.

• The first flight test of the T129B Mk-I Light Class Attack and Tactical Reconnaissance Helicopter's Phase-II version equipped additionally with Aselsan's Helicopter Electronic Warfare Self Protection System (HEHSIS) and communication systems was successfully accomplished at TUSAS facilities on November 13, 2019. Following the detail tests, the delivery of the **ATAK Phase-II** to the Turkish Land Forces Command (TLFC) will start in mid-2020. Phase-II configuration is expected to be implemented retrospectively to 21 T129B Mk-I Phase-II helicopters that had been manufactured and delivered so far.

• **Within the scope of the T129 ATAK Program**, a total of 91 aircraft will be delivered to the TLFC (59 firmed and 32 optional) and a total of 27 aircraft (24 firmed and 3 optional) will be delivered to the Ministry of Interior (for the demands of the Gendarmerie General Command – GGC and General Directorate of Security's Aviation/ Aerospace Department). Therefore, as part of the ATAK Program where a total of 118 T129A/B Mk-I Helicopters (83 definite) is expected to be manufactured, as of January 3, 2020 the delivery of 56 helicopters has been accomplished; 50 helicopters (9 T129A EDH + 41 T129B) were delivered to the TLFC, 6 were delivered to the GGC (a total of 18 T129Bs were ordered). The 55th helicopter was delivered on December 26 and the 56th helicopter was delivered on December 31, 2019. In this way, TUSAS accomplished the delivery of 14 T129Bs in 2019.

• The production of **T700-TEI-701D Turboshaft Engines** that will be used in T70 Utility Helicopters to be manufactured within the scope of the Turkish Utility Helicopter Program (TGMHP) is being conducted at TEI facilities. The delivery of the first 4 engines manufactured was accomplished on May 13, 2019. Within the context of the program, TEI will execute the production of a total of 248 T700-TEI-701D Turboshaft Engines composed of 218 T70 platform engines and 30 spare engines.

• Regarding the additional order of a total of 12 ANKA UAVs composed of 4 **ANKA-B** and 8 **ANKA-S** UAVs, TUSAS signed the contract with TNFC/SSB in mid-2019. Following the signing of the main contract, TUSAS and TEI signed a sub-contract for the supply of TEI-PD170 turbodiesel aviation engines (13 engines) to be used in the aircraft. CMX-15D FLIR payload will be used in the ANKA Block-B and Block-s UAVs that will be delivered to the Turkish naval Forces Command (TNFC) in 2020 and some of the aircraft will be equipped with Aselsan's SARPER SAR/GMTI/ISAR radar and AIS Automatic Identification System. The CMX-15D FLIR payload and the SARPER SAR/GMTI/ ISAR radar (are also used in the three leased ANKA Block-B UAVs currently under the service of the TNFC.)

• Within the scope of the **Turkish Utility Helicopter Program (TGMHP)**, first helicopter of the 109 T70 helicopters to be manufactured by TUSAS as the Main Contractor was rolled out from the hangar with a ceremony held on November 25, 2019. An intensive flight test program with qualification and certification purposes will be executed in 2020 and the deliveries are planned to be launched in 2021. As part of the TGMHP, a total of 109 T70 Helicopters in two different configurations based on S-70i™ IBH model will be delivered to a total of six different users (Turkish General Staff [Special Forces Command SFC/ÖzKK, 11], Land Forces Command [TLFC, 22], Air Forces Command [TurAF, 6], Gendarmerie General Command [GGC, 30], Security General Directorate [EGM/SGD, 20] and Directorate General of Forestry [OGM, 20]) within a duration of 10 years.

• Baykar Makina delivered 98 BAYRAKTAR TB2 Tactical UAVs and BAYRAKTAR TB2-S AUAVs to the Turkish Armed Forces and security forces. 150,000 flight hours were completed as of November 23, 2019, and the first flight test were completed with the prototype aircraft of the **AKINCI Attack UAV** with tail number PT-1 on December 6, 2019 at Çorlu Airport in Tekirdağ. The BAYRAKTAR AKINCI Attack UAV with a length of 12.3 m, wingspan of 20 m and a take-off weight of 5,500 kg has a total of 1.350 kg payload carrying capacity; 900 kg external and 450 kg internal payloads. The AKINCI Attack UAV İS powered with two AI-450C turboprop engines manufactured by Ukrainian Motor Sich Company. Each of the engines has a power capacity of 450 hp (285 shp) with 5 blade props that work with Jet-A1 and JP-8 fuels in the first stage. Later, they will be equipped with AI-450T turboprop engines with a capacity of 750 hp (544 shp) that will be manufactured locally. The AKINCI Attack UAV is expected to be launched into service at the end of 2020.

• According to the Armed Mini/Micro UAV Project contract signed between the SSB and Asis A.Ş., 8 **SONGAR Armed Drone Systems** with 5.56 mm machine guns and a 200 bullets capacity will be supplied. The delivery is planned to be realized in 2020.

• In line with the **Kamikaze Mini UAV Systems Supply Project Contract** signed by the SSB and STM Savunma Teknolojileri Mühendislik ve Ticaret A.Ş. in December 2019, 356 new generation kamikaze UAV KARGU-IIs, with an increased duty period, altitude and autonomy, featuring low noise level and improved target acquisition algorithm, will be delivered. The deliveries are expected to be completed in 2020. In 2020, STM will also accomplish the delivery of Autonomous Tactical Fixed Wing Striker UAV ALPAGUs. STM previously conducted the delivery of around 130 KARGU-I kamikaze UAVs to the TAF and security forces and KARGUs successfully performed in local and international operations.

• On November 16, 2019, the SSB announced the launch of the **KERKES-Global Positioning System Independent Autonomous Navigation System Development Project** enabling the UAVs to function in environments without a GPS. With the help of this system, the UAV starts to function with the installed map and successfully performs its tasks by comparing the map with the data obtained from the field, without requiring a GPS.

• As part of the Swarm UAV Project launched by the SSB in 2019, STM successfully accomplished the flight, motion, formation, rotation and assault tests with over 20 KARGU-I Rotary Wing Attack Drone (Kamikaze Drone) Systems in the first half of 2019.

WEAPONS/ MUNITIONS/ MISSILES

• **Close-In Weapon System (CIWS) for GÖKDENİZ Naval Platforms** was launched at IDEF '19 held on 30 April - 3 May 2019 and the system was rendered available for utilization in naval platforms. Equipped with Particulate Munition (ParM/ATOM), the GÖKDENİZ CIWS System will enable the most effective air Defence against the anti-ship guided missiles, Unmanned Air Vehicles (UAV), Aircraft and Helicopters. The System will also be effective against close-in asymmetrical surface threats. As all the sub-systems are inside the turret and units related to power are located under the turret, the GÖKDENİZ CIWS could be easily installed on surface platforms since they do not require any penetration to the hull/under the deck. GÖKDENİZ CIWS' weight is expected to be around 8.5 tons including the munition and two operator consoles.

• Within the scope of the **HİSAR-A Air Defence Missile System Project**, firing tests with warheads against • high-speed live targets similar to tactical configuration were held in the first half of October 2019. Previously in 2019, as part of the Project, Fire Control Unit (FCU/AİC), KMOAİHSFS (horizontal firing) and FFS (Missile Launching System, vertical firing mode) and HİSAR-A Seeker Guided Test Missile without warhead (AGTF) and HİSAR-A KTF-03 Missile were used in the firing test campaign in March 2019. Upon the completion of the final tests and rendered available for serial production, the first delivery of the HİSAR-A Project is expected to take place in October 2020.

• With the **HİSAR-O Medium Altitude Air Defence Missile System,** as part of the firing test performed in May 2019, two high-speed target drones, named Banshe Jet 80 was launched simultaneously from two catapults and were flown over the Aksaray HİSAR Firing Range. After detection, identification and monitoring of the aforementioned high-speed target drones, the HİSAR-O System conducted projectile motion from the Missile Launching System (FFS). After the evaluation, it was announced that the system achieved 100% performance results and that the firing was quite successful. The first warhead complete round missile tests with the HİSAR-O is expected to be realized in 2020 and the HİSAR-O System is planned to be included in the inventory in May 2021.

• A series of modifications (since the temperature degrees will be different in

A view from HİSAR-A Self-Propelled Autonomous Low Altitude Air Defence Missile System firing test executed during October-November 2018


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SOM-B2 ALCM

ground-to-air utilization, the radome/warhead will be rendered available for performing under high degrees of temperature) are conducted over the Ku-Band, active RF Seeker Head in air-to-air configuration developed for the BOZDOĞAN-GÖ missile to be used in the HİSAR-O Medium Altitude Air Defence System. The first firing with the new missile, named **HİSAR-RF**, is planned to be realized in the first half of 2020. A flat slab slotted RF antenna positioned over a steering gimbal mechanism will be available on the missile. The HİSAR-RF contains the deployment system in the HİSAR-A/O, yet it has some different features in terms of aerodynamics.

• Firing tests were executed from the ground with the **ATMACA Surface - to-Surface Guided Missile (G/M)** at the Sinop Missile Test Range first in May and then in September 2019. The first firing test from the sea was successfully conducted from the TCG Kınalıada Corvette on November 3, 2019. A net type floating target at a fixed position was used at the first sea firing test where an ATMACA G/M was utilized without a warhead. The ATMACA G/M is expected to be put into service in the second half of 2020.

• The development of **the SOM-B2 Missile** with a Dual Stage Tandem Penetrating Warhead, and its ground and flight tests were completed in 2019. The firing tests of the SOM-B2 Air Launched Cruise Missile (ALCM) were conducted in the second half of 2019 and the targets were destroyed through high precision shooting. Meanwhile, the new capabilities added to the SOM-B1 ALCM in line with operational requirements were verified with the successful test fire conducted by the TurAF in November 2019. Development activities of the SOM-C1 (High Explosive Blast-Fragmentation Warhead) and the SOM-C2 (Dual Stage Tandem Penetrating Warhead) that are the variants of SOM with ASuW capability and equipped with a KEMENT data link, are still ongoing. The serial production contract was signed between the SSB and Roketsan in October 2018 and it was stated that so far, a total of 495 SOM ALCMs have been ordered in two different groups (80+415). However, since the TR-40 turbojet engine manufactured by French Safran Power Units, with 250-340 kgf propulsion capacity is used in the SOM group, the project may be affected by the sanctions imposed by the French Government. On the other hand, according to the news in the Ukrainian press of December 2019, a contract on the supply of the AI-305 Turbojet Engine with 310kgf propulsion capacity manufactured by SE Ivchenko-Progress Company has been signed by Ukraine and Turkey a short while ago.

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BOZDOĞAN IIR Guided VVR Air-to-Air Missile

• The guided fire tests of the **Short Range BOZDOĞAN (IIR Guided) and the GÖKDOĞAN Long Range (RF Guided) Missiles** developed as part of the GÖKTUĞ Project, conducted for the production of the first indigenous and national air-to-air missiles, were successfully accomplished in November and December 2019. The flutter tests of the BOZDOĞAN missile were launched with the cooperation of TÜBİTAK-SAGE and the 401st Test Fleet Command in April 2019; the test fire was run from the F-16 wing on the ground in November 2019 and the missile successfully destroyed the high-speed target drone at an altitude of 4 km. The execution of the air-to-air fire tests were planned to be held in 2020 with the BOZDOĞAN Missile and the project is planned to be completed in 2021. The BOZDOĞAN Missile with a range of 25km, capable of speeding up to 3 Mach, is expected to be included in the inventory of the TurAF in 2021. The ground guided fire tests of the GÖKDOĞAN Long Range Air-to-Air Missile developed in parallel with


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the BOZDOĞAN short range Air-to-Air Missile was completed again at the end of 2019. The execution of the air-to-air tests of the GÖKDOĞAN Long Range Missile, which will have a range of 65-70 km, is planned to take place in 2020 and the missile is planned to be included in the inventory in 2021.

Major components of the S-400 Triumph Battery (from left to right); the 5P85TE3 Transporter Erector Launcher (TEL), X-Band 92N6E Grave Stone Engagement and Fire Control Radar and C-Band 3D 96L6E Surveillance and Tracking Radar

• The delivery of the first **S-400 Triumph Long Range Air and Missile Defence System** composed of two separate battalions each with 8 launchers according to the contract signed between Turkey and Russia on April 11, 2017 was completed on 12-25 June 2019 (first battalion) and on 27 August-15 September 2019 (second battalion). After the installation and training operations with the first S-400 Battalion assigned under the auspices of the 1st S-400 Fleet (call sign ZAFER/TRIUMPH) located at Mürted Airport Base Command, the test activities were launched on November 25, 2019. The delivery of the missiles to be used in the first S-400 System was accomplished by sea in the beginning of December 2019. Missiles transferred from Russia by sea were disembarked at Derince Port and then transported to Ankara. The first S-400 System is expected to be operational in April 2020.

• In April 2019, the contract on the **Project for the Development of a 20 mm Cannon** for the domestic development and production of the Gatling type gun with a caliber of 20mm that will be used in various land, sea and air platforms, particularly the T129 ATAK Helicopter, was signed by the SSB and TR Mekatronik Sistemler A.Ş. - a joint venture of TUSAS – Sarsılmaz Silah Sanayi A.Ş. According to the project schedule, the production of 4 prototypes will be accomplished within 30 months and the serial production of 30 guns will be realized during the first phase.

• The indigenous laser gun **ARMOL** successfully passed acceptance tests and was included in the inventory of the TurAF. With the participation of the SSB, Aselsan, Roketsan, TÜBİTAK BİLGEM and Ermaksan, the Laser Technologies Center of Excellence was established and started operations.

• A record was beaten in terms of muzzle energy during shooting with the **Electromagnetic Rail Gun System TUFAN**. The Center of Excellence for Electromagnetic Launching Technologies was built with the participation of Aselsan and TÜBİTAK SAGE and it has started operations.

• The delivery of the indigenously designed and manufactured guidance kits **HGK-84, HGK-82 KGK-82, KGK-83, LGK-82, LGK-84 and TEBER**, **MAM-C and MAM-L** smart munitions and UMTAS, L-UMTAS Missiles continued in 2019 as well. In accordance with the contracts signed both with the MoND and the SSB, Aselsan, during nearly 5 years, accomplished the delivery of over 1,500 LGK series and also over 1,500 HGK series smart munitions to the TurAF and the deliveries continue on a monthly basis. In line with existing orders, the deliveries are expected to continue until the end of 2020. LGK-82 and LGK-84 LGBs have similar features with GBU-12 and GBU-10 Paveway II LGBs in terms of shape and size, yet their internal design is completely different from Paveway IIs. The GBU-10/12 Paveway II LGBs have pneumatic propulsion systems for the blades, while the Aselsan LGK-82/84 munitions utilize an electric Blade Propulsion System. On the other hand, the laser sensor within the munitions (semi-active laser seeker), thermal battery and Guidance Computer are completely manufactured by Turkish companies. One of the most critical components, the laser detector, is also an indigenous product. Likewise, the control algorithms used in LGK-82 and LGK-84s are different.

• The **Miniature Bomb** known as the Indigenous SDB (Small Diameter Bomb) is being produced under the cooperation of Aselsan – TÜBİTAK/ SAGE. Significant progress was made in the certification flights conducted in 2019 with the Miniature Bomb and Multiple Transport Racks and the activities are almost finalized. The Miniature Bomb is expected to be included in the inventory of the TurAF in 2020. With the help of the Multiple Transport Rack (Smart Rack) is capable of destroying a total of 8 enemy targets up to a range of 55 nm (100 km) in a single sortie by carrying 4 Indigenous SDBs in the single station of the F-16 jet and 8 Indigenous SDBs in two stations. The total weight of the Miniature Bomb is 135 kg and there is a kinetic piercing warhead and a PBX-9 explosive that weighs nearly 8kg on the bomb. The front part of the Miniature

Bomb is manufactured with custom production steel and during the tests the bomb penetrated a 1m-thick concrete wall reinforced with steel.

• A new fire test was conducted on December 20, 2019 as part of the **AKYA Indigenous Heavy Class Torpedo Development Program** executed under the coordination of the Presidency of Defence Industries with the participation of many local companies, with Roketsan as the Main Contractor. According to the latest information, the test was conducted at a depth of 40m on a floating test platform. According to the Strategic Plan 2017-2021 document published by the SSB in February 2017, 50% of the critical sub-system qualification activities as part of the AKYA Indigenous Heavy Class Torpedo Program will be completed in 2020 and the remaining 50% of such activities will be completed in 2021. In this way, foreign dependency in terms of critical sub-systems will be abolished within two years. The AKYA Indigenous Heavy Class Torpedo is expected to be utilized in the PREVEZE Class Submarines that will be equipped with the MÜREN CMS for the first time.

• The deliveries of 7.62 mm **MPT-76** and 5.56 mm **MPT-55** and **SAR223** Infantry Rifles, **KNT-76** Designated Marksman Rifles (1,200+) and Indigenous Local Handgun TP9SF METE to the TurAF and Security Forces continued. As of November 2019, the number of MPT-76s in the inventory exceeded 52,000. As of October 2019, the number of 5.56mm infantry rifles (MPT-55, MPT-55K and SAR223) manufactured by MKEK, KaleKalıp and Sarsılmaz exceeded 43,500.

During the first half of 2019 the ÇAFRAD System prototype was installed at the Naval Electronic Warfare Test and Training Field of the ARMERKOM at Tuzla, Istanbul for testing purpose

• Developed and manufactured by MKEK to be utilized in the M60T Fırat and Leopard 2A4 Main Battle Tanks, the indigenous **120mm HE-T (MOD300) Tank Gun Munition**'s serial production was launched. In line with the first contract that covered a total of 8,000 munitions, the delivery of the first 1,000 tank guns, was accomplished in December 2018. The efforts towards the production and delivery of the remaining 7,000 munitions to the TLFC continued in 2019. The muzzle energy of the 120 mm HE-T Munition with a complete round weight of 27.5 kg is 870 m/s and its effective range is 4 km. In the meantime, MKEK has been developing 120 mm HEAT (High Explosive Anti-Tank) munition for the ALTAY AMT.

ELECTRONIC SYSTEMS

• The New Generation Network Enabled Data Integrated Combat Management System (ADVENT) began in 2010, launched with the cooperation of the TNFC Research Center Command and Havelsan to fulfill the modern Combat Management System (CMS) with Network Centric Warfare of the TNFC's air, surface, underwater and land platforms and was integrated to the 4th ship, the TCG Kınalıada Corvette of the MİLGEM Project, and was delivered on 29 September 2019. In 2020, the **ADVENT CMS** retrofit operations will be conducted over the 3rd MİLGEM Corvette, the TCG Burgazada, and in the aftermath, the first trials in terms of Network Enabled Capability and Joint Engagement capabilities will be realized in 2020 with the participation of the TCG Burgazada and TCG Kınalıada Corvettes. The ADVENT CMS will not only be installed in surface ships; it will also add a capability as an indigenous and national CMS to all the submarines that may be either modernized or built from scratch, with the name MÜREN, and to naval and air platforms with the name MARTI. Today, a 100% national ADVENT CMS is achieved with the utilization of 51 Sub Systems, 120 Software Configuration Components, nearly 550 Software Units and 13 million lines of code.

• The High speed Indigenous and National Şimşek drone developed by TUSAS was shot successfully in the guided missile test executed in Sinop on December 11, 2018 (with the RIM-162B Block 1 Improved SeaSparrow [ESSM] Guided Missile) with the **Multifunctional Phased Array Radar (ÇAFRAD) System**'s (there are 2-3 similar in the world) technological demonstration prototype and its delivery was accomplished in the first half of 2019. The prototype system installed at the Naval Electronic Warfare Test and Training Field (at the Naval Academy) of the Research Center

Command (ArMerKom) at Tuzla is still being utilized for the activities planned for ÇAFRAD Phase-II. Gallium – Arsenide (GaAs) based Transfer/Receive (T/R) Modules exist in the prototype system and Gallium – Nitrat (GaN) based T/R Modules will remain in the serial production model to be manufactured as part of Phase-II. The ÇAFRAD System is actually composed of 4 radars comprising the Multi-Functional Radar (MFR), Illuminator Radar (IR), Long Range Radar (LRR) and the IFF System.

• The **TurAF Low Altitude Radar (AIR) System Project Contract** was signed. Within the scope of the AIR System Project contract signed between the SSB and Aselsan on May 1, 2019 during IDEF '19, 5 Low Altitude Radar Systems will be supplied. In the company's public announcement (PDP) upon the permission of the SSB dated May 17, 2019, the total amount of the contract was stated to be TL 450 Million. On account of the technology it owns, Aselsan will complete the Project within a short period of 3 years and deliver the first AIR System that will operate in S-Band frequency (the same frequency band with EIRS) with a mobile structure with an AESA type antenna (to be carried over a tactical vehicle with 8 wheels) to the TurAF in 2022.

• Within the framework of the **New Generation Radar Electronic Support/ Electronic Attack (REDET-II) Project**, the first Radar Electronic Support System was delivered to the TLFC in November 2019. While Aselsan's Radar Electronic Support System Device formed over the BMC product BMC 380-26Z Tactical Wheeled Vehicle with armored cabins and in 6x6 configurations fulfills the functions of detection, identification and navigation, the Radar Electronic Attack System Device enables the jamming and neutralization of the target radars.

• Delivery of the MUKAS System manufactured by Aselsan as part of the **Radar Jamming and Deception Simulator (RAKAS) and Communication Jamming and Deception Simulator (MUKAS) Project** was accomplished in 2019. Of the two systems both formed over 6-wheeled vehicles produced by BMC, RAKAS was developed for the TNFC and MUKAS was developed for the TLFC. Aselsan was the main contractor of the Project on the Supply of RAKAS and MUKAS, the contract of which was signed on September 7, 2012 and the delivery of one RAKAS and one MUKAS system formed over a tactical vehicle will be accomplished within the scope of the project. Besides, mobile generator systems formed over a 4-wheeled tactical vehicle each for RAKAS and MUKAS (to generate power required in areas without a network) and 10 portable OPKAR Electronic Attack Systems will be delivered to the TLFC with MUKAS. The remaining deliveries within the Project are expected to be completed in 2020.

• As part of the Project for the Implantation of the **National Electronic Warfare Suite for Yavuz Class Frigate (MEHS)**, the third (TCG Yavuz) and fourth (TCG Turgutreis) MEHS were delivered to the TNFC in 2019. Within the scope of the Yavuz-MEHS Project executed by Aselsan with national resources, the Cutlass-B1 ESM System located at the tip of the foremast of the Yavuz Class Frigate was replaced with the ARES-2NC ESM System antenna and EW Suite Operator Console was integrated to the SHM, merely the panels of the Chaff/Flare Launchers were altered while the Launchers (Mk36 SRBOC System and Mk137 Launchers) remained the same. Moreover, the processor units were changed, and the system was rendered automatic. The existing launchers and circuit breakers were preserved, and all other hardware were renewed.

C2Tech's airborne SatCom antenna for ANKA UAVs

• The flight tests of the **National UAV Satellite Communication (SatCom) System** manufactured by the C2Tech Company, one of the affiliates of Turkish Aerospace (TUSAS), were successfully completed over ANKA-S UAV in December 2019. In August 2018, C2Tech Company signed a contract with TUSAS on the utilization of Ku-Band National UAV SatCom System in an ITAR Free structure in ANKA-S UAV platforms. The C2Tech National UAV SatCom terminal features an 18-inch (45.72 cm) dish type antenna, and has a weight of 13.750 kg and data transfer rate of 20 megabytes. As part of the Project, the initial stages of the product tests were launched in May 2019 and the first test flight over the ANKA-S UAV was realized in October 2019. In the first stage, C2Tech will accomplish the

GÖKTÜRK - 2

EO SATELLITE SYSTEM

TF

TURKISH FIGHTER

HÜRJET

ADVANCED JET TRAINER AND LIGHT ATTACK AIRCRAFT

AKSUNGUR

HIGH PAYLOAD CAPACITY UAV SYSTEM

HÜRKUŞ

ADVANCED TRAINER AIRCRAFT

ANKA

MULTIROLE UAV SYSTEM

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TURKISH AEROSPACE

KILIÇ-II Class FPB TCG Meltem fitted with KASUMSIS antenna

delivery of two Ku-Band National UAV SatCom Systems in accordance with the contract. As per the new contract to be signed subsequently with TUSAS, C2Tech will be making the delivery of additional National UAV SatCom Systems to be used in ANKA-S UAV platforms (initially over 8 ANKA-S ordered for the TNFC). According to the information we received, initially the delivery of National UAV SatCom System with a 10Mbps data transfer rate capacity will be delivered in the first group, starting from the second group new version of the National UAV SatCom System where antenna design with 20 Mbps data transfer rate will be delivered. The data transfer rate of the SatCom terminals delivered within the first group may be increased to the level of 20Mbps through modem exchange. The SatCom system requirement of the 10 ANKA-S UAVs previously delivered to the TurAF was fulfilled through 10 Ku-Band SatCom systems with a 10 Mbps data transfer rate capacity delivered in form of 2+4+4 by the company ViaSat which is located in the US. However, since the product is subject to ITAR export restrictions, new export licenses have to be obtained from the US Congress for the additional requirements. On the other hand, due to the ITAR restrictions, the utilization of the ViaSat's SatCom terminal over the Armed UAV is not favored by many.

• The delivery of the third group of the **122 mm Sakarya Multiple Rocket Launch System Fire Control and Communication System Project** for fulfilling the requirements of the TLFC, conducted by Roketsan as the Main Contractor, was successfully launched in 2019. As part of the third and largest group of the Project, Aselsan accomplished the delivery of the Launcher Communication Systems to Roketsan in September 2019 and the delivery of Fire Control Centers in November 2019.

• Aselsan completed the **delivery of the ADOP-2000 System's Second Group** to the 54th Mechanized Infantry Brigade Command of the TLFC in 2019. Delivery of the Second Group is composed of FIRTINA K/M Howitzer Task Computers, portable system sets, a Training Center, Armored Personnel Carriers and Tactical Wheeled platforms that are equipped with systems enabling the fire support components' execution of their command control and observation functions on the battlefield. The whole group of the Armored Personnel Carriers and Tactical Wheeled platforms was equipped out of Aselsan's campuses and they were delivered to the 2nd Main Maintenance Factory Directorate in Kayseri.

• The Factory Acceptance Tests (FAT) of the **ARES-2SC/P Submarine Electronic Support (ES) System** manufactured for the second submarine PNS/M Khalid as part of the modernization of Agosta-90B Class Submarines of the Pakistan Navy were successfully completed in the last quarter of 2019 at Aselsan's Gölbaşı Campus with the participation of an acceptance delegation composed of the representatives of Pakistani Naval Forces and the Main Contractor STM. Within the scope of the Project, Factory Acceptance Tests of the first ARES-2SC/P Submarine ES System (for PNS/M Hamza Submarine) were completed in June and system was delivered in the second half of 2018. Integration of the ARES-2SC/P to the PNS/M Hamza Submarine was completed in November 2019 and system was successfully run. Port and Sea Acceptance Tests of the PNS/M Hamza Submarine will be executed in 2020.

• The contract for the **Ku-Band Satellite Communication System Project** was signed with the SSB on April 10, 2014. Within the scope of the Project, numerous Ku-Band satellite communication ship-borne terminals in Type-1 and Type-2 configurations were successfully integrated to surface platforms under the service of TNFC. Aselsan was the Main Contractor of the Project where the last Ship Satellite Communication System was put into the service of Naval Forces Command in February 2019, upon the completion of its acceptance processes.

• Delivery of the X-Band Satellite Communication System in line with the contract valued at US$ 38 million for the **Supply of Military Satellite Communication System for KILIÇ Class Rifle Boats Project (KASUMSİS)** signed between Aselsan and the SSB on May 12, 2015, started in 2019. Within this framework, the acceptance process of the Project's first ship the TCG Meltem was completed in April 2019, the acceptance processes of the second ship the TCG Tufan and third ship the TCG Bora were completed in the last quarter of 2019, with the participation of the representatives from the SSB and the TNFC. The Factory Acceptance Tests over the Project's first ship the TCG Meltem were launched in November

A CGI of TÜRKSAT-6A communication satellite

2018 and the X-Band Satellite Communication System received full marks during Operation Sea Wolf performed in May 2019. Through KASUMSİS, the KILIÇ Class Rifle Boats gain IP based, uninterrupted and secure communication capability, within the coverage area of the satellite and under any sea conditions.

• A new contract for the construction of an additional 22 **Modular Temporary Base Zones (MGÜB)** was signed between the SSB and Aselsan on August 7, 2019. In response to the requirements of the TLFC, the base zones in modular structure being developed by Aselsan with indigenous and national resources serve the TurAF with high-end reconnaissance, surveillance and weapon systems utilized in the fight against terrorism and homeland Defence. The total number of delivered base zones reached 36 as of August 2019. Aselsan is the main contractor of the Project and the construction and installation activities of 15 base zones as part of the project continue.

• The delivery for the 68th province as part of the JEMUS Project was accomplished in the last quarter of 2019. The sixth and seventh phases of the **Gendarmerie Integrated Communication and Information System (JEMUS) Project,** the first phase of which was signed with the Gendarmerie General Command in 2003, were completed and the 68th system was achieved. The final acceptance of the Erzurum province system has been accomplished and in this way the coverage zone of the JEMUS vehicular radio reached 653,782 square kilometers (in every city at an average of 95%). As part of the JEMUS Project, deliveries with a total amount of US$ 664 Million were made regularly by Aselsan in 2003-2019. Installation activities of JEMUS Radio Systems are being carried out in the 13 remaining cities.

• Within the scope of the efforts exerted for the first indigenous communication satellite - **TÜRKSAT-6A Engineering Model**, payload panel tests were completed with the participation of client institutions at the Satellite Assembly, Integration and Test Center in the last quarter of 2019. Different from Turkey's former communication satellites, TÜRKSAT-6A will be the first communication satellite that will be manufactured fully with domestic resources. The satellite will provide TV broadcast in Ku Frequency band to the western coverage area composed of Europe and North Africa and to the eastern coverage area that consists of Middle East and Central Asia in addition to Turkey and was designed in a way to contain a total of twenty channels. As part of the TurAF Satellite Communication System (TUMSIS) Project, the X-Band payload with military purposes developed by Aselsan will also remain over the TÜRKSAT-6A Satellite. TÜRKSAT-6A will have three different models during the design process and the Thermal Structural Qualification Model of the satellite was completed in December 2018. The activities regarding the Engineering Model are being successfully conducted in parallel with the preparations of the Flight Model of the satellite, which is also in the final phase.

Developed for security applications, the indigenous and **National Face Recognition Algorithm** has achieved performance tests.

• In 2019, **RF Jammer/ Neutralization Systems** in various types such as Mobile Type, Vehicle Type and Bomb Disposal Type, **Drone/Mini UAV RF Jammer/ Neutralization System, Second Generation Mobile Type Jammer System (MİLKAR-5T), KANGAL Jammer System, GERGEDAN RF Jammer System for the Modular Temporary Base Zone and Fixed Facility Protection as part of İHTAR Project, Mobile V/ UHF Electronic Attack System (MİLKAR-3A3)** and various types of **Software - Based Radios** were delivered.

Important Activities and Deliveries Planned for 2020

The launch of 46 different projects is expected to be realized by the SSB in 2020. The following is a compilation of the projects, each containing critical deliveries and activities that will be realized through indigenous and national facilities.

•

KİRPİ II MRAP

LAND

• The deliveries of vehicles in different types and characteristics such as **VURAN, KİRPİ-2, New Generation Criminal Investigation Vehicle KIRAÇ, Crime Scene Investigation Vehicle, Masked Armored Small Vehicle GİZKO and Armored Ambulance** to Security Forces will be accomplished.

• The delivery of armored trucks with masked turreted weapons within the scope of the **Armored Trucks and Automobiles Project** for the Turkish National Police will be launched for the first time.

• **Mine Resistant Rescue Vehicle (MKKKKA)** manufactured for the TLFC will be used for the first time.

• The initial deliveries as part of the **6x6 Mine Resistant Vehicle Project** will be launched.

• The first howitzers within the scope of the indigenously manufactured **Air Portable 105 mm Light Towed Howitzer (BORAN) Project** will be delivered to the TLFC.

• Qualification Tests of the **Armored Amphibious Assault Vehicle (ZAHA)** will be launched.

• Tenders will be launched for certain groups of **Light Class, Medium Class and Heavy Class Unmanned Land Vehicles** and vehicles of certain classes will be included in the inventory.

PREVEZE Class Submarine

NAVAL

• **Multi-Purpose Amphibious Assault Ship TCG Anadolu** will be delivered at the end of 2020.

• **Test and Training Ship TCG Ufuk** will be delivered.

• Two **Emergency Response and Diving Training Boats** being built by DESAN Shipyard will be delivered to the TNFC in May.

• The second **New SAT Boat** will be delivered to the TNFC.

• As part of the Supply Contract on the **Replenishment at Sea and Combat Support Ship (DİMDEG)** being built by Sefine Shipyard, the Detail Design Phase of the ship will be completed.

• The activities regarding the Preliminary Design Phase of the **PREVEZE Class Submarine Half Life Modernization Project** will be completed.

AIR

• **AKINCI Attack UAV** will be delivered at the end of 2020.

• Delivery **of ATAK PHASE-II Helicopters** will be launched upon the completion of the detailed tests.

• Delivery of **Kamikaze Mini UAV Kargu-2s** with improved features will be launched.

• Delivery of the **Fixed – Wing Autonomous Tactical Attack UAV Alpagu** will be launched.

• Delivery of the **Improved Mini UAVs** will be initiated.

ATR-72/600 TMPA of the TNFC

• The contract for the **Cargo UAV** will be signed; its design and development activities will be launched.

• In response to the needs of the TLFC, a contract will be signed on the **Basic Training Helicopter Project**.

• Delivery of the 6 **ATR-72/600 Maritime Patrol Aircraft,** ordered for the TNFC within the scope of the MELTEM III Project, is expected to start in 2020. The contract of which was signed on December 21, 2005 and which had taken effect on April 20, 2006. Previously, it was declared that the deliveries would be take place in 2019-2020. The first of the 6 ATR-72/600 Sea Maritime Patrol Aircraft modified through the structural modification at TUSAS facilities (the transformation of the aircraft into Maritime Patrol Aircraft with Anti-Submarine Warfare capability with the integration of the task equipment of AMASCOS 300 Airborne Sea Status Control System) and were transformed into the Turkish Maritime Patrol Aircraft (TMPA) had been sent to the Flight Test Center of Alenia Aermacchi (Leonardo)

at Torino – Caselle for the Certification Tests that were conducted by the Italian Certification Authority and Finmeccanica after its maiden flight on July 14, 2016. The second aircraft was sent to the same center in April of 2017.

• The remaining 12 HÜRKUŞ-Bs out of the 15 HÜRKUŞ-B New Generation Basic Trainer Aircraft with final orders in line with the Contract and the official acceptance processes of the 3 **HÜRKUŞ-B New Generation Basic Trainer Aircraft** that were delivered to the TurAF in December 2018 for flight and acceptance tests are expected to be completed in 2020. The HÜRKUŞ-B Training Aircraft are being operated by the 122nd Fleet Command (Call Sign AKREP) under the auspices of the 2nd Main Jet Base Command in Çiğli, İzmir.

WEAPON/ MUNITION/MISSILE

• **Low Altitude Air Defence Missile System HİSAR-A** will be included in the inventory.

• **ATMACA Ground-to-Ground Guided Missile (G/M)** will enter the inventory.

• Developed as part of the GÖKTUĞ Project executed for the production of the first indigenous and national air-to- air missiles, the **BOZDOĞAN Short Range (IIR Guided) Missile** will be included in the inventory after the completion of test firing from the aircraft.

A view from ATMACA Surface-to-Surface Missile (SSM) live firing test executed at Sinop Missile Test Range

• **Medium Altitude Air Defence Missile System HİSAR-O**'s complete round missile shooting tests with warheads will be conducted.

• Delivery of the **KORKUT Low Altitude Air Defence Systems** will continue.

• As part of the **Portable Air Defence Missile System Project (HİSAR-K)**, the fire tests of guided test missiles with warheads will be conducted.

• Delivery of the **HGK, KGK, LGK** and **TEBER Guidance Kits**; **SOM-A, UMTAS, L-UMTAS, OMTAS Missiles, MAM Smart Munitions** and **Anti-Submarine Warfare Missiles** will continue.

• Delivery of the **MPT-76, Indigenous Handgun METE** and **5.56 mm Infantry Rifles** will continue.

• Delivery of the grenade thrower supporting the **MPT-76 Infantry Rifle** will continue.

• The development of the deployment systems that enable the artillery munition used in the **FIRTINA K/M Howitzers** to reach their targets in the most efficient and effective way through indigenous resources will be provided.

ELECTRONIC SYSTEMS

• The tender for the **Project for the Protection of Critical Facilities against Mini/ Micro UAV Threats** will be accomplished.

• Delivery of the **ASELPOD Targeting Pods** to the TurAF will continue in accordance with the Serial Production Contract signed in 2016.

Within the scope of the **RAKAS - MUKAS Project**, the delivery of the Radar Jamming and Deception Sim • ulator (RAKAS) System will be accomplished.

• ES and EA Systems will be delivered under the **New Generation Radar Electronic Support/ Electronic Attack (REDET-II) Project**.

• The installation activities will continue throughout the country within the scope of the **City Security Management System and Plate Recognition System Project**.

• Delivery of the **Modular Temporary Base Zones** will continue.

• Deliveries of various types of **RF Jammers, Neutralizers, Anti-Drone/ UAV System** and **Radios** will be conducted.

• Deliveries as part of the **X-Band Satellite Communication System Project** will be launched.

• The contract on the **National Scanning System (MILTAR) Project** that aims the indigenous production of systems regarding the scanning of the x-ray vehicles and containers that are manufactured merely in 7 countries in the world will be signed.

• The integration of the national IFF devices to various air and naval platforms, particularly to F-16s will be accomplished as part of the **Friend or Foe Identification System (IFF) Mod 5/S Project**.

• Aselsan's new type **PRC V/UHF Software Defined Tactical Hand Radios (EHKET)** with Electronic Warfare Protection, operating at 30-512 MHz frequency range, 5 different types of wave forms, capable of frequency hopping and selecting new wave forms when requested will be launched into service.

RAKAS vehicle of the Turkish Naval Forces

• In line with the contract signed between the MoND and Aselsan on December 16, 2016, the delivery of the first **KALKAN-II 3-Dimensional Air Defence Radar** to the TLFC is expected to be accomplished in 2020. The performance characteristics of the KALKAN Medium Altitude 3 Dimensional Air Defence Radar that has been in the inventory since 2008 has been augmented, certain units have been replaced with indigenous and new generation products and the delivery of the first group of KALKAN-II Radars with the configuration renewed according to the criteria set by clients was planned to be accomplished in 2019. 24 KALKAN-II Radars were ordered to be used as the main seeker radar of the Air Defence Early Warning & Command Control System (HERİKKS).

• Within the scope of the contract on the **Weapon Location Radar Supply Project** valued at US$ 176.850 Million signed between the MoND and Aselsan on December 16, 2016, the delivery of the first Weapon Location Radar (WLR) is expected to take place in 2020. Aselsan will deliver to the TLFC a total of 9 Weapon Location Radars with AESA (Active Electronic Scanning Antenna) technology and a detection range of 100 km. The Aselsan WLR Systems will replace the two COBRA WLRs with 40 km range in the inventory.

KALKAN-II 3D Air Defence Radar

• The project on the supply of a system based on Wide Band LTE technology which is planned to be launched for the utilization by **Secure Public Communication** and development of a DMR + LTE hybrid terminal for the Turkish National Police is planned to be signed.

A CGI of Aselsan Weapon Locating Radar (WLR)

OTHER

• Proposals regarding the Combined Multiple Mini Satellite Development Project will be collected by the SSB in 2020.

• Proposals for the **GÖKTÜRK-3 Synthetic Aperture Radar Satellite System Development Project** will be collected in 2020.

• 6 satellites in different types are expected to be placed into their orbits in space in 2020. These are the **TÜRKSAT-5A** Communication Satellite (within the second quarter of 2020, weighing 3,5 tons), the **ASELSAT** Cube Sat (5 kg), Turkey's first high resolution micro satellite the **LAGARİ-SAT** Cube Satellite (70 kg), the **PİRİSAT** Nano Satellite (10 kg**), the Grizu 263A** Pocketqube Satellite (approximately 1 kg) and the **SSS-2B** SAT Small Satellite System (4 kg).

• New projects regarding **hybrid engine systems and energy storage systems** are aimed to be realized in 2020.

• The construction of the 2nd Runway of the **Sabiha Gökçen Airport** will be completed in 2020 and the construction of the new terminal will be launched

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Turkish Defence & Aerospace Export Surpassed US$ 2,74 Billion in 2019!

by İbrahim SÜNNETCİ

In a bid to start developing its own/indigenous designs, which is a direct result of the country's heavy investment in the defence & aerospace industry that took place during last decade, the Turkish Defence and Aerospace Sector has started to promote and export its NATO-standard compliant, state-of-the-art products at a cheaper price than normal market prices, and more importantly along with technology transfer and local production options, the world's major players are not flexible enough to meet such requirements easily. Focusing on the lucrative international arms market, the Turkish Defence and Aerospace Sector is emerging as a new arms exporter.

Providing more efficient, low cost, combat proven, and less problematic products for arms buyers, the Turkish Defence and Aerospace Sector has increased exports by 34.6% during January 1st – December 31st of 2019 compared to the same period the previous year. This is the first time defence exports from Turkey exceeded the US$2.7 Billion level. However, though this figure represents the best performance in terms of growing exports among all sectors in 2019, it still remained below the export target that was set for 2019 by the Defence and Aerospace Exporters' Association (SSI) in March 2019. Exports from the Turkish Defence and Aerospace Sector were expected to reach US$3 Billion by the end of 2019.

According to export figures revealed by the Turkish Exporters' Assembly (TIM), on January 3rd, 2020 during January 1st – December 31st of 2019, the Turkish Defence & Aerospace Sector exported a total of around US$2.741 Billion, while the said figure was around the US$2.036 Billion level in the same period of the previous year.

Turkey's exports hit an all-time high with US$180,468 Billion in 2019, which represents a 2.04% year-on-year increase compared with around US$168,1 Billion in 2018. With a 34.6% year-on-year increase compared to 2018, the Turkish Defence & Aerospace Sector showed the best performance in terms of growing exports among all sectors in 2019. Turkey's top exporting industries in 2019 were the Automotive, Chemicals and Textile sectors, at around US$30,594 Billion, US$17,800 Billion and US$13,858 Billion respectively. Meanwhile, even though they do not get governmental support as much as the Turkish Defence & Aerospace Sector does, and do not have an Undersecretariat or Presidency like the Turkish Defence & Aerospace Sector, the Turkish Carpet Industry has been able to increase its exports to the US$2,535.245 Million level, representing a 11.7% increase compared to 2018 (around US$2,265 Billion).

According to TIM data, the exports carried out by the Turkish Defence & Aerospace Sector soared by 13.9% percent year-on-year in December, reaching US$288,660 Million. In December 2018 the Turkish Defence & Aerospace Industry's arms exports amounted to around US$253,495 Million.

According to data released by the TIM, the Turkish Defence & Aerospace Industry realized US$$174,498 Million in defence and aerospace equipment exports in January, US$157,657 Million in February, US$282,567 Million in March, US$197,033 Million in April, US$248,778 Million in May, US$207,582 Million in June, US$234,060 Million in July, US$175,315 Million in August, US$156,463 Million in September, US$258,091 Million in October and US$360,284 Million in November (the highest monthly export figure seen throughout the year).

According to data released by the TIM, the total weight of products exported by the Turkish Defence & Aerospace Industry during January 1st – December 31st of 2019 was around 44,315 tons. The total weight of products exported by the Turkish Defence & Aerospace Industry in December 2019 is around 4,728.000kg. It was 3,928.000kg in October and 3,724.000kg in November. So, the average price of Turkish Defence & Aerospace export products reached US$61 per kilogram as of December 2019. It was around US$71.44 in October and US$96,746 in November. The average price of Turkish Defence & Aerospace export products reached US$57.16 per kilogram in December 2018.

According to Defence Industry Exporters' Association Chairman of the Board Latif Aral ALİŞ the average price of Turkish export products was US$1.32 per kilogram in 2018, US$1.28 per kilogram

in 2017 and US$1.26 per kilogram in 2016 and the average price of defence exports was US$46.59 in 2018, US$39.71 in 2017 and US$27.72 in 2016. The per kilogram export value of the 'T129 ATAK Helicopter', which is one of the high added value, indigenously developed platform solutions of the Turkish Defence & Aerospace Industry, is around US$10,000.

According to TIM's figures during January 1st – December 31st of 2019, the Turkish Defence & Aerospace Industry has exported US$841,397 Million (which was at US$744,723 Million level during the same period last year) in defence and aerospace equipment to North America/US, US$554,960 Million (which was at the US$549,312 Million level during the same period the previous year) to EU Member Countries, around US$38,766 Million to other European countries, around US$710,145 Million (which was at around US$311,187 Million level during the same period the previous year, rising 128.20% compared to 2018) to Middle East countries, around US$240,913 Million (which was at the US$118,303 Million level during the same period the previous year) to the Commonwealth of Independent States (CIS), around US$89,759 Million (which was at US$120,471 Million level during the same period the previous year) to other Asian countries, around US$75,961 Million (which was at the US$84,349 Million level during the same period the previous year) to African countries and around US$49,435 Million (which was at around the US$51,895 Million level during the same period the previous year) to countries in the Far East.

According to TIM's data as of November 30th, 2019 the list of the top 15 countries that imported defence and aerospace products from Turkey is composed of; the US, Oman, Germany, Qatar, UAE, Ukraine, the UK, Serbia, India, Pakistan, Azerbaijan, Poland, Bahrain and France.

With a total of around US$748,701 Million (represents a 16.27% increase compared to the same period the previous year), in purchases, the United States was the largest recipient/importer (mainly military and civil helicopter and aircraft parts, and component sales realized under offset commitments), followed by Oman with around US$262,250 Million (represents a 74.23% increase compared to the same period the previous year, one of the largest in terms of the rate of increase, mainly stemming from FNSS PARS III ACV deliveries to the Royal Omani Army), Germany with around US$242,215 Million (represents a 14.42% increase compared to the same period the previous year), Qatar with around US$177,786 Million (represents a 150.47% increase compared to the same period the previous year and is believed to stem from wheeled armored vehicles, Aselsan RCWSs and fast intervention boats sales/deliveries to the Qatar Armed Forces), the UAE with US$132,016 Million (mainly stemming from Otokar's RABDAN 8x8 III ACV deliveries to the UAE Army), Ukraine with US$118,739 Million (represents a 711.28 % increase compared to the same period the previous year, the largest in terms of the rate of increase, mainly stemming from BAYRAKTAR TB2 Armed UAV Systems sale and Aselsan's software defined radio set deliveries to the Ukraine Army) the Netherlands with around US$72,733 Million, the UK with US$54,019 Million, Serbia with US$41,651 Million, India with US$ 40,609 Million (represents a 40.609 % decrease compared to the same period the previous year), Pakistan with US$38,537 Million (represents a 339.41 % increase compared to the same period the previous year and mainly stemming from the Jinnah Class Frigate Project's contract effectivity payment and Aselsan's deliveries to the Pakistan Armed Forces), Azerbaijan with US$36,003 Million, Poland with US$33,102 Million (represents a 31.62 % decrease compared to the same period the previous year), Bahrain with US$28,373 Million (represents a 420.14 % increase compared to the same period the previous year) and France with US$28,298 Million.

As demonstrated by the above figures, Turkey has achieved considerable increases in recent years in terms of exports and turnover figures, however the Turkish Defence and Aerospace Sector is still dependent on potential orders from the internal market. Even though the Turkish Defence and Aerospace Sector made a considerable leap in export revenues with particularly indigenous product/platform sales in the recent period, at least 1/3 of defence exports are still being actualized under off-set commitments.

To celebrate its 35th anniversary in November 2020 the SSB is as of 31 December 2019 managing a total of around 700 defence and security programs (it was 667 in 2018 and 618 in 2017) valued at around US$70 Billion in land, air, space, sea, electronics and weapon systems areas for the TAF, SGD (Turkish National Police), MIT (the Presidency of National Intelligence Organization which reports directly to the Turkish Presidency since August 2017), and other Governmental Organizations including but not limited to the General Directorate of Forestry and the General Directorate of Mineral Research and Exploration (MTA). According to SSB data the local content rate in defence and aerospace projects reached 68% during 2019.

On December 4, 2019 the Presidency of Defence Industries (SSB), the procurement authority under the Turkish Presidency, issued the "Strategic Plan 2019-2023," document, which states that the Turkish Defence and Aerospace Sector's annual turnover will rise to US$26.9 Billion in 2023, from US$8.761 Billion in 2018. According to the "Strategic Plan 2019-2023," document Turkey plans to boost its defence and aerospace (both military and commercial) exports to US$10.2 Billion by 2023, from US$2.188 Billion in 2018 and by 2023, the local content rate in defence and aerospace projects will reach 75%, up from 65 percent in 2018, according to the plan.

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CES Advanced Composites & Defence Technologies Exporting High Technology Solutions to the World

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In our interview, Selçuk ŞENTÜRK, General Manager of CES, discusses exports results, ambitious goals with exports being vital for both the company and our country. With intention to grow on this path, creating employment, and developing new solutions/technologies, Açık Group is focused on taking the necessary steps to make CES an international brand and to be number one in the industry.

Defence Turkey: Mr. ŞENTÜRK, first of all, thank you for taking the time for this interview. What can you say about the current infrastructure, manufacturing capacity, and technologies used in the production facilities of CES Advanced Composites and Defence Technologies?

Selçuk ŞENTÜRK: We have the most advanced infrastructure, machinery, and equipment regarding advanced composite manufacturing in International Aviation standards at CES's modern production facilities. We determine our manufacturing methods according to the specific requirements of our customers, and we opt for the most cost-effective process that delivers the highest quality based on our engineering studies. Additionally, we have high-pressure heat press machines that are not used by most composite manufacturers. We use these presses in special aviation projects and ballistic composite manufacturing.

The aviation industry has rigorous quality control requirements. We have internalized these procedures and use them in all activities of CES Advanced Composite except for aviation. We crown our distinct qualifications with these quality certifications.

CES Advanced Composite develops ballistic solutions for both platforms and personal protection. We have a highly experienced team, each of whom has been working in the field of ballistics for about 15 years. Experience and testing are essential factors for ballistics. You choose a material, determine the process, finalize your prototype, and test what you produce, then depending on your results, you return to the material and process stage again. This is a costly, labor-intensive cycle.

As CES Advanced Composites, we focus on what is needed in Turkey and the world, and how we can reduce the weight and cost of the solutions offered. With the experience of our team, we develop materials for unique solutions. We have an outstanding supplier network both at home and abroad. Thanks to our expertise and knowledge, we can communicate very well with our suppliers at the technical level. This communication allows us to continue our work without any problems in the supply chain.

When people who closely follow the studies and products abroad see what we have achieved, they affirm that we are ahead of our European competitors in most cases. I would especially like to emphasize that there is no technology transfer in our works; everything is the original product of CES Advanced Composite. The reason we can develop these products so quickly is the experience of our team and the motivation that our country needs for these products. We promptly introduced all our ballistic products in both vehicle protection and personal protection thanks to our infrastructure equipped with the highest level of technology and our continuous efforts. We even successfully exported one of our solutions. We have completed the serial production of the helmets ordered from abroad and delivered them. We continue our export activities with similar projects.

Defence Turkey: As CES, you continue your production activities in three different fields: Aviation, Ballistic Protection, and Defence. Could you enlighten our readers about CES's capabilities and studies on aerial platforms and its recent deliveries?


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Selçuk ŞENTÜRK: Among the ballistic solutions we have developed, the configurations we have created for aircraft have an essential place. As you know, while weight is a crucial factor for all kinds of vehicles, it is vital for aircraft. Providing armor protection to aircraft already operating at their limits also brings specific difficulties. However, thanks to our in-depth material knowledge and R&D infrastructure, we can offer users the lightest armor solutions possible. In addition to the floor armor solutions we have developed for different helicopter platforms so far, we are also developing "wing armor," which provides protection against much more advanced threats for critical personnel and crew. The last example of this is the composite armor solution we have designed and qualified for Turkish Aerospace as part of the Turkish Utility Helicopter Program (TUHP). As a subcontractor of Turkish Aerospace, we continue to manufacture composite parts for various helicopter and aircraft platforms. In addition to the current projects, we also try to support and participate, especially in the development of national platforms as much as we can.

Defence Turkey: As CES, you took part in the armoring of Black Hawk and Mi-17 helicopters domestically, and in the international arena, you are the solution partner of Paramount Group in helicopter armoring. You are currently one of the two qualified companies in the world that are competent and certified to produce armor kits (both cockpit and base) for Black Hawk helicopters. What can you tell us about the work you have carried out and/or ongoing activities in cooperation with Paramount Group in the field of helicopter armoring and helicopter models?

Selçuk ŞENTÜRK: We care about working with partners that we can find common ground with and produce mutual benefits both at home and abroad. Our cooperation with Paramount Group is the result of this approach. Of course, seeing our products included in such a prestigious consortium makes us very proud. This relationship has emerged thanks to the successful moves of our highly experienced and competent international sales and marketing team. Hopefully, we will share more good news about this cooperation in the future.

Defence Turkey: As part of the MİLGEM Project, you have worked on armoring the critical components of ships, and you have participated in the M60T FIRAT modernization program with your spall liner solution. Could you briefly inform us about the defence projects that CES has accomplished so far?

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Add-on Vehicle Armor

Selçuk ŞENTÜRK: The critical names in our engineering team started their first ballistic adventure by developing an armor solution for MİLGEM. They have designed and manufactured composite armor for more than 2,000 platforms within CES, such as wheeled armored vehicles, tanks, helicopters, and naval vessels of different sizes. In addition to composite armors, most of these vehicles also have metal-to-composite parts developed by CES engineers. It will not be correct to mention customer and platform names here, but it is possible to come across different CES products on various domestically produced platforms recently.

Defence Turkey: On the vehicle protection side, what can you tell us about your add-on armor or spall liner products that you have also exported successfully?

Selçuk ŞENTÜRK: When we started working on these systems, all the solutions that we can produce domestically today had been acquired from abroad. As CES, when we went to the Presidency of Defence Industries (SSB) and the companies related with our indigenous solutions, and we received considerable support from both sides. Especially from the high-level officials working in the relevant departments in the SSB, they have firmly


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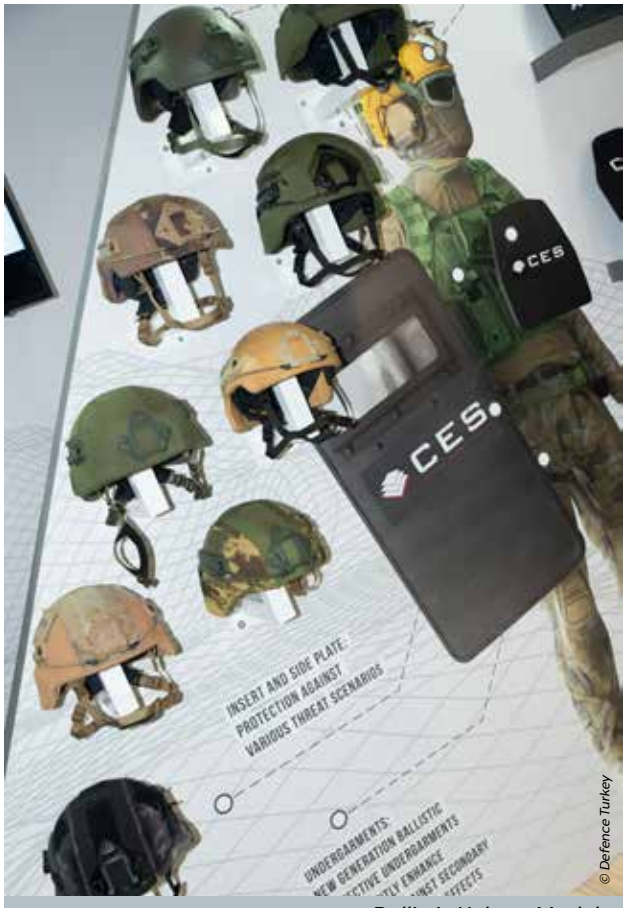
supported our work as they know the strategic importance of the matter very well. By working closely with our customers, we have developed solutions that can compete with imported products in terms of ballistic protection, weight, and price, and pass all the qualification and environmental tests. We are also very pleased as we can now offer these solutions to our international customers as well. Currently, we continue to mass-produce our spall liner and add-on armor solutions with different features for different customers and platforms. Considering our current capacity, I can say that we are indeed among the few companies operating in the field of armoring not only in our country but also in the world.

Defence Turkey: On the personal protection side, you offer products such as ballistic vests, helmets, plates, and shields. As one of the three companies that produce ballistic helmets in Turkey, CES closely follows the tenders opened by the Turkish Armed Forces and the General Directorate of Security. To meet the requirements of the Turkish Armed Forces, a new tender with a relatively large amount of anticipated purchase was expected to be initiated by the SSB for a new ballistic helmet model resistant to rifle bullets with add-on armor (applique) plates. Has the tender process started yet? Could you enlighten our readers about the product you have proposed or will offer in the tender?



Ballistic Helmet Models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Selçuk ŞENTÜRK: A few years ago, Turkey bought ballistic helmets from a foreign country because of its urgent needs. With a national responsibility, we started to look for indigenous solutions based on the idea of "Why shouldn't we produce these in Turkey?" With the support of our Group, studies were initiated on this process with high motivation. We aimed to create a product with the highest level in terms of both design and ballistic protection. Our results demonstrate that we have achieved this goal. Our solutions are absolutely on par with the products that are considered to be the best in the world in terms of weight, protection level, and ergonomics. Moreover, with our original materials and process, we have managed to reduce the manufacturing costs significantly.

It makes all employees of the Açık Group, especially our senior management, very proud to see that a Turkish company that has managed to indigenously develop an imported product that is needed by the Armed Forces. As the Açık Group, we approach the issue with a sense of national responsibility. To meet the rapidly developing and changing defence needs of our country, we spare no expense to be ready in every field where we have the technological capability. We started our serial production in ballistic helmets for export, but we made our first delivery to the Turkish Armed Forces with a tender we won in 2019. As of this year, we have manufactured and delivered over 10 thousand helmets to our Land forces, and we have another 17 thousand orders that are part of the 2020 production plan.

Apart from the ballistic helmet we mentioned, we also have products in two different categories. One of them is a much lighter helmet solution made

from high-performance materials, and the other one is an add-on armor plate we have developed to stop rifle bullets. Although there is not a tender with these demands yet, we continue to develop our solutions in close contact with the authorities.

Defence Turkey: Could you enlighten our readers about CES's position in the international market, its export targets, and its features and superiorities that make it different from its competitors in the market?

Selçuk ŞENTÜRK: Although CES's international marketing activities date back to two years ago, I can say that we have come a long way in a short time. We continue our Europe focused marketing activities with a highly experienced and competent team. After our London office in the UK, we are launching an R&D/manufacturing workshop in Coventry as of this year. By participating in major defence fairs and B2B meetings in the world, we strive to promote CES via every medium. Thanks to these efforts, we have managed to reach a significant number of customer portfolios in a short time, and we expect this number to increase even more by the end of this year.

Defence Turkey: What can you tell us about the ongoing export activities of CES, the most important export markets of the company, followed tenders abroad, and the share of exports in turnover?

Selçuk ŞENTÜRK: It is considerably easier for companies to sell in the domestic market, especially in the field of defence and aviation. On the other hand, as CES Advanced Composites, we accomplished the more difficult market and exported our products before selling them in the domestic market. Our original ballistic helmet was the first example.

There is significant demand worldwide, especially in the field of ballistic protection, and we have high expectations in this field. We aim to increase our exports significantly, and we are expanding our team in this direction. Thus, we added Murat ÖZMEN as the Global Markets Business Development Director and expert technicians from leading European companies in the field of advanced ballistic protection to our team, and we also benefit from their experience.

We started our export activities in the second half of 2018. In 2018, the share of exports in our turnover was 10%. Our goal is to reach a figure between 10% to 30% in 2019. In 2020, we aim to exceed 50%.

Defence Turkey: What can you say about the expectations and goals of CES Advanced Composites & Defence Technologies for the next ten years?

Selçuk ŞENTÜRK: As a domestic and national company, CES aims to expand into global markets. Of course, we care about our local market share and our customers, and we do not want to lose our weight here. On the other hand, we want to significantly

CES Advanced Armor

increase our export volume by offering high technology solutions to the world. We consider that exports are vital for both our company and our country. We intend to grow on this path, create employment, and develop new solutions/technologies. We are trying to take the necessary steps to make CES an international brand and to be number one in our industry.

Defence Turkey: Is there anything else you would like to add as a message to our readers?

Selçuk ŞENTÜRK: We receive very positive reactions and praise in different places and platforms related to our work, and this motivates us as much as it makes us happy. As the CES family, we are strongly committed to what we do, and we attach the utmost importance to our work. From our managers to engineers, we all know how vital our products are for our customers. Thus, we always uphold this responsibility with our dedication and commitment.

Defence Turkey: Once again, thank you for taking your time and valuable contributions ...

Cem AKALIN, Managing Editor of Defence Turkey Magazine with Selçuk ŞENTÜRK, General Manager of CES

Defence & Aerospace Industry International Cooperation and Export Current Analysis Report Published

Under the auspices of the Presidency of Defence Industries and in cooperation with the Defence and Aerospace Industry Exporters' Association, the "Defence and Aerospace Industry Global Strategies Conference" was held in Antalya between November 30 - December 1 2019 with the participation of President of Defence Industries Prof. İsmail DEMİR, President of Defence and Aerospace Industry Exporters' Association Latif Aral ALİŞ, and senior representatives of defence industry companies. During the two-day conference, panels were held on issues such as international marketing and foreign policy in the field of defence, and various workshops were held for the strategies to be developed.

The Defence and Aerospace Industry Global Strategies Conference was organized in Ankara to develop strategies in line with 2023 targets for the defence and aerospace industry, which is one of the most strategic sectors for Turkey's economy and exports. At the conference, the Defence and Aerospace Industry International Cooperation and Export Current Analysis Report was also published for the first time. The report was prepared as a result of the studies and investigations carried out with the 27 leading companies in exports between October 2018 - March 2019. In the report it was noted that the USA, Germany, Italy, Spain, France, England, and Azerbaijan were listed among Turkey's top 20 export destinations. According to the report, exports to the U.S. are around US$500-700 million annually, and exports to the United Arab Emirates and Saudi Arabia have declined significantly in recent years. Exports of aircraft and helicopter structural parts and engine components in the civil aviation sector constitutes approximately half of the export figures.

Prof. İsmail DEMİR: "Turkey ranks 14th on the global defence industry export rankings and 13th on import rankings"

Prof. İsmail DEMİR - President of SSB

Taking the floor at the conference President of Defence Industries Prof. İsmail DEMİR said, "Total defence spending on a global scale is $ 1.8 trillion. Turkey ranks 14th on the global defence industry export rankings and 13th on import rankings. The defence and aerospace industry has the highest export potential among all the sectors in Turkey. The aviation industry has the most significant share in the defence exports. Our export target for 2023 is US$10.2 billion. To reach this figure, the current situation needs to be supported by incentives, credit mechanisms, and intergovernmental negotiations. We need to look at international cooperation and marketing more strategically to increase our exports." Underlining that the domestic and national products of the Turkish defence industry are highly capable, Demir said, "We need to show this to the world. Our success in this area will change the perception in other areas as well. We should focus more on R&D and better market the products we demonstrate on the field. The capabilities of our products are not appreciated enough. We need to improve our local production capabilities and develop new cooperation and strategies on technology transfer with other countries. For the development of the sector, we should focus on not only selling and buying but contributing to the other countries' economies as well."

Muhsin DERE - Deputy Minister of MoND, Prof. İsmail DEMİR and Latif Aral ALİŞ

Expressing that the gap between the defence import and export figures of our country has been closed, which is beneficial for our economy, Demir said that the most exported products of our country are parts of aircraft and helicopters, tanks, and other armored fighting vehicles. Prof. DEMİR also emphasized that certain products or subsystems of our country should be clearly demonstrated to be among the best of the best in the world. "The arms industry must have a marketing strategy of its own. It is necessary to discuss how to transfer technology in countries where we consider potential markets. We need to identify one or two topics on technology and R&D and focus on that area. In this respect, we need to focus on specific issues in our technology and R&D roadmap and find ways to be the best in these areas as the sector with a total mobilization. Together with the industry, we should put forward methods and strategies to find a place in markets with high potential such as Southeast Asia, Central and Latin America, and Africa."

Latif Aral ALİŞ: "Between January and October 2019, Defence and Aerospace Industry exports increased by 37.5% with a total of US$2,136 million, compared to the same period of the previous year"

Latif Aral ALİŞ - Chairman of the Board at SSI

In his speech, Chairman of SSI Latif Aral ALİŞ drew attention to the fact that the defence industry achieved the most significant increase rate among the 28 sectors in our country. Emphasizing that Turkey's exports increased 10.5% in the last six years while the defence industry exports increased by 61.3%, Latif Aral ALİŞ said, "Between January and October this year, our exports have increased by 37.5% and reached US$2,136 million. We are the leading sector with this increased rate. In the last 12 months, we have earned US$2,690 million from exports. While Turkey's exports per kg were US$1.32, our exports per kg in the defence and aerospace industry has reached US$ 46.59. This is almost 50 times the average of Turkey. In other words, the return on investment in the defence and aerospace industry to our economy has been 50 times higher than in other sectors. These figures show that our export union, SSI, produces value, and the world accepts this value. Therefore, the continuation of

investments in this area without slowing down is very valuable for the development of our economy. Our success also has a multiplier effect on other sectors." Underlining that the value added to the national economy by defence industry exports is incomparably superior to the other sectors, ALİŞ continued his words as follows, "Turkey is open to physical and economic threats. Therefore, the defence industry has significant importance for the defence of our country. Especially in the last ten years, our defence industry has made considerable advancement, both economically and technologically. Our President's support for the sector also brought the defence industry to a prominent position. As private and public sectors, we have to synchronize and achieve greater success in the defence industry field. Manufacturing defence products is important but marketing them is even more critical. Therefore, designing domestic products and being competitive and reliable stands out as important factors."

Orhan AYDIN - Chairman of the Board of the OSTIM

Underlining the importance of transferring the skills acquired in the defence industry to the civilian sector, Chairman of the OSTIM Board of Directors, Orhan AYDIN stated, "The skills learned in the defence industry should also be transferred to the civilian sector. We see that there is more potential in civil aviation. I believe that we can achieve the US$10 billion export target for 2023 in civil aviation. We don't have a strategy yet to grow the small companies that can increase exports and reach the US$10 billion target. To achieve this, large defence industry companies should support small companies. Meeting the National Certification Center need will pave the way for exports, and we know that SSB is currently working on this subject."

Aselsan Vice President Osman Devrim FİDANCI said, "We exceed the target of US$320 million in exports, and we expect an export surplus of 50% compared to the previous year. Aselsan has investments in 10 different regions of the world and has customers from 65 different countries. Our Ukraine and Pakistan offices will start their activities in 2020. While the certification and training budget of the Aselsan marketing and business development team for 2019 was US$34 thousand dollars, we will continue this training by increasing the budget in 2020."

According to the SWOT analysis in the Defence and Aviation Industry International Cooperation and Export Current Analysis Report, product features and quality, customer focus and flexibility in solutions, and knowledge and experience are the top three strengths of the Turkish Defence and Aviation Industry. On the other hand, the weaknesses include issues such as international relations, organizational deficiencies in the number of units and staff, and lack of credit mechanisms. While positive international relations, improvement of brand value and perception of Turkey, and the SSB's support and strategies are considered as opportunities in the report, foreign policy, licensing, embargoes and sanctions are noted to be threats.

Stating that identifying new technological areas that may create opportunities for export and prioritizing these areas for export incentives have strategic importance, the report considers cybersecurity as an area with high growth potential. The report also states that 20 of the 27 companies contributing to the research have a sales approach to the civil sector, and the ratio of civilian sales to turnover is around 18%

Osman Devrim FİDANCI- Aselsan Vice President

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A Look at Latest Status of the PN MİLGEM Project

by İbrahim SÜNNETCİ

The project, which was signed on September 6, 2018, and started on March 11, 2019 (T_0), includes the construction of a total of 4 frigates based on the ADA Class Corvette design for the Pakistan Navy. Two of the ships will be built at the Istanbul Naval Shipyard and the other two at the Karachi Shipyard in Pakistan.

This agreement is the single highest value contract signed by the Turkish Defence and Aviation Industry to date, and it marks a historic moment as it is the first domestically designed warship export. Taking the floor at the 9th Naval Systems Seminar held on October 14-15, 2019, at METU Culture and Congress Center, Ministry of National Defence (MSB) Shipyard's Deputy Director-General Rear Admiral (Lower Half) Mehmet SARI, made a speech about the PN MİLGEM Project and said, "We received the project worth over €1 billion from Pakistan despite all kinds of negative attempts by the Americans and this also paved the way for the Helicopter (T129B ATAK) Project."

The construction of the first frigate was officially commenced with the first steel cutting ceremony held within the scope of the Delivery Ceremony of the TCG Kınalıada Corvette on September 29, 2019. The first steel to be used on the first ship of the Pakistan Navy MİLGEM (PN MİLGEM) Project was cut by President Recep Tayyip ERDOĞAN and Pakistan Navy Commander Admiral Zafar Mahmood ABBASI. The first ship under the PN MİLGEM project is planned to be delivered in Turkey in August 2023.

According to the production process calendar shared by the main contractor of the project, Military Factory and Shipyard Management Inc. (ASFAT), the first ship will be completed in the T_0+54th month in Turkey, the second ship in the 60th month in Pakistan, the third ship in the 66th month in Turkey, and the last ship in the 72th month in Pakistan. There will be a 6-year time difference between the construction of the first ship and the delivery of the fourth ship. The last frigate of the Jinnah Class will be delivered at Karachi in 2025 and will enter the Pakistan Navy inventory.

Within the scope of the AMAN-2019 Exercise, which was hosted by the Pakistan Navy on February 8-12, 2019, in the Arabian Sea and the Indian Ocean with the participation of Defence Turkey Magazine as a special guest, Pakistan Navy (PN) Commander Admiral ABBASI visited the TCG Gökçeada Frigate and announced that Jinnah Class Corvettes (Pakistan Navy classifies them as Corvettes) will be equipped with a Vertical Launching System (VLS). However, he did not share any information about the number of ships to be equipped with the VLS. The ship image, which was shown at the PN MİLGEM Project 1st Steel Cutting Ceremony on September 29, 2019, featured two 8-cell Vertical Launching System (VLS) modules behind the main cannon as well as an Aselsan GÖKDENİZ Close-in Weapon System (CIWS) where the RIM-116 Mk49 Lancer is located. We also learned that there would be some differences in the design of the fourth Jinnah Class Frigate. Pakistani engineers and

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TCG Kınalıada (F-514) Corvette

technicians who will begin on-the-job training during the construction of the first ship are expected to acquire the necessary know-how to make changes to the ADA Class Corvette design until the construction of the fourth ship. It was also stated that the fourth vessel would be designed jointly, and it will also be the first frigate designed by Pakistan with its own means. Due to VLS integration, the Jinnah Class will be longer and heavier than the ADA Class.

It is considered that the propulsion system to be used in Jinnah Class Frigates, which will be shaped according to the requirements of the Pakistan Navy, will include only diesel engines and not the LM2500 gas turbine. ADA Class Corvettes can reach a maximum speed of 31 knots with their propulsion system in the Combined Diesel and Gas (CODAG) configuration, which consists of two 32MW diesel engines and a gas turbine, while the maximum cruising speed of the Jinnah Class is 26 knots. We learned that the Jinnah Class Frigates will accommodate an additional 40 personnel compared to the ADA Class, and include ablution rooms and a small mosque. Unlike the ADA Class, which can stay at sea for 10 days, the Jinnah Class Frigates will be able to stay at sea for 15 days, and the ships will be armed with Chinese C-802 guided anti-ship missiles instead of Harpoon or ATMACA missiles. The Pakistan Navy is also expected to place the Harba Anti-ship Cruise Missile in the Jinnah Class vessels in the future.

Under the PN MİLGEM Project the construction of the first frigate was officially commenced with the first steel cutting ceremony held at Istanbul Naval Shipyard on September 29, 2019 with the participation of President ERDOĞAN and Commander of the PN Admiral ABBASI

As noted above, the RIM-116B (Block 1A) Rolling Airframe Missiles (RAM) and the 21-cell Mk 49 Mod 3 Guided Missile Launching System (GMLS) located on the helicopter hangar, will be replaced with 20mm Phalanx or Aselsan product 35mm GÖKDENİZ CIWS. The ships will also be equipped with two 8-cell VLS, which can launch LY-80/HHQ-16 Medium Range Air Defence Missiles. The Jinnah Class Frigates will also incorporate several critical sub-systems of the ADA Class Corvette. Some of those are the Havelsan ADVENT Combat Management System (CMS), Aselsan ARES-2N ESM (ships are also expected to use AREAS-2NC ECM System), HIZIR Torpedo Countermeasure System, SMART-S Mk2 3D Search Radar, YALTES product EPKİS Integrated Platform Management System, and the Meteksan Defence product the YAKAMOS Hull-Mounted Sonar System. The Jinnah Class Frigates will also be equipped with the Naval Information Exchange System (NIXS) developed by MilSoft for the Pakistan Navy and the indigenous data-link system "Link Green." The Pakistan Navy has established a nationwide communication infrastructure called RedLine to enable communication between NIXS-equipped platforms.

Meanwhile, the Main Contractor ASFAT and Aselsan signed a €176.9 million contract on November 14, 2019, for the supply and integration of Aselsan product systems and equipment to be included in the Jinnah Class Frigates. Under this contract, Aselsan will make its deliveries between 2022-2023.

A CGI of PN MİLGEM frigate

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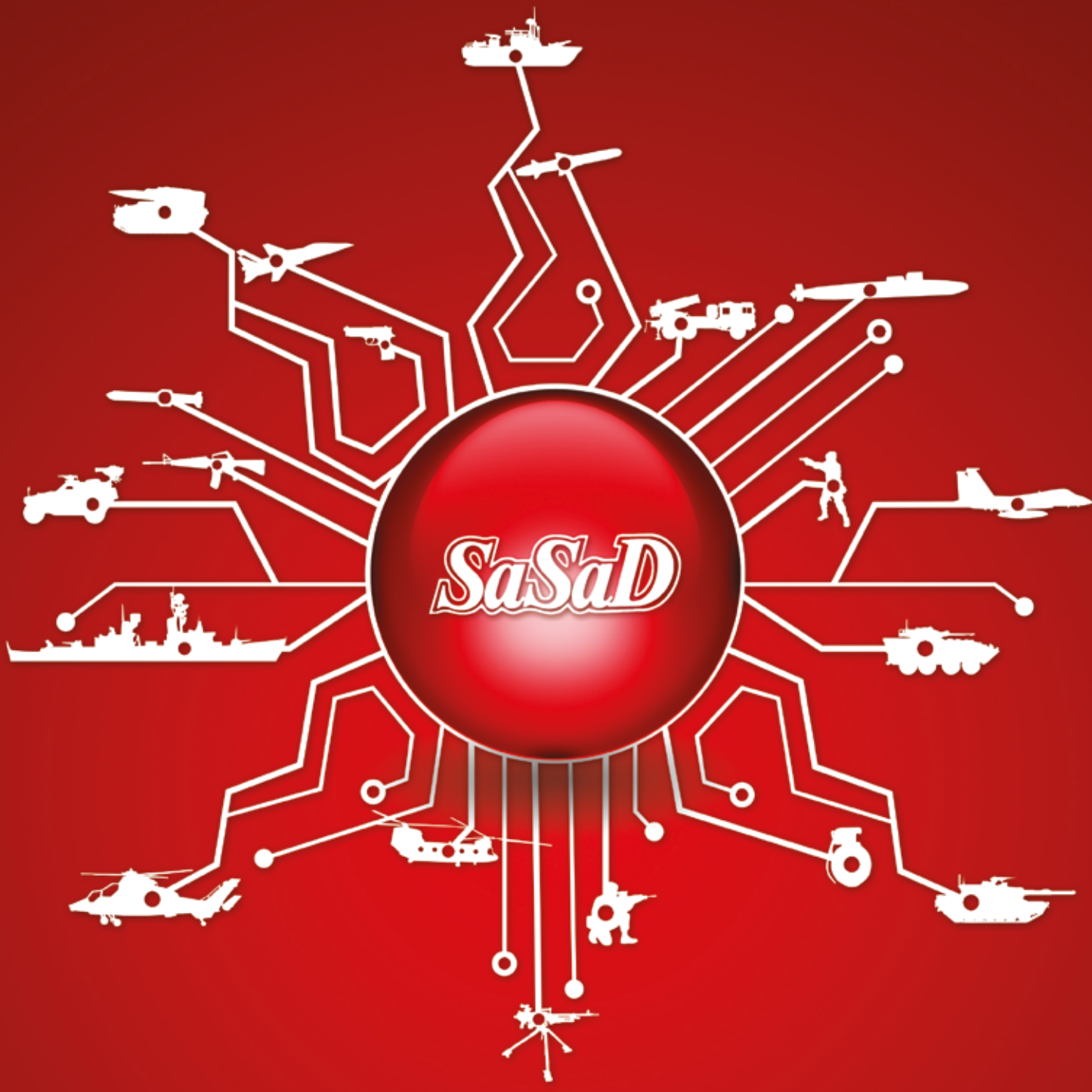
Pakistan – PN MILGEM Combat Systems Contract

Within the scope of the Pakistan MILGEM Project (PN MILGEM), which is the biggest export ever achieved by the Turkish defence industry in a single batch and includes the construction of 4 corvettes, the Pakistan MILGEM (PN MILGEM) Combat Systems Contract was signed between ASFAT, Havelsan and Aselsan. During the contract signing ceremony for the procurement and integration of combat systems, National Defence Minister Hulusi AKAR, Havelsan Chairman of the Board Prof. Hacı Ali MANTAR, Havelsan General Manager Ahmet Hamdi ATALAY, Aselsan Chairman of the Board and CEO Haluk GÖRGÜN were present.

ASFAT CEO Esad AKGÜN, the main contractor of the project, said in his speech at the ceremony that the project is important to reveal that Turkish engineers performed the design and production within international standards and even beyond and share these capabilities generously with their Pakistani brothers. Emphasizing that exports are the only solution for the sustainability and dynamism of the defence industry, AKGÜN said exports are not just an option for the defence industry, they are a necessity. Esad AKGÜN pointed out that the Pakistan Corvette Project will be completed with the principle of the lowest cost, highest quality and shortest time period and added that Pakistan will gain new capabilities in design and shipbuilding when the project is completed.

Minister of National Defence Hulusi AKAR expressed his gratitude to all employees who contributed to the project, while Havelsan General Manager Ahmet Hamdi ATALAY placed emphasis on the ADVENT Combat Management System in his speech and said: "We are proud that the next generation Network Enabled Data Integrated Combat Management System (ADVENT), jointly developed by Havelsan and the Turkish Navy and which is owned by only a few countries in the world, will be used on the ships of friendly and our brother country Pakistan". Underlining that this system developed by nearly 6 million lines of code is being used for the first time on Turkey's 4th MİLGEM ship, he said they aim to gain ADVENT also to other platforms in the inventory. ATALAY said that they will assume the task of integrating all weapons and sensors in the project as well. Havelsan, the Main Integrator of the project's Combat System, will also supply the ADVENT Combat Management System, Ship Data Distribution System and Ship Information System of the Pakistani Ships.

Aselsan CEO Haluk GÖRGÜN said the Electronic Warfare System, Fire Control Radar, Laser Warning System, Torpedo Countermeasure System, 3D Search Radar, Navigation and LPI Radar, Navigation Support Systems, Inertial Navigation System, Combat Systems, 76 mm Gun Fire Control System and 25 mm Stabilized Gun System will be provided by Aselsan.



DEFENSE AND AEROSPACE INDUSTRY MANUFACTURERS ASSOCIATION

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Under the contract awarded by STM within the scope of PREVEZE MLU Program, HENSOLDT will take out the existing Kollmorgen Model 76 attack and surveillance periscopes and drop in (which means a simple, rapid and cost effective retrofit into the confines of submarines so no need for expensive alterations to the vessels) the new SERO 420 Attack Periscope and SERO 430 Search Periscope. To achieve this, HENSOLDT Optronics has engineered a straightforward 'drop-in' installation through the existing hull penetration, avoiding any need for hull modifications and retaining the existing hydraulic hoist mechanisms, bearings and seals

“We Have Continued to Strengthen Our Business Development with Turkish Companies!”

Defence Turkey presents an exclusive interview with Levent DÜNYA, Director of HENSOLDT GmbH Turkey Ankara Liaison Office and Harald Hansen, Director of Sales for Maritime Optronics at HENSOLDT on the Company’s history in Turkey, their ongoing activities in Turkey as well as the collaboration potential with Turkish defence and aerospace companies

Defence Turkey: Could you please briefly introduce HENSOLDT Company to our readers?

Levent DÜNYA: HENSOLDT is a global pioneer of technology and innovation in the area of defence and security electronics. The company is a market leader in civilian and military sensor solutions, developing new products to counter evolving threats based on disruptive concepts in such fields as big data, robotics and cyber security. With a workforce of some 4,300 employees, HENSOLDT generates revenue that exceeds 1 Billion EUR per year.

Defence Turkey: The company has performed activities in different areas in our country since the 1940s. Could you please summarize HENSOLDT's history in Turkey, and inform us about its current status as well as its viewpoint regarding Turkey?

SERO 250

Levent DÜNYA: Turkey has been an important market for HENSOLDT for many years, particularly for our naval business. We have successfully worked together with both, Aselsan and Savunma Teknolojileri Mühendislik ve Ticaret A.Ş. (STM) in the past.

In the last decade we took part in the modernization project for the AY Class submarines in the inventory of the Turkish Naval Forces Command (TNFC), in which STM was the Prime Contractor. Replacing our own ASC 18 attack and BS 19 surveillance periscopes as well as SERO 400 periscopes in these vessels, our state-of-the-art solution SERO 250 brought the submarines up to the latest standards to meet current operational requirements. We signed a cooperation agreement with Aselsan regarding ESM-EW/GPS early-warning antennas for the SERO 250.

For the upgrade of vision equipment for the PREVEZE Class submarines, we are working together with STM, who has the overall responsibility for the upgrade program. Here, we are set to deliver eight SERO 400 periscopes with thermal imagers as add-on units.

We recently decided to carry out even more technology-oriented projects with STM, and STM brought us together with BAUMIND, a spin-off company that operates under Bahçeşehir University that is engaged in studies of underwater optical communications. Both BAUMIND and STM have been working on projects in this field. We, on the other hand, have developed optical surveillance systems for both underwater and surface applications. We decided to bring these two systems together, putting forward a solution that enables communication between submarines and divers. We have already completed the concept design and are now in the system-engineering phase.

Levent DÜNYA, Director of HENSOLDT GmbH Turkey Ankara Liaison Office

Defence Turkey: As the HENSOLDT GmbH Turkey Ankara Liaison Office, what would you like to say about your activities performed in 2019 and your targets for 2020?

Levent DÜNYA: For the first time HENSOLDT Group participated in IDEF '19 in Istanbul with its own booth. The interest from Turkish and international/ end users and customers were amazing and we could come up with a lot of key stake players of the Turkish Defence Industry. We have continued to strengthen our business development with Turkish companies, but we mostly engaged in relationship management and made bilateral visits. In 2020, depending on the political improvements on both sides, we would like to concentrate on our business development at each level of the SSB. Further, as our second concentration point, we will continue to support Turkish players for the projects in Turkey and in the region.

Defence Turkey: HENSOLDT's two COBRA Radars had been granted to Turkey in 2002 by the German Government. According to our sources one of the COBRA Radars was operational but the other one is utilized for the purpose of spare parts. What can you share about the operational status of COBRA Radars, feedback received from the user regarding the performance of the system and whether or not their modernization is planned?

Levent DÜNYA: Although the COBRA Radars are partly operational and the end users are really pleased with their performance, the COBRA Radars need to indeed be upgraded and also refurbished according

to the latest state of the art solution that is available on the market. HENSOLDT is ready to modernize COBRA Radars and thus conducted several meetings at the end user level but also at the SSB. We are expecting the SSB's call for further technical negotiations that will lead us to a contract.

Defence Turkey: Aselsan will deliver the first indigenous Weapon Location Radar to the Turkish Land Forces in 2020 under a contract worth US$ 176.850 Million signed with the MoND in December 2016. On the other hand, within the scope of the Turkish Air Force (TurAF)'s Low Altitude Radar System Project, the contract of which was signed with the SSB during the IDEF '19 Fair at an amount of TRY 450 Million, 5 Low Altitude Radar Systems with S-Band AESA antenna technology will be procured. Is there any technological cooperation between Aselsan and HENSOLDT on such areas?

Levent DÜNYA: Although HENSOLDT is open for cooperation with Aselsan. We have expressed our readiness to both the SSB and also to Aselsan authorities for a possible cooperation on the TF-X radar project development. This we think, could be a good initiation point.

Defence Turkey: HENSOLDT will supply 4 SERO 420 Attack Periscopes and 4 SERO 430 Search Periscopes under the contract valued at EUR 40 million signed with STM within the scope of the PREVEZE Class Submarine Mid-Life Upgrade (MLU) Project, which was announced to the public on August 5, 2019. Can you share some details about the delivery schedule of the periscopes?

Harald HANSEN: HENSOLDT will supply 4 SERO 420 Attack Periscopes and 4 SERO 430 Search Periscopes under a contract signed with STM within the scope of the PREVEZE Class Submarine MLU Project, which was announced to the public on August 5, 2019. The contract is based on the delivery of a twin SERO 400 Periscope systems which will be integrated into the Turkish Combat Management System. The HENSOLDT Optronics relationship with STM has grown significantly since the previously executed contract for the AY Submarine refit contract and the professionalism and skilled expertise of STM will ensure a positive operational readiness outcome on the PREVEZE Class.

Harald HANSEN, Director of Sales for Maritime Optronics at HENSOLDT

Defence Turkey: HENSOLDT is also the supplier of SERO 420 Search Periscope and OMS 100 Optronics Masts to be used in Type 214TN REIS Class Submarines, the first of which was launched on December 22, 2019. Could you inform us on the latest status of the project and the delivery process? Is there any infrastructure in Turkey for the repair and maintenance of HENSOLDT periscopes existing in both PREVEZE and REIS Class Submarines? Any activity planned with the TNFC?

Harald HANSEN: The delivery of the SERO 400 and OMS 100 periscopes to the TKMS for these submarines is ongoing and we expect to participate in the initial Sea Acceptance Tests in the near future. Under this contract HENSOLDT Optronics will also deliver a dedicated Workshop in the Naval Maintenance Facility enabling the TNFC to accept system maintenance and repair responsibility in Turkey. This will greatly enhance the operational readiness of the systems and significantly reduce the maintenance cost.

The contract with STM for Turkish Submarines has and will continue to foster a relationship for the supply of HENSOLDT Optronics Masts for the international markets under subcontract to STM. This business is significant and seem strategic for both HENSOLDT and STM.

In 2019 HENSOLDT in cooperation with STM entered into discussions relating to the co-development of a submarine diver visual and underwater

COBRA Radar & COBRA Virtual Reality

The new version of HENSOLDT's ARGOS-II FLIR payload was displayed with Vestel Savunma's KARAYEL-SU Armed UAV at Dubai Airshow 2019

HENSOLDT is expected to provide Driver Sights under the ALTAY MBT Series Production Project

COBRA WLR of the TLFC seen here while being deployed at Turkey-Syria border

The T129A/B ATAK Helicopters are fitted with Aselsan/HENSOLDT AN/AAR-60 MILDS B1 sensors

communication systems know as VIPERFISH. The systems enable the visual observation and communications with the diver in close proximity to the submarine.

HENSOLDT will supply equipment for the periscope workshop in Turkey, including special tooling. In this context, we are looking forward to the synergies that will arise regarding maintenance, in addition to operation and training.

Defence Turkey: Could you please inform us on HENSOLDT's prospective projects in Turkey as well as the collaboration potential with Turkish defence and aerospace companies?

Levent DÜNYA: The only project that is ongoing is the MILDS Block I Project with Aselsan. For the ALTAY MBT Project, we have signed another contract with BMC for the driver sight. With STM, HENSOLDT has signed another contract for PREVEZE Class periscopes.

HENSOLDT is aiming to extend its collaboration with Turkish defence players not only in Turkey but also in all countries where these companies are active.

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

Levent DÜNYA: We can look back upon several years of successful cooperation with Turkish partners. We are looking forward to expanding our cooperation further

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Type 214TN REIS Class TCG PİRİ REİS Submarine Launched

by İbrahim SÜNNETCİ

The launch ceremony of the TCG Piri Reis (S-330) Submarine, the first of the Type 214TN REIS Class Submarines being constructed at the Gölcük Naval Shipyard Command under the €2,060 Billion New Type Submarine Project (NTSP), was held on December 22, 2019, with the participation of President Recep Tayyip ERDOĞAN, Minister of National Defence Hulusi AKAR, Force Commanders and President of Defence Industries İsmail DEMİR. The keel of the TCG Seydi Ali Reis (S-334), the 5th Submarine of the Project, was also laid at the ceremony. In the next phase, the outfitting activities of the TCG Piri Reis Submarine will continue, and the submarine will enter service with the Turkish Navy in 2022 following the Factory Acceptance (FAT), Harbor Acceptance (HAT) and Sea Acceptance (SAT) Tests, respectively.

The Turkish Submarine Fleet has a long history spanning 134 years and has an indispensable place among world navies with its respectable traits and capabilities. With its modern vessels, the Submarine Fleet is one of the most vital combat elements that forges the striking force of the Turkish Navy. The Submarine Fleet Command currently operates a total of 12 submarines, including four AY Classes, four PREVEZE Classes, and four GÜR Classes. The Turkish Navy Submarine Fleet, which is always ready with 12 submarines, is an outstanding deterrent both in our region and worldwide...

To ensure the continued effectiveness of the Submarine Fleet in operational areas in the surrounding seas,

the Turkish Naval Force Command (TNFC), seeing the need for modern submarines with quieter hull forms for reduced flow noise, the New Type Submarine Project was launched to acquire a variety of capabilities; an Air Independent Propulsion (AIP) System for long endurance underwater tasks, low acoustic, thermal and magnetic signatures, high capacity batteries, hybrid propulsion, and modern countermeasure systems. The administrative responsibility for this project was given to the Presidency of Defence Industries with the decision of the Defence Industry Executive Committee (DIEC/SSIK) dated June 22, 2005.

The €2,060 Billion New Type Submarine Project (NTSP) contract was signed between the SSB and German TKMS Joint Venture (formerly the HDW-MFI Joint Venture) on July 2, 2009 and entered into force on June 22, 2011. The project covers the construction of six Type 214TN Air Independent Propulsion (AIP) Submarines with the technical support and technology transfer to be provided by TKMS Joint Venture at the Gölcük Naval Shipyard Command, which has previously constructed 11 submarines (three AY, four PREVEZE, and four GÜR-Classes).

The construction of five submarines (the first steel plate of the 5th submarine was cut on December 22, 2019) is underway and the first submarine, TCG Piri Reis (S-330), was launched in December 2019 and will be commissioned with full operational capability in 2022. It will be followed by TCG Hızır Reis (S-331), TCG Murat Reis (S-332), TCG Aydın Reis (S-333), TGC Seydi Ali Reis (S-334) and TCG Selman Reis (S-335). The last submarine in the project will be delivered to the Turkish Naval Forces Command (TNFC) in 2027.

Initially, the class was to be called CERBE and was planned to be 66.3m long with a surface displacement of 1,845 tons. However, significant design modifications were made to meet Turkish Naval Forces Command (TNFC) requirements because of some technical problems with the HDW design, and Turkish engineers found five major design flaws and developed solutions for them. The resulting submarine, which is longer and heavier than CERBE, was renamed as REIS Class in 2014. However, the technical specifications of the REIS Class Submarines were revised, and the total length was increased again following the modifications. Additionally, the number of Cylindrical Metal Hydride Tanks (MHT) that are used to store Liquid Hydrogen, an essential element of the Air Independent Propulsion (AIP) System, has also been increased. The PEM (Polymer Electrolyte Membrane) Fuel Cells of the AIP System use pure hydrogen (H2) to generate power; however, pure hydrogen has toxic properties and is carried in cylindrical double-walled metal hydride tanks. Using seven rows of Cylindrical Metal Hydride Tanks instead of six rows in a CERBE Class design (Each carries a horizontally placed 15.3-ton capacity Liquid Oxygen [LOX] tank in its pressure hull) will considerably increase the amount of hydrogen carried in the Metal Hydride Tanks, which provide the necessary energy for the fuel cells used in the AIP System and will also increase the maximum amount of time that a submarine can stay underwater (Submerged Endurance). The Type 209PN and Type 214 Class submarines have six rows of metal hydride tanks (each row includes six cylinders, three on the right and three on the left) located outside the pressure hull in the bottom of the submarine hull while the Type 209 AIP submarines have five rows. However, the scale model of the Type 214TN New Type Submarine Project, which was revealed by TKMS for the first time at the 8th Naval Systems Seminar held in October 2017, has seven rows of metal hydride tanks outside the pressure hull. This means that REIS Class Submarines will have 6x7 = 42 metal hydride tanks. Before the second revision, the delivery schedule of the REIS Class Submarines

was planned as 2021-2026 with a 12-month phase difference, while the new calendar was updated as 2022-2027.

While the height (13.1m/16.5m with the periscopes), width (6.3m), draught (6.8m) and the surface displacement (about 1,855 tons) of this new version, which we call REIS-II, didn't change; the total length of the submarine was increased to 68.35m (0.75m longer than the first version of the REIS-Class and 2.05m longer than the CERBE Class). The submerged displacement of the submarine is around 2.050 tons. According to the TKMS product brochure, the total length of the new Type 214 Class submarines is 72m, and the surface displacement is about 2,000 tons.

On the other hand, the National Submarine (MILDEN), which will open a new page in the history of Turkish Submarines, is expected to enter service by the second half of the 2030s. Currently, the studies on the feasibility of MILDEN and the technical and operational characteristics of the submarine are continuing while the TNFC carries out manufacturability analysis for the MILDEN vessel. MILDEN will be built at the Gölcük Naval Shipyard Command, which has been doing overhauls of submarines in the TNFC service for 55 years and built submarines for 37 years. Gölcük Naval Shipyard Command is one of the 16 shipyards in the world that can build submarines.

Two BZM120 Proton-Exchange Membrane (PEM, also called Polymer Electrolyte Membrane) Fuel Cell modules (each generates 120kW power) lie at the heart of the Air Independent Propulsion (AIP) System of the Type 214 Class Submarines (the first batch of the U212A submarines and the first batch of the Type 214 boats ordered by the Republic of Korea Navy have 9 (one backup, eight active) BZM34 PEM modules that generate a total of 306kW (400hp) power). The service life of the BZ120 PEM Fuel Cell modules (each weighs 900kg, has a capacity of 500 liters and constitutes of 320 cells), is estimated between 2,000-4,000 hours. This means that after running 2,000-4,000 hours, the BZM120 PEM Fuel Cell modules will need to be replaced. The BZM120 PEM module enables the submarine to navigate at a cruising speed of 2 to 6kt (3.7 to 11.1km) and stay underwater without surfacing for about three weeks, depending on the speed. The Type 214 submarines can reach 12 knots on the surface and 22 knots while submerged. Thanks to its AIP System the submarines can stay underwater for 18 days (approximately 1,248nm/2,311km at 4 knots) without snorkeling to charge its batteries or can travel 12,000nm (2,311km) at 4 knots with maximum fuel and snorkeling.

The Type 214 submarine uses its diesel engines while cruising at high speeds and AIP System for low-speed silent cruising. The main components of the AIP System consist of the PEM Fuel Cell module, cylindrical metal hydride tubes, liquid oxygen tank, and control unit. The submarine can operate for an extended time without surfacing by using the electrical energy generated in the fuel cell module as a result of the chemical reaction between the liquid oxygen and the hydrogen stored in metal hydride tanks. Since the fuel cells use pure hydrogen to generate power, the module can continuously produce electricity as long as there is hydrogen feeding the system.

Construction Process of REIS Class Submarines

While the AY, PREVEZE, and GÜR Class submarines were built with the horizontal construction method using HY-80 high yield steel plates at the Gölcük Naval Shipyard Command, the REIS Class Type 214TN Submarines are being constructed with the vertical construction method, which has been newly introduced to the Shipyard. Vertical construction allows faster production by using more automation and automated welding technologies, including more advanced welding machines and systems which has increased the welding quality. Since Erdemir could not produce ferromagnetic HY-100 and HY-80 high yield steel alloys, the REIS Class Type 214TN Submarines are being constructed with steel plates supplied from Austria.

In the vertical construction method, the steel plates of the pressure hull and the keels supporting them from the inside are built vertically as ring-shaped sections with a length of about 3m, and later the steel hull of the submarine is assembled by rotating the rings and combining them end to end with automatic welding machines. Both ends of this long cylindrical steel hull are sealed with the addition of the forward elliptical bulkhead (dome) and the aft conical bulkhead and the construction of the waterproof and pressure-resistant submarine hull is completed. Apart from the pressure hull, the boat's construction is finalized by adding the upper deck, sail, ballast tanks (aft ballast tank is not pressurized), and the inner compartments. Because of the way the pressure hull is constructed, all the devices, systems, and equipment to be used in the submarine must be outfitted before the pressure hull blocks are combined.

To prevent corrosion and provide durability, the upper deck and the sail sections of the submarines are constructed from Fiber-Reinforced Plastic (FRP), while the hull is built from high-yield stainless steel alloys (HY-80/100) with high corrosion resistance. The bow of the submarine, which is the most critical part of the vessel, will be built domestically at the Gölcük Naval Shipyard Command. Thus, the entire submarine hull will be built for the first time in Turkey. The bow of the TCG I. İnönü (S-360), last Gür-Class (Type 209/1400 Mod) submarines, was also built by Turkish engineers and workers at the Gölcük Naval Shipyard Command. Another critical section to be constructed under the project for the first time at the Gölcük Naval Shipyard Command is the aft conical bulkhead that forms the stern (dome) of the submarine.

REIS Class Submarines consist of 22 sub-blocks, each approximately 3m long, and five main blocks. There are also three internal reinforcements (six in AY, PREVEZE and GÜR Classes) built from the HY-80 steel in different parts of the hull to increase the strength of the submarine further. A single main section of the pressure hull is formed by combining 6-7 sub-sections. The hull of the submarine, on the other hand, is constituted by combining five different main sections, each weighing 840 tons. The internal support elements/ parts that provide the main strength of the hull are called 'keels.' The keels consists of two parts: WEB and FLENC. WEBs are made of HY-100 steel plates.

Each REIS Class submarine will have around 100 keels (reinforcement element). According to the information we received, during the construction process, first, the non-pressurized aft ballast tanks will be built, and then the keels that form the basis of the pressure hull will be manufactured. Subsequently, the main sections called Section 10, Section 20, Section 30, Section 40, and Section 50, will be constructed.

A special hull constructed from fiberglass is placed on the outside of the pressure hull to reduce the acoustic signature and improve hydrodynamics. Carbon fiber materials are also partially used in the construction of the outer hull, which uses special Radar Absorber Materials (RAM) and paints. Under the leadership of STM, studies were carried out to produce RAM materials and paints to be used in REIS Class Submarines with domestic capabilities.

Incorporating around 100 keels, the construction of each single-hull REIS Class Submarine is estimated to cost 180,000 Man-Days (160,000 for TCG Heybeliada and 140,000 for TCG Büyükada Ada Class Corvettes) and 1.5 Million Man-Hours in total

Tank Hunters: KAPLAN & PARS 4X4 STA

First Two Kaplan STA Vehicle Delivered to Turkish Armed Forces

by Cem AKALIN & Saffet UYANIK


© Defence Turkey

Within the scope of the Anti-Tank Vehicles Project carried out under the contract signed between the Presidency of Defence Industries (SSB) and FNSS Savunma Sistemleri A.Ş., the first Two Kaplan Anti-Tank Vehicles (STA) were delivered to the Turkish Armed Forces (TAF)

December 25, 2019. The first two tracked KAPLAN STA vehicles were delivered at a ceremony held at FNSS Gölbaşı Facilities as part of the Anti-Tank Vehicles (STA) Project carried out for the supply of new generation antitank vehicles to the Turkish Armed Forces (TAF). President of Defence Industries Prof. İsmail DEMİR, FNSS General Manager & CEO K. Nail KURT, Nurol Holding Vice Chairman of the Board Oğuz ÇARMIKLI, Aselsan Chairman of the Board Prof. Haluk GÖRGÜN and several militaries and defence industry officials attended the ceremony. During the KAPLAN STA delivery ceremony, the Subcontractor Agreement for the Supply of Mission Equipment within the scope of the Special Purpose Tactical Wheeled Armored Vehicle (ÖMTTZA) Project was signed between FNSS and Aselsan, and also the Subcontractor Agreement for the Supply of the Indigenous Engine signed between FNSS and TÜMOSAN. The agreement with Aselsan was signed by FNSS Chief Marketing & Programs Officer Aybars KÜÇÜK, Aselsan Chairman of the Board Prof. Haluk GÖRGÜN and Aselsan Defence System Technologies Vice President Mustafa KAVAL with the witness of SSB President Prof. İsmail DEMİR. The agreement between FNSS and TÜMOSAN was signed by FNSS General Manager and CEO K.Nail KURT and TÜMOSAN Chairman Ahmet ALBAYRAK.

Speaking at the delivery ceremony, FNSS General Manager and CEO K.Nail KURT said the Qualification Tests of the KAPLAN STA vehicles were completed, and they were delivered to the security forces in accordance with the project schedule and added, "The Anti-Tank Vehicles contract signed between the Presidency of Defence Industries and our Company in June 2016 covers a total of 260 vehicles, 184 of which are tracked and 76 of which are 4x4 wheeled, as well as turrets to be used on these vehicles. 64 of these will be equipped with KORNET missiles that are currently in the inventory of the Turkish Armed Forces. Other vehicles will be equipped with OMTAS missiles developed by Roketsan. We have two different vehicles and two different types of turrets. In short, four different types of products are being developed, designed, prototyped and qualified. There is a KORNET turret on our tracked KAPLAN and an OMTAS turret on our PARS 4x4 prototype vehicle. These two vehicles and two turrets were completely designed and manufactured from scratch to cater for our Armed Forces as per the TAF's requirements. Within this context, two KAPLAN Tracked Anti-Tank vehicles are being delivered today. We are planning to finalize the qualification of the PARS 4x4 in January 2020."


© Defence Turkey

K.Nail KURT - FNSS General Manager & CEO

FNSS General Manager and CEO K.Nail KURT: “We attended the critical design meeting held in the 16th month, not only with drawings and slides but with a prototype vehicle available in the R&D workshop.”

Mentioning the value of support given by FNSS solution partners in the Project, KURT said, “Within the scope of STA Project, we have teamed up with Nurol Makina throughout the development phase of the PARS 4x4 vehicles and developed PARS 4x4 STA which is a very distinctive vehicle. We made use of the competence and expertise of our sister company on 4x4 vehicles. They provided critical design input and support. Additionally, the manufacturing activities are performed entirely by Nurol Makina. For antitank turrets, the OMTAS Mission Unit was developed with Roketsan for the preparation of OMTAS missiles on turrets and their launch. In this context, very critical collaboration was made in terms of integration. The SAGER high-performance Electro-Optical Sight System developed and manufactured by Aselsan is used on all turrets. SDT has developed Platform and Gunner Interface Units to provide the operator interface with the turret on the vehicles. They had provided critical support with electronic control units. The STA Project is a very important example where highly effective cooperation has been achieved.”

Underlining that they have designed an indigenous vehicle, and even though the critical technical requirements

KAPLAN Anti-Tank Vehicle

The KAPLAN Anti-Tank Vehicle (STA) is the smallest member of the KAPLAN new-generation armored combat vehicle family developed by FNSS. The vehicle is powered by a diesel engine coupled to a fully automatic transmission system that provides a 21 hp/ton power-to-weight ratio allowing joint operation capability with main battle tanks. It has a maximum road speed of 65 km/h, with a cruising range of over 525 km. The KAPLAN STA is 5.6m long, 3m wide, and has an overall height of 3.1m. Its advanced torsion bar suspension system is specifically designed to minimize vibrations in the vehicle and improve road handling. The vehicle has a low silhouette, and with its twin tracks (five road wheels each side), it can operate at high speeds, not only on asphalt but also on soft soil or muddy and rough terrains under all weather conditions. The KAPLAN STA can climb a gradient of 70% and a side slope of 40%. It can cross a vertical step of 0.75m and a trench of 1.8m.

The vehicle has a modular platform design that allows it to execute a wide variety of missions by integrating different subsystems. It is equipped with an advanced self-protection suite consisting of a CBRN Protection System, A/C, Automatic Fire Extinguisher, Mine Resistant Seats, and Smoke Grenade Launchers. It has two self-sealing fuel tanks at the rear that are fully armored and isolated from the vehicle to ensure the safety of personnel.

The KAPLAN STA is one of the very few vehicles in its class that has fully amphibious characteristics with water speeds up to 6.3 km/h. Its hull is water-resistant, and both the hatches and lids are water-proofed via seals. The vehicle can enter the water without any prior preparation, and thanks to its two rear-mounted propulsion systems, it can move in deep and fast-flowing streams.

The hull of the KAPLAN STA is manufactured using a unique welding technique that provides advanced ballistic protection. The vehicle features mine and blast resistance and offers high mobility under different geographical conditions thanks to its lightweight hull. The power pack and the expanded driver cabin are located at the front of the vehicle, while the gunner and the commander sit in the middle of the vehicle. The rear section of the vehicle is allocated for the assistant gunner and additional crew members. The KAPLAN STA can be accessed through the integral personnel door on the ramp or the hydraulic ramp located at the rear of the vehicle. The power pack can be removed through the cabin access hatch for maintenance and repair.

FNSS General Manager & CEO K.Nail KURT and TÜMOSAN Chairman Ahmet ALBAYRAK signed an agreement with the witness of SSB President Prof. İsmail DEMİR for the supply of the unique engine for the ÖMTTZA project

need to be bounden, FNSS General Manager & CEO K.Nail KURT emphasized that they attended the Critical Design Review meeting held in the 16th month not only with technical drawings and slides but with a prototype vehicle available in the R&D workshop. "The project requirements were really challenging. Mine and ballistic protection requirements were quite high. There was also a need for amphibious capability; therefore, serious system engineering and optimization efforts were made to meet on common ground for two conflicting requirements. I don't think there are too many countries in the world achieving this. Considering the point we have reached today, the development of 4 different products, the manufacturing of prototypes and the completion of all qualification processes in a short time is a big achievement of the Turkish Defence Industry especially in terms of land systems. I would like to thank the Presidency of Defence Industries, Turkish Land Forces and all of the companies who work with a common understanding in this project as a subcontractor."

President of the SSB Prof. İsmail DEMİR: "We will use unique Armor Steel in our Armored Vehicles in a short span of time"

Speaking at the ceremony, President of Defence Industries Prof. İsmail DEMİR pointed out that there are activities being performed on armor steel and engines that will reduce foreign dependency in the field of land vehicles. "There are issues we are closely following regarding one of the most important components of our foreign dependency in the field of armor steel, engine and transmission, especially within the scope of this project. We will use unique armor steel in our vehicles in the near future with the valuable initiatives of our private sector in terms of producing local armor steel. In addition, our engine and transmission development activities are going on. Today, we are proud of adding KAPLAN and PARS 4X4 Anti-Tank vehicles to our inventory, which is the valuable output of our intensive efforts within the scope of our modernization and new generation vehicle projects. In the STA project, great efforts were made to use the engine of TÜMOSAN in terms of using indigenous engines, thanks to our Presidency's persistence and determination."

Highlighting the export potential of the STA project, Prof.DEMİR said, "We consider that our domestic products that are to be used on the turrets, weapon systems and other systems to take part in the vehicle in the STA project will be important export items. Together we will witness how effective such vehicles will be in the future. Most probably, by diversifying the turrets and weapon systems on our vehicles, these vehicles will become much more functional and will be a crucial combat elements that will reduce the workload of our tanks at the theater with various optical imaging and control systems."

Following SSB President Prof. İsmail DEMİR's speech, scaled-model of the STA and the vehicle key were presented by Nurol Holding Vice Chairman Oğuz ÇARMIKLI.

During the ceremony, the Subcontractor Agreement for the procurement of Mission Equipment within the scope of the Special Purpose Tactical Wheeled Armored Vehicle (ÖMTTZA) Project was signed between FNSS and Aselsan, and also the Subcontractor Agreement for the procurement of the unique engine signed between FNSS and TÜMOSAN. Within the scope of the ÖMTTZA

The Subcontractor Agreement for the Supply of Mission Equipment within the scope of the ÖMTTZA project was signed between FNSS and Aselsan Executives

agreement signed between the SSB and FNSS, FNSS will complete the manufacturing of a total of 100 8x8 and 6x6 vehicles in 5 different types, via a domestic development model, and deliver them to the Turkish Land Forces Command and Gendarmerie General Command. Within the scope of the ÖMTTZA project, 30 6x6 command vehicles, 45 8x8 sensor and reconnaissance vehicles, 15 6x6 radar vehicles, 5 8x8 CBRN vehicles, 5 units of 8x8 Armored Fighting Vehicles (AFV) will be delivered.

All Platforms and Turret Systems Under the STA Program will be Delivered in 2022

STA Project tender that adopted the local Production and Integration model was firstly started 11 years ago. At that time, the Undersecretariat for Defence Industries (SSM) had issued an RFP (Request for Proposal) on March 7, 2008 for the procurement of 1,075 tactical wheeled armored vehicles and an Integrated Logistics Support System to meet the need of carrier vehicles for TOW, Milan and 40mm Automatic Bomb Launchers that were available in the inventory of the Turkish Land Forces Command, and for KORNET-E ordered by SSM under the OMTAS Direct Procurement Project, and for Medium Range Antitank Weapon (OMTAS) Missile Systems developed by Roketsan. The breakdown of the vehicles had been determined as 350 TOW, 344 Milan, 229 40mm Automatic Bomb Launchers and 152 OMTAS Carriers. On December 15, 2008, BMC, FNSS, HEMA Industry, Nurol Makina and Otokar

PARS 4X4 Anti-Tank Vehicle

The anti-tank version of the PARS 4x4 is the latest member of the PARS family of wheeled armored vehicles that was unveiled in May 2015. Developed by FNSS to meet the needs of the Turkish Land Forces Command, the PARS 4x4 Anti-Tank Vehicle (STA) offers both speed and high maneuverability under all-terrain conditions and the ability to engage second targets following a rapid change of position. The PARS 4X4 STA is an exceptional amphibious vehicle that can meet these challenging requirements simultaneously and has been designed to undertake specialized operational roles such as advanced surveillance, anti-tank, and command & control (C2).

The PARS 4X4 STA is powered by a diesel engine coupled to a fully automatic transmission with an axle lock for use on slippery surfaces and soft soil. The power pack is located at the rear of the vehicle and provides a power-to-weight ratio of 25 hp/ton. The location of the power pack also offers a 180° field-of-view for the driver, who is seated at the front of the vehicle. The vehicle also features additional camera systems for increased situational awareness. There is one single door on each side of the hull. The PARS 4X4 STA has a maximum speed of 110 km/h on asphalt and a range of over 700 km. The engine inlet and exhaust ports are located on top of the vehicle hull, allowing the vehicle to go amphibious without prior preparation, thus granting it the best amphibious capabilities in its class and further enabling The PARS 4x4 STA to maneuver at higher speeds. The vehicle is propelled in the water by two water jets located at the rear of the hull with a maximum water speed of up to 6.5 km/h.

The PARS 4x4 STA has a length of 5 m, a width of2.6 m, and an overall height of 3.1 m (2.1 m hull). The PARS 4X4 STA has a low center of gravity, a fully independent suspension system (Double Wishbone, Independent and Helical Spring), ABS-assisted hydraulic disc brakes, low ground pressure, and increased angles of approach and departure (7.5 m Turning Radius), which allows operating on any rough terrain. The PARS 4X4 STA can climb vertical slopes of 70% and can hold on horizontal slopes of 40%. It can also pass over 0.4 m of vertical obstacles and trenches of 0.8m with ease. In addition, the hydraulic recovery winch, located at the front of the vehicle, provides self-recovery when required.

The PARS 4X4 STA features a central tire inflation system (CTIS), which enhances the mobility of the vehicle. It also has run-flat capability thanks to the support ring attached to the wheel that can support the weight of the vehicle in the event of a loss of pressure. The vehicle has a standard crew of 4. The driver's cabin features a transparent ballistic armor that offers a wide field of view for both the driver and the crew. The PARS 4X4 STA also provides the driver and the commander with integrated night and day vision cameras that enable night operations with or without using blackout lights. The command and warning panels and the height-adjustable mine-protected seats have been specially developed for the commander, driver, gunner, and the additional dismounted infantry.

The vehicle is made of a ballistic hull, which provides protection against mines and improvised explosive devices (IED). The vehicle offers a remarkable load-carrying capacity. With its open architecture and significant design, the vehicle can carry out various missions. The PARS 4X4 can be transported using any military transport aircraft, including the CH-47 Chinook heavy-lift helicopter. To reduce operating costs, many parts have been designed to have the same life-expectancy as the vehicle. Thanks to its power pack, which can be removed and installed quickly on the field, the vehicle offers ease of maintenance and logistic support.

companies had submitted their bids, soon afterwards the number of vehicles was reduced to 846 vehicles that excluding 229 40mm Automatic Bomb Launcher Vehicles and then to 260 vehicles as per the request of the Land Forces Command.

Within the scope of the STA Project, on June 21, 2013, an RFP had been issued to FNSS and Otokar Companies for a total of 260 vehicles (184 tracked & 76 wheeled), FNSS Savunma Sistemleri A.Ş. had become the successful bidder and the signing ceremony was held on June 27, 2016 at the Undersecretariat for Defence Industries with the participation of FNSS, SSM and MoND officials. Following the signature of the contract, the project kick-off meeting was held on October 14, 2016 in accordance with the decision of the Defence Industry Executive Committee (DIEC/SSIK) dated March 9, 2016, FNSS will develop a total of 260 vehicles, 184 of which are tracked and 76 of which are wheeled, as well as 64 KORNET-E Weapon Turrets and 196 OMTAS Weapon Turrets.

The detailed design of the vehicles was approved by SSM and the Turkish Land Forces in the 15th month of the project and qualification tests started on December 3, 2018.

The KAPLAN STA and PARS 4x4 STA successfully passed the Mobility and Durability, Environmental Conditions, EMI / EMC, Mine and Ballistic Protection and


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Amphibious Capability Tests. Within the frame of qualification tests, KAPLAN STA successfully completed the 10,000 km durability driving test including performance tests on snowy terrain and KORNET Turret qualifications.

Within the scope of the STA Project, the integration test of the OMTAS antitank missile developed by Roketsan onto the KAPLAN STA Anti-Tank Vehicle was verified by the firing test performed with the participation of the teams of the Presidency Defence Industries and Land Forces Command in Karapınar, Konya on February 13, 2019. During the firing test on 6 April 2019, that was performed with the OMTAS missile launched from the Remote-Controlled Anti-Tank Turret integrated successfully onto the KAPLAN STA, the firing test towards the moving target from the stationary vehicle was successfully performed. The video of the firing test with the OMTAS missile integrated onto PARS and KAPLAN vehicles (from the moving vehicle towards the stationary target) was made public on November 25, 2019, on the SSB's official twitter account. In the video the OMTAS missile is shown successfully hitting the target.

The PARS 4x4 STA also successfully passed the 20,000 km durability driving test, while the OMTAS Turret qualifications are expected to be completed at the end of December 2019 in accordance with the FNSS statement. The qualification tests of the PARS STA 4x4 vehicle are planned to be finalized in January 2020 and in pursuit of the acceptance tests, first vehicles are planned to be included in the inventory of the TAF.

All tracked & wheeled platforms and turret systems are expected to be included in the inventory of Turkish Armed Forces by 2022


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by Saffet UYANIK

Dynamic Components & Landing Gears of T-70 Helicopters Delivered Under the Turkish Utility Helicopter Program

The delivery ceremony of the first batch of Dynamic Components and Landing Gears to be used in the T-70 helicopters under the Turkish Utility Helicopter Program (TUHP) was held on January 15, 2020, at Alp Aviation facilities in Eskişehir

President of Defence Industries Prof. İsmail DEMİR, Vice Presidents of Defence Industries Serdar DEMİREL, Harun ÇELİK, and Dr. Celal Sami TÜFEKÇİ, Governor of Eskişehir Özdemir ÇAKACAK, Combatant Air Force Deputy Chief of Staff Major General İsmail GÜNAYDIN, 1st Air Supply and Maintenance Center Commander Brigadier General Gürhan ERGÜRHAN, Chairman of the Turkish Aerospace Industries (TUSAŞ) Board of Directors Prof. Oğuz BORAT, President & CEO of Turkish Aerospace Prof. Temel KOTİL, President & CEO of TEI Mahmut Faruk AKŞİT, Chairman of the SSI Board of Directors Latif Aral ALİŞ, Chairman of the Alp Aviation Board of Directors Tuncer ALPATA, Deputy General Manager of Turkish Armed Forces Foundation (TAFF) Sadık PİYADE, and senior executives of several Turkish Defence Industry companies and Sikorsky Aircraft participated at the delivery ceremony held at Alp Aviation facilities in Eskişehir. During the ceremony, the Main Gearboxes/ Transmission, Main Rotor Heads, Intermediate and Tail Rotor Gearboxes, and the Main and Tail Landing Gears to be used in the T-70 helicopters were delivered to Turkish Aerospace.

Taking the floor at the ceremony, Chairman of the Alp Aviation Board of Directors Tuncer ALPATA stated that Alp Aviation has made stepwise investments to reach its goals and said: "Alp Aviation used to manufacture detailed parts and combine these to produce intermediate systems, but as of today, we have become a company that can build whole systems and manage processes successfully from detailed parts to the final test. In this context, we are having a historic day. We have achieved this success together with the will and support of our Presidency and the Presidency of Defence Industries, Industry 4.0 processes, and the devoted work of our colleagues. Once again, I would like to thank all our colleagues, our Presidency of Defence Industries, and our friends at Sikorsky Aircraft."

Prof. İsmail DEMİR - President of SSB

In his speech, Chairman of the Turkish Aerospace Board of Directors, Prof. Dr. Oğuz BORAT pointed out that Turkish Areospace aims to be an integrator company and said: "As TUSAŞ, our goal is to be an integrator company. We want to transform the existing defence industry in Turkey into organizations that create added value. The Presidency of Defence Industries plays a leading role in the emergence of this structure. The products we will receive today marks an important milestone for the Turkish Defence Industry. In this regard, I especially want to congratulate Alp Aviation staff and wish them success."

Tuncer ALPATA - Chairman of the Board of Directors at Alp Aviation

Prof. İsmail DEMİR: "The Local Content Ratio in the Turkish Utility Helicopter Program Reached 63%"

Speaking at the ceremony, President of Defence Industries Prof. İsmail DEMİR shared information about the deliveries and the overall management of the program. "We are witnessing a critical stage of the Turkish Utility Helicopter Program. We are very proud to

hold a ceremony in this facility that we had opened in 2017, and in this regard, I would like to thank everyone who contributed to such a project. Within the scope of the T-70 program, we plan to manufacture 109 helicopters in 2 different configurations in line with the needs of 6 different users. However, this 109 number is likely to increase further, and studies are continuing."

Prof. İsmail DEMİR also emphasized the importance of the Turkish Utility Helicopter Program for the defence industry. "I would like to underline an important concept here; thanks to the policies we have implemented under this program, our localization rate has reached 63%. With this program, Alp Aviation has become a company that not only manufactures parts but also produces sub-systems and integrates them. Eskişehir has become an important center for the aviation industry and will become even more critical in this field. Some restrictions imposed on our country, suspensions in the F-35 project and large and small embargo decisions cannot stop us; on the contrary, it speeds us forward even further."

Underlining that the technical knowledge gained from the TUHP program will be used in future projects, İsmail DEMİR said, "We have now moved to a new phase in helicopter platforms. Our domestic and national helicopter

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GÖKBEY made its first flight. We acquired certain competencies in the field of transmission systems, gears, and landing gears. What we expect from the main contractor is the optimum utilization of this competence and succeeding with both GÖKBEY and our future helicopter platforms with the same level of cooperation."

T-70 Helicopters Dynamic Components and Landing Gear Production Contract Started in 2016.

Within the scope of the Turkish Utility Helicopter Program (TUHP), Alp Aviation signed a contract with Turkish Aerospace in 2016 for the production and delivery of T-70 helicopters "Dynamic Components and Landing Gear" and also signed a contract with Sikorsky Aircraft to export these products. To carry out engineering, manufacturing, quality control, and testing processes of critical sub-systems to be produced under the program, Alp Aviation established the "Helicopter Business Center Facilities" with an investment of US$ 90 million in the Eskişehir Organized Industrial Zone. On October 3, 2017, an inauguration ceremony was held with the participation of the then Prime Minister Binali YILDIRIM and the President of Defence Industries İsmail DEMİR. Gears, gearboxes, dynamic components, rotor assemblies, flight control systems, and landing gears will be produced for helicopters, especially the S-70 Medium Transport/Utility Helicopters at the Center and Alp Aviation aims to create a business volume of US$500 Million in the long term.


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T-70 Landing Gears

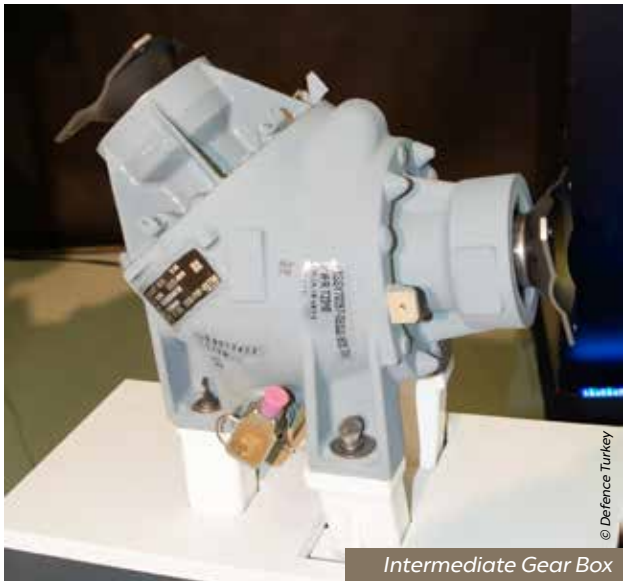
With its extensive experience in machining spanning 15 years, Alp Aviation manufactures Helicopter Dynamic Parts & Assemblies, Helicopter Tail Rotor Drive Shaft System (TRDS) Parts & Assemblies, Dynamic & Static Engine and APU Parts, Landing Gear Parts & Assemblies, Structural Parts & Assemblies for Aircraft, Hydraulic and Fuel Systems Tube Assemblies, and subsystems for the Aerospace Industry. As one of the few companies that manufacture flight-critical parts in the world, the total business volume of Alp Aviation has exceeded US$7 Billion thanks to long-term agreements. Alp Aviation aims to increase its value-added technological product exports, currently approaching US$200 Million annually, to US$350 Million in 2023. Alp Aviation successfully completed the engineering, manufacturing and testing processes in a timely manner following the project schedule under the Turkish Utility Helicopter Program and delivered the first batch of its products.

First Deliveries of T-70 Utility Helicopters Will Begin in 2021

Within the scope of the program, the main contractor Turkish Aerospace and the subcontractors Sikorsky Aircraft, Aselsan, TEI, and Alp Aviation will produce 109 T-70 Utility Helicopters based on the Sikorsky S-70i Helicopter under license in Turkey for the next ten years, and they will deliver these helicopters to six different users (Land Forces Command, Air Force Command, Special Forces Command, Gendarmerie General Command, General Directorate of Security and General Directorate of Forestry). Within the scope of the "Dynamic Components Project" under the TUHP program, Alp Aviation will produce the Main Rotor Heads, Main Gearboxes/ Transmission, and the Intermediate and Tail Rotor Gearboxes. Alp Aviation will also provide 104 chipsets for the dynamic components as part of the project.

The functional tests of these products were successfully completed at the qualified test stand established at Alp Aviation facilities. The standards used in the production, assembly and testing phases of the TUHP program were prepared by Alp Aviation engineers, taking into account the NADCAP "Flight Safety Criteria," including all user approvals. With the "Value Flow Analysis" (VFA) studies carried out at the beginning of the project, the requirements for the assembly and test processes were determined by the parties in the most suitable way, and an integrated structure covering all activities was created under a single roof.

Under the "Landing Gear Project," which constitutes another part of the program, the production of the Main and Tail Landing Gear to be used in the T-70 helicopters is also carried out by Alp Aviation. Within the scope of the project, all engineering, manufacturing, special process, assembly, and testing activities were completed using Alp Aviation capabilities, and all qualification tests under the TUHP program were successfully carried out at Alp Aviation facilities. Utilizing its vast technical expertise from landing gear component and subassembly production for Original Equipment Manufacturers (OEM) directly in this project, Alp Aviation ensured that all processes were completed without any problems. In addition to supporting the Turkish Utility Helicopter Program with serial production, these products can also be exported to the American aircraft manufacturer Sikorsky Aircraft Corporation through agreements. Since Alp Aviation's work share under the project includes various critical parts and subsystems of Black Hawk helicopters, it will also be possible to meet the spare part and after-sales support needs of all global users with national capabilities.



Intermediate Gear Box

T-70 Main Rotor Transmission and Gear Box Assembly with Rotor Hub

Within the scope of the program, the main contractor Turkish Aerospace is responsible for the production, final assembly, testing, and integrated logistics support of all main parts such as the cabin, cockpit, tail cone, vertical and horizontal stabilizers, and the main and tail rotor blades of T-70 helicopters. Aselsan will develop and integrate the main avionics and codevelop the helicopter cockpit with Sikorsky. TEI will produce the T700 engine. Alp Aviation will manufacture the landing gears and gearboxes, and both manufacture and assemble the dynamic components. The subsystems to be delivered under the program will not only meet the needs of Turkey but will also meet the needs of several countries both in our region and the world.

The first T-70 Utility Helicopter, produced by the main contractor Turkish Aerospace, is expected to roll out of the hangar in November 2019, and the first deliveries are planned to begin in 2021

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First Launch Test of AKYA National Heavyweight Torpedo with the Acoustic Seeker Conducted Successfully!

by İbrahim SÜNNETCİ

Speaking at the 2019 Annual Evaluation Meeting held at the Beştepe National Congress and Culture Center on January 16, 2020, President Recep Tayyip ERDOĞAN shared information about the AKYA National Heavyweight Torpedo (HWT) Program, one of the important developments of the Turkish Defence & Aerospace Industry last year, and said: "We have successfully completed the launch tests of our National Torpedo AKYA."

Under the AKYA National Heavyweight Torpedo Program, of which the €24 Million valued Phase-1 (Development Phase) contract was signed between the Presidency of Defence Industries (SSB), the main contractor Roketsan, and various domestic defence industry companies on May 8, 2009, a new Launch Test was carried out on December 20, 2019. According to our information and the test video shown at the evaluation meeting, the launch was performed from an underwater test platform at a depth of 40m. During this launch test, the AKYA Heavyweight Torpedo (HWT) was equipped with a live active/passive acoustic sonar sensor for the first time.

The first launch test of the 533mm AKYA HWT without the warhead and active/passive acoustic sonar sensor was carried out successfully in the Sea of Marmara on July 11, 2013. Under the AKYA National Heavyweight Torpedo Program, Roketsan will develop the warhead and guidance system, Meteksan Defence will develop the sonar transducer arrays (sonar wet end), and Koç Information and Defence Technologies (KBS) will develop the Wake Sensors, Torpedo Test Range Underwater Detection and Positioning System, Acoustic Signal Generators, and the Underwater Acoustic Models (to verify the systems and software to be developed under the program).

The AKYA Phase-2 Project was signed between the SSB and Roketsan in July 2016. According to the 2017-2021 Strategic Plan Document published by the SSB in February 2017, critical sub-system qualification activities in the AKYA National Heavyweight Torpedo Program will be completed in two years, 50% in 2020 and 50% in 2021. The completion of the qualification process will effectively end foreign dependency in critical sub-systems. The AKYA HWT is planned to be used as the first alternative to the veteran heavyweight torpedoes (Mk14, Mk23, Mk37 Mod 2, Mk37 Mod 3, SST-4 Mod 0 and Mk24 Mod 2 TigerFish) onboard the submarines in the Turkish Naval Forces inventory. The AKYA HWT is designed to be fired against both surface targets (ASuW) and submarines (ASW). It is a battery-powered (Otto Fuel II is not preferred), fiber-optic cable guided heavyweight torpedo, equipped with an active/passive acoustic sonar, magnetic proximity sensor (can be replaced with an acoustic proximity sensor in the future), and wake sensor (wake-homing capability). Following the industrialization activities, the AKYA HWT is expected to be ready for the Serial Production Phase by the end of 2020. The AKYA is planned to be tested for the first time in the PREVEZE Class Submarines that will be equipped with the MÜREN Combat Management System (CMS) and subsequently used as the first alternative torpedo in all submarines in the Turkish Naval Forces inventory. The first torpedo launch with the MÜREN CMS is expected to be carried out at the end of 2020 or the beginning of 2021.

AKYA National Heavyweight Torpedo Technical Specifications	
Length:	≤6.6m (The length of the 533mm torpedo tubes is 6.6m according to NATO standards)
Diameter:	21 inches/53.3cm.
Weight:	1,200 kg.
Power Plant:	Electric.
Battery:	Possibly Silver-oxide batteries.
Range:	15km (at 40kt).
Maximum Speed:	40kt (40 nautical miles per hour).
Propulsion:	twin contra-rotating propellers (rotate in opposite directions around the same axis).
Guidance:	Fire and Forget, Active/Passive Acoustic Sonar + Fiber Optic Wire Guidance + Magnetic Proximity Sensor (can be replaced with an acoustic proximity sensor in the future) and Wake Sensor (wake homing capability).
Body:	Metal body (assumption), fiber nose.
Sonar:	Conformal Array Sonar (located in the Parabolic Head Shell made of fiber material. The hydrodynamic optimized parabolic shape both reduces torpedo self-noise and cavitation to an absolute minimum).
Warhead:	AKYA is expected to carry a heavier warhead than the one used in the DM2A4 Torpedo (260kg PBX).
Target:	Although designed for dual use (ASuW/ASW), the primary targets are expected to be naval warships considering the Conformal Array Sonar preference.
Unit Cost:	The unit cost is expected to be lower compared to the DM2A4 and Mk 48 Mod 6AT Heavyweight Torpedoes.

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TEI-PD170 Turbo Diesel Aviation Engine Serial Production Delivery Ceremony

by İbrahim SÜNNETCİ

On January 15, 2020, the TEI-PD170 Turbo Diesel Aviation Engine Serial Production Delivery Ceremony was held at TEI facilities with the participation of the President of Defence Industries Prof. İsmail DEMİR. The TEI-PD170 Turbo Diesel Aviation Engines were developed with national capabilities for use in ANKA Unmanned Combat Aerial Vehicles under the Operative UAV Engine Development Project signed between TEI and the SSB on December 27, 2012.

The contract for the delivery of the TEI-PD170 Turbo Diesel Aviation Engines to be used in ANKA Blok-B and ANKA-S UAVs by the Turkish Naval Forces was signed between Turkish Aerospace (TUSAŞ) and TEI in the second half of 2019. TEI completed the production of the 13 TEI-PD170 Engines to be used in 12 additional ANKA UAVs (4 ANKA-B and 8 ANKA-S) by the end of 2019. The first of the engines that were mass-produced under the contract was sent to Turkish Aerospace on December 27, 2019, for preliminary studies. In 2019, TEI also completed the production of two TEI-PD170 engines to be used in the BAYRAKTAR AKINCI (Raider) Unmanned Combat Aerial Vehicle (UCAV) developed indigenously by Baykar Makina. Within the scope of the ceremony, the delivery of 15 engines, including 13 TEI-PD170 Engines produced by Turkish Aerospace for the Turkish Naval Forces, and 2 TEI-PD170 Engines to be provided for AKINCI UCAV, have also been completed. With the signing of the contract for the engines to be used in the additional 10 ANKA-S UAVs by the Turkish Air Force, the number of engines to be delivered increased to 40. In 2020, an additional 25 TEI-PD170 engines are planned to be mass-produced and delivered to Turkish Aerospace as part of the second delivery.

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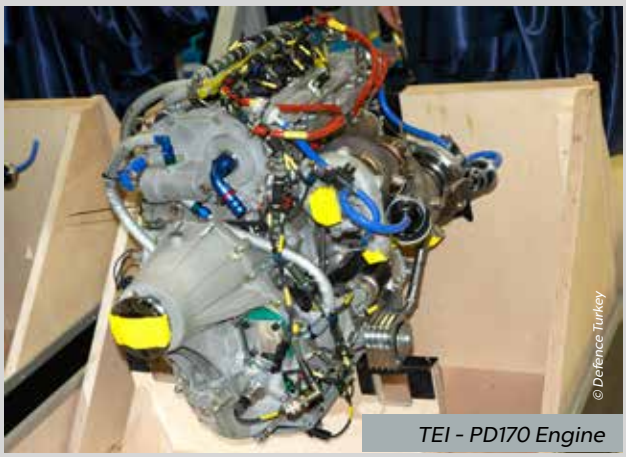
Speaking at the ceremony, Chairman & President of TEI, Prof. Mahmut Faruk AKŞİT underlined that the development and manufacturing of the TEI-PD170 engine within 5 years and its successful delivery after tests was a remarkable success for our country. Prof. Faruk AKŞİT also emphasized that within the scope of the project, TEI's collaboration with Turkish SMEs and sub-industry companies in the aviation field exceeded 90%. Prof. AKŞİT also noted that aside from the PD170, the PD155 engine, which was ordered for emergency needs, was developed by TEI engineers and delivered for use in the ANKA UAV. "The PD170 Engine, which we will deliver today, has been designed and developed from scratch by Turkish engineers, workers, and employees," Prof. AKŞİT also shared valuable information about the PD170 Piston Diesel Engine, the test images of which were shown in the promotional video: "As you can see in the video, we reached 225hp. There will be a second version of the AKINCI platform, and we will use the high hp version of these engines in the new version of AKINCI."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TEI - PD170 Engine

President of Defence Industries Prof. İsmail DEMİR emphasized that the PD170 Engine will also be used in the AKINCI UCAV and said, "There will be different models of the AKINCI UCAV, and I hope we will be flying one of these models with the PD170. We will send some of the PD170 engines to AKINCI; we will use the national engines on the national platform and I wish the best of luck in this project." Underlining that the PD170 Turbo Diesel Aviation Engine has reached a 90% locality rate in terms of the subsystem, material, and labor costs, Prof. DEMİR shared the good news that the tests of the TS1400, another engine produced by TEI, were also successful. Emphasizing that the first

engine run test of the first T-70 Multi-role Utility Helicopter manufactured by Turkish Aerospace was carried out on December 25, 2019, with the T700-TEI-701D Turboshaft Engines, Prof. DEMİR stated that TEI would deliver 25 more T700-TEI-701D engines in 2020.

Under the Operative UAV Engine Development Project, which was signed on December 27, 2012, and started in 2013, the first engine run test was conducted on January 31, 2017, the first engine was delivered on November 14, 2017, and the first flight test on the ANKA UAV was accomplished on December 27, 2018. During the development process, the power and fuel consumption targets of the engine were met in a short time, and the calibration and maturity tests exceeding 6,000 hours were successfully completed. Also, within the scope of the official qualification tests, six different EASA CS-E tests were successfully concluded. The TEI-PD170 turbo Diesel engine was designed and produced indigenously with national capabilities, and its Intellectual Property (IP) rights are owned by the Presidency of Defence Industries (SSB). The locality rate of the PD170 exceeds 90% in terms of the subsystem, material, and labor costs, and the localization efforts of the systems, excluding the off-the-shelf products, are aimed to complete by the end of 2020.

The TEI PD170 Engine Supply Subcontract was signed between Turkish Aerospace and TEI on November 23, 2019, for the serial production of the TEI-PD170 Turbo Diesel Aviation Engines. As part of this first serial production contract, 40 engines (TEI-PD170 Engine met the technical requirements of the Operative UAV Engine Development Contract) will be shipped with the Electrical Power Generation System Kit and Propeller Accessories Mounting Kit. Throughout the 3,600-hour service life of the engine (service life of the Rotax 914UL Engine used in the Heron/GÖZCÜ-I UAV is 1,800 hours, and the service life of the Thielert Centurion 2.0S [CD-155] Aviation Engine used in ANKA UAVs is 1,200 hours), all periodic interim maintenance (alternator and gearbox maintenance) and all planned depot-level maintenance will be carried out under the responsibility of TEI under the Integrated Logistics Support (ILS) management contract. Under the agreement, engine orders were received on December 26, 2019.

The PD170 Turbo Diesel Aviation Engine has a 170 hp capacity, double alternator, and twin turbocharger, and was developed by TEI to replace the Thielert Centurion 2.0S Engine, one of the three critical sub-systems of foreign origin in the ANKA MALE UAV System. The PD170 Turbo Diesel Aviation Engine has four-stroke and 2.1-liter volumes. According to the product brochure, it can provide 165 hp at a 20,000ft altitude, 155hp at a 25,000ft altitude, about 130hp at a 30,000ft altitude, 105hp at a 35,000ft altitude and about 90hp at a 40,000ft altitude. While the bare, dry weight of the PD170 Engine, which can operate with both JP-8 Jet Fuel and diesel fuel, is stated as 165kg in the product brochure, the total weight of the engine on the aircraft with all support equipment is 230kg. On May 28, 2017, Chairman& President of TEI Prof. Mahmut Faruk AKŞİT pointed out that just the engine block of the PD170 Engine costs US$50,000 and underlined that ANKA or similar UAVs can climb up to an altitude of 45,000ft with the PD170.

TS-1400 Turboshaft Engine's Core Engine Test Acceptance Process Accomplished

January 15, 2020. President of Defence Industries Prof. İsmail DEMİR received information on the latest developments of the TS1400 Turboshaft Engine by conducting an on-site examination in Eskişehir after the serial production delivery ceremony of the TEI-PD170 Engine.

Sharing up-to-date information about the project with the President of Defence Industries Prof. İsmail DEMİR, TUSAŞ Engine Industry's Chairman & President Prof. Mahmut Faruk AKŞİT said, "We have successfully completed the Core Engine Test acceptance process, which is one of the important milestones of the Turboshaft Engine Development Project, on December 16-17, 2019, with the participation of the representatives from the Presidency of Defence Industries and the Turkish Armed Forces."

The first ignition of the TS1400 engine, which will be the first indigenous helicopter engine of our country, was successfully realized in 2018 after the first parts manufacturing was completed in 2017. Within the scope of the Core Engine Test conducted on December 16, the calibration, configuration checks, 1.45-hour test execution, test result evaluation, and critical part FPI evaluation were successfully completed without any negative findings. In the preparation process prior to the Core Engine Test, more than 200 preparatory tests were carried out, reaching up to 32,000 engine revolutions, including a total of 18 engine assemblies with 2 engines, some of which exceeded 3 hours.

Sempro Hosted the International SemproConX19 Conference on 18-19 November in Ankara at the Bilkent Hotel

We talked with Semiha YAŞAR, Founder of Sempro, about the outcome of the Conference and much more in this exclusive interview

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Defence Turkey: Mrs. Semiha YAŞAR, first of all, I would like to congratulate you and your team for the conference that you have hosted with 200 participants from 54 companies. Before we talk about the conference could you please inform us about Sempro and its main activities?

Semiha YAŞAR: Thank you, as the SEMPRO team we are proud that the conference reunited professionals from companies both local & abroad and promoted experience in Configuration Management.

Regarding our main activities, SEMPRO is a consultancy, engineering, and services company. As Sempro's our vision is to be the preferred stakeholder that supports the design, development and production processes of companies. We aim to establish CM2 methodology as the method for change management by providing training and consultancy services. In addition to CM2 training, Sempro also organizes Project Management, PLM, ILS (Integrated Logistics Support) and Systems Engineering training with international and local partners.

We have already talked about CM2 methodology on our previous interview, to give you some brief information about the methodology I may say that the main goal of CM2 is to improve operational excellence across the enterprise by controlling product lifecycle management with a product-based approach, ranging from configuration management to change and data management.

CM2 methodology is successfully implemented or in use in more than 1,800 organizations around the world. Some examples of these companies are Airbus, Amazon, Apple, ASML, Caterpillar, Delphi, General Motors, Gulfstream, Lockheed Martin, Motorola, Sub-Zero/Wolf. I would like to say that ASML has its own CM2 school and gives training to its employees in their internal school. When we look at Turkey, the leading companies in their sectors such as Aselsan, Havelsan, Turkish Aerospace, FNSS, TEI, Arçelik, BMC have received CM2 training. Since 2015, 798 participants from 45 organizations have participated in our training programs to achieve process excellence in their companies. Among these participants, 28 people reached the level of CM2-P and 106 people completed the training up to CM2-C level.

Defence Turkey: (For further information about CM2 methodology our readers may consult Sempro's website or the previous interview with Mrs. Semiha YAŞAR.) I would like to talk about the conference SemproConX19 which has attracted considerable attention. The sessions were quite interesting. Could you tell us what the general theme of the conference was and from which companies the guest speakers came from?

Ray WOZNY, CEO of IpX

Semiha YAŞAR: The event was focused on business excellence and digital transformation. Experiences about the implementation of CM2 methodology in companies, PLM applications for digitalization, configuration management applications for software and digital transformation journeys were shared during the speeches.

Besides the speeches, panel sessions were held during our conference. Panel topics were "The Role of Configuration Management in Companies", "How Should Product Management of the Future Be?" and the "Contribution of CM2 Methodology in Digital Transformation". A lot of questions were asked by participants during the panel sessions. Through those questions, useful discussions occurred and more experience was shared in the related subjects. In our post-event survey, we asked participants their opinions about the panel sessions. We realized that those panel sessions have drawn as much as attention as the speeches.

We had experienced guest speakers and panellists participating from both international and local companies, and as such during the sessions participants could listen to various experiences from different perspectives. Guest speakers were from Arçelik, Aselsan, ASML, CIMdata, Configit, ESEN Sistem, FNSS, Havelsan, IpX, IpX-Europe, Nurol Makina, Roketsan, SUB-ZERO, TAOS, TEI, and TÜBİTAK- Sage.

Defence Turkey: Did your partners join the conference?

Semiha YAŞAR: Yes, officials from our partners IpX, CIMdata and Configit gave presentations during the conference.

Ray WOZNY, CEO of IpX made the opening speech which was quite entertaining. Ray loves Turkey and his Turkish friends. I could say it is enjoyable to work with him. In his speech, Ray encouraged participants to communicate with as many people as possible

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during the conference, to share more experience and information. As a part of his presentation, he called on the attendees in the hall to introduce themselves to someone that they had never met before.

Paul KAISER, Vice President of IpX gave a presentation about the True North Enterprise Calibration Model that offers a proven pragmatic methodology that guides decision making, minimizes disruption and lowers risk. As he mentioned during his speech, the True North Enterprise Calibration Model is a proven set of best practices that enables global organizations to benchmark, assess, and transform the business challenges that impact most organizations.

Our partner IpX is providing sustainable business and digital transformation for more than 1,800 global corporations on 6 continents with CM2 methodology and the True North Calibration Model.

Henrik Reif ANDERSEN, CSO of Configit was also a guest speaker of the Conference. Our partner Configit offers powerful configuration technology for leading manufacturing companies. During his speech, HENRIK explained the capabilities of the configurator solutions offered by the company.

Peter A. BILELLO, President of CIMdata talked about the company's training and support services in Product Lifecycle Management (PLM) and digital transformation.

We are organizing PLM training in collaboration with CIMdata. CIMdata's PLM training is assessment-based and is delivered through a series of educational and training sessions that have been designed to ensure that those involved in a PLM project have a strong understanding of PLM concepts and industry best practices.

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Defence Turkey: The event was supported by many companies in various ways. Defence Turkey Magazine was the media sponsor of this conference. What other companies supported the event?

Semiha YAŞAR: I would like to thank you and all the sponsor companies. The support of the sponsor companies has been valuable for us. Dassault Systemes was the Platinum Sponsor, ArGe PLM and Upchain were Silver Sponsors and FNSS was the Bronze Sponsor of the event. MSI Turkish Defence Review contributed as the Official Publication and Media Sponsor, while Techvisor, EnginSoft Turkey and Havelsan were among the organizations supporting the event.

Defence Turkey: During SemproConX19 a game demonstrating Configuration Management was managed by your guests from ASML. How were the reactions of the audience to that game?

Semiha YAŞAR: The game was managed by Martin HAKET, Configuration Management Business Architect, and Martijn DULLAART, Lead Architect for Enterprise Configuration Management, of ASML. The game was about completing configuration processes within a short time. Participants were divided into teams and

each team was divided into three groups: engineering, operations, and supplier. Each team had to create product documentation, purchase and production orders, build Assemblies and a Final Assembly of a Truck within the 25 minutes. Every minute represented a week in the schedule. The real challenge was managing the change order that teams received at the 10th minute of the game.

Participants had the opportunity to practice CM2 concepts and created fun memories through the CM game.

Defence Turkey: After the conference, CM2 and PLM training sessions have taken place. Could you please give us some details about these training sessions?

Semiha YAŞAR: After the conference two CM2 training sessions, two CM2 workshops and one PLM training took place. A 2-day CM2-13 Optimizing the Software Lifecycle with CM2 training was conducted by Guido WEISCHEDEL, General Manager and Lead Instructor from IpX-Europe. The CM2-13 course describes how the CM2 model for configuration management (CM) can be applied to software.

Guido also conducted a 1-day CM2 Fast-Track Change Process Workshop. This workshop explains the Fast-Track Change Process of the CM2 methodology. In addition to Guido's explanations, two presentations were made by Roketsan and FNSS employees to discuss their change processes.

A 2-day CM2-15 Operational Excellence Boot Camp was conducted by Ray WOZNY. This course gave an in-depth review of the IPE/CM2 model for process improvement and enabled each attendee to gain a better understanding of the strengths and weaknesses of their processes.

A 1-Day IpX-21 Item interchangeability and Re-Identification Workshop was conducted by Ray was about Naming and Numbering, Requirements Management, Variant Management, Tracking Changes and Re-Identification.

A 3-Day CIMdata PLM Certificate Program was conducted by Peter BILELLO. As I mentioned earlier, this training is designed to ensure that those involved in a PLM project have a strong understanding of PLM concepts and industry best practices.

Defence Turkey: When can we expect the next event to take place?

Semiha YAŞAR: We are planning the next event for 2021.

Defence Turkey: Thank you very much for the valuable information...

Su-57 Crashed During a Flight Test!

Did it affect the overall program?

by İbrahim SÜNNETCİ

On December 24, 2019 a Su-57 aircraft crashed some 120km from the Komsomolsk-on-Amur aircraft plant in the Far East Khabarovsk Krai region of Russia during a flight test. The pilot of the aircraft, that was participating in factory trials before delivery when the accident occurred, escaped without injuries and was rescued by a Mi-8 helicopter. It is claimed that the aircraft involved in the incident was the first serially produced Su-57. This is the first known loss of the Su-57, two of which were expected to enter the service of the Russian Air Force by the end of 2019 and two more in 2020. According to Russian media, despite the Su-57 crash the Russian Air Force is still expected to receive the first batch of serially produced Su-57 fighter jets in 2020.

Designed by Sukhoi, the Su-57 (formerly T-50 and PAK FA) is a fifth-generation single seat, twin-engine multi-role fighter aircraft intended to be the successor to the MiG-29 and Su-27 in the Russian Air Force. The Su-57, recently codenamed the "Felon" by NATO, is the first indigenous combat aircraft program that was started by the Russian Federation and will be the first aircraft in Russian military service to use stealth technology. In August 2017, Sukhoi revealed that the T-50 PAK FA fifth-generation fighter jet had received the serial index of 'Su-57'. Categorized as a '5th Generation Fighter' the Su-57 is planned to have super cruise capability, stealth/radar-absorbing materials, supermanoeuvrability, networking, data fusion and advanced avionics. The Su-57 has been experiencing technical problems which caused delays in the program schedule.

The first flight of the Su-57 took place on January 29, 2010 at Komsomolsk-on-Amur aircraft plant and according to Russian media there are a total of 13 Su-57 prototypes (10 for flight-tests plus 2 for static tests and one for ground tests). The 10th prototype (T-50-10) performed its maiden flight on December 23, 2017. Prototype aircraft are being used under the Su-57 Flight Test Program. In 2018, the first contract was signed for the delivery of an initial production lot (covering 12 aircraft) of Su-57 fighters to the Russian Ministry of Defence (MoD). A second order, for a large batch (covering 76 aircraft) of Su-57s was placed by the Russian MoD in June 2019.

The prototypes and the initial production batch will be delivered with NPO Saturn AL-41F1 (Izdeliye-117) engines, closely related to the Saturn 117S engines used on the Su-35S, as interim engines while a new clean-sheet design Product 30 turbofan engine (Izdeliye-30) is currently under development. Each of the NPO Saturn AL-41F1/ Izdeliye-117 turbofans provides 33,067lbs of thrust. According to Russian sources, though the AL-41F1 provides enough thrust for sustained supersonic cruise capability, however it does not meet the Russian Aerospace Forces requirements for thrust-to-weight ratio or fuel efficiency. On June 10, 2014, the fifth flying prototype, the aircraft

T-50-5, was severely damaged by an engine fire after landing. The pilot managed to escape unharmed. The first successful test flight with a Su-57 (T-50-2 prototype) using the new generation Izdeliye-30 turbofan engine took place on December 5, 2017 and lasted 17 minutes. But the Saturn Izdeliye-30 is not ready for serial production. It is unclear when production will shift to the Saturn Izdeliye-30 engine. The new engine features increased thrust and fuel efficiency and is reportedly fitted with 3D thrust vectoring nozzles.

In May 2019 during a visit to the United Aircraft Corporation (UAC) Komsomolk-on-Amur aircraft plant in the Russian Far East, Russian Deputy Defence Minister Alexey KRIVORUCHKO had noted that the first Su-57 would be delivered to the Russian Air Force by the end of 2019. "We will get the first fighter jet (of this model) by the end of this year," KRIVORUCHKO was quoted as saying by TASS news agency on May 29. "We are already talking about serial production. We have assessed the jet's readiness today, as well as the plant's readiness to mass manufacture the Su-57. We were fully satisfied with what we saw and hope that all plans will be fulfilled." The Russian Air Force was expected to receive two Su-57s by the end of 2019 and two more aircraft in 2020.

In May, Russian President Vladimir PUTIN, however, announced that the Russian Air Force will procure a total of 76

Su-57s by 2028. In May 2019, Russian Minister of Defence Sergei SHOIGU also reported that the unit cost of each Su-57 and associated equipment went down by 20%. Russian Minister of Industry Denis MANTUROV told reporters on June 27, 2019 at the Army 2019 Forum that the Russian Ministry of Defence will receive 76 Su-57 jets within the framework of a contract with Sukhoi Company. In July 2019 Sukhoi commenced serial production of the Su-57 aircraft. According to Russian media the cost of the contract is estimated at around US$2.7 Billion. That works out to about US$35.5 million for each 76 Su-57 aircraft. The Su-57 fighter jets will be supplied by 2028, Russian Deputy Defence Minister Alexei KRIVORUCHKO told reporters.

Russia had deployed four Sukhoi Su-57 5th Generation fighter jets in Syria at the Khmeimim Air Base during first half of 2018 (in February) for combat-testing (operational and combat trials) purposes. The first pair (T-50-9 and T-50-11) arrived on February 21, 2018 and the second pair arrived on February 23. Meanwhile the Chief of Staff of the Russian Armed Forces, First Deputy Defence Minister General Valery GERASIMOV, stated in December that the Su-57, has undergone a "second combat testing" in Syria "during which all tasks planned were successfully performed." The aircraft first participated in combat missions in Syria in early 2018.

The Russian Government has been in search for an export customer for the export version of its Su-57 stealth fighter dubbed the Su-57E. According to reports Algeria signed a contract to acquire 14 Su-57E 5th Generation fighter jets and became the first customer of this type. The Algerian Air Force has also signed two other contracts for 14 Su-34 bombers and 14 Su-35 air domination devices. Deliveries under the US$6 Billion contract would be completed by 2025. It is said that the purchase decision was made after the Algerian delegation visited the MAKS 2019 Air Show in the summer of 2019.

41st TOBB Defence Industry Assembly Held in Ankara

The last TOBB Defence Industry Assembly Meeting of 2019 was held on December 24th in Ankara. The first session of the meeting was conducted with the participation of Vice President of the SSB - Celal Sami TÜFEKÇİ, President of the TOBB Defence Industry Assembly - Yılmaz KÜÇÜKSEYHAN, President of TOBB – Mehmet BÜYÜKSİMİTCİ and sector assembly members. The second session was a Q&A session and President of Defence Industries Prof. İsmail DEMİR answered questions regarding sector information and issues.

The meeting was launched with the opening remarks of TOBB Defence Industry Assembly President KÜÇÜKSEYHAN. In his speech, the Assembly President gave an overall evaluation of the sector.

Member of the TOBB Executive Board - Mehmet BÜYÜKSİMİTCİ underlined that the defence industry is the most critical and prominent sector of the country adding that the rate of domestic participation in the defence industry has reached 70%. BÜYÜKSİMİTCİ also expressed his satisfaction in gathering with Assembly members at the event.

Addressing members of the sector assembly in the meeting, Vice President of Defence Industries Dr. Celal Sami TÜFEKÇİ stated that the export figures of the defence industry increased to US$ 2.7 billion by the end of 2019 and made the following comments in his remark: "By the end of 2019, the defence industry's export figures reached US$ 2.7 billion. This is an achievement, and this is your success. But we will not be satisfied with this. We conducted a workshop on how to increase our exports further, under the guidance of our Department of International Relations, in Antalya. During this workshop we presented a three-stage plan to increase the exports. We gathered with many shareholders of the sector at the event, we listened to their ideas and discussed them. A strategic road map will be built with the output of this workshop. All the members of the industry need to act collectively in order to achieve the target of US$ 10.2 billion that we've identified for 2023."

Stating that they also organized a workshop abroad with former employees of the Turkish Defence Industry Companies working in Europe, TÜFEKÇİ said, "There was a considerable amount of participation in this workshop from all around Europe. I can give the good news that as a result of this workshop, 25 employees will be returning our country."

Underlining that infrastructural investments are required for production and they will establish a new structure for the formation of such cycle, TÜFEKCİ added that they will build a Teknopark close to the campus of TUSAS, similar to the Technology Development Zone at the Aerospace Industrial Zone, and Istanbul Teknopark structures and added: "A structure to which we refer as the Production Technologies Center of Excellence (ÜRTEMM) will remain at this Technopark. There will be an investment towards prototype production at the center. We will be building a prototype production center towards advanced technologies with the contribution of our industrialists. To this end, we will soon hold a meeting with our main industry companies and the companies we will invite from the clusters. At the meeting we will describe the model to them in order to build a mechanism for accelerating our activities by addressing the feedback we receive".

Following the opening speeches, the agenda items regarding problems faced by the sector and their solutions were reviewed by the President of TOBB Defence Industry Assembly Yılmaz KÜÇÜKSEYHAN. During the review which was held as a Q&A session at the assembly meeting, the topics on Insufficiency of the Incentives for Fairs, Lost Markets, Export Credit Mechanism, Commercial Credit Interests, Brain Drain, Cancellation/ Postponement of Defence Projects, Prevention of Unfair Competition against local manufacturers in Public Procurement Law, the increasing amount of the transferred VAT receivables due to (F) Clause of Article 13 of Law No. 3056, the lack of regulations for encouraging the competitiveness of Turkey in the Aviation/ Aerospace Structural

Sector were evaluated.

Taking the chair in closing, President of Defence Industries Prof. İsmail DEMİR presented assessments on agenda items regarding sector problems.

Prof. DEMİR: "We projected our target for total defence industry turnover as US$ 26-27 billion."

President of Defence Industries Prof. DEMİR stated that the total turnover of the Defence Industry reached US$ 8.7 billion as of today (Dec 24) Defence Industry exports will reach US$ 3 billion by the end of the year and that R&D expenses increased to the level of US$ 1.5 billion. Mentioning that the size of approximately 700 projects under the auspices of Presidency of Defence Industries increased to US$ 60 billion, DEMİR said that the total turnover target within the scope of 2023 targets is projected as US$ 26-27 billion while the export target is over US$ 10 billion. "In order to achieve such targets, we aim to increase employment numbers to the level of 80 thousand. We also aim to increase our rate of domestic participation to 75% - 80%. We believe that while proceeding towards these targets, we need to decrease foreign dependency to the minimum, develop platforms, systems, sub-systems by performing our work in detail, identify the data infrastructure, capability inventory and our academic inventory in a way to cover our existing capacities and develop a strategy to become the best in the world particularly in certain areas through bringing our strengths to the forefront."

Commenting on the negative experiences faced during credit payments, regarding the improvement of the unfavorable credit conditions of Public Banks and many other banks for the better coverage of our companies' financial requirements, Prof. DEMİR stated that their doors are wide open to all companies taking part in the projects conducted by the Presidency of Defence Industries and that they will be providing all the support they can to all those applying to the Presidency.

Underlining that complaints on the competition of main contractors and sub-contractors continued, Prof. DEMİR noted that they constantly emphasized that all our main contractor companies, our foundation companies in particular, need to take part in projects of greater sizes and added: "The measures that have to be taken to this end need to be discussed in an open forum. Existing capabilities have to be analyzed, who owns which capability? At which maturity level are they? These need to be analyzed well. Perhaps, certain spin-offs should be made from the extending structures of major companies and they should be formed in companies with depth."

Expressing that certain obstacles in exports were true, and that they were ready to support all companies exporting, especially in the formation of being a credit mechanism, Prof. DEMİR continued: "Our companies should absolutely apply to our institution if they have special conditions. The MILGEM Project sold to Pakistan is the best example of this. We provided the credit through a decree of the ministerial cabinet. We are willing to provide all types of support when an export opportunity arises. We are receiving crucial support from our government to this end as well. There is also this issue whether Eximbank loans are used in weapon and defence industry products or not. I would like to underline a few points here. Our companies can apply to Eximbank for loans regarding electronic products, optical products and products that may not be directly linked to the defence industry."

Stating that there was an increase in brain drain in 2017-2018 and expressing that he has a different perspective on this issue, Prof. DEMİR shared that according to the analysis conducted on the departure of skilled resources in an environment with so many projects, they concluded that the financial aspect was not on the top of the list. Prof. DEMİR: "Financial opportunities are not on the top of the list. Therefore, we need to improve the work and working conditions. We cannot prevent the staff wishing to work abroad, by no means. On the other hand, we need to work in cooperation in order to bring the Turkish citizens either working or conducting research in foreign countries back to Turkey. We have been exerting certain efforts to this end. The human resources offices at the Presidency of the Republic of Turkey have conducted certain activities on

this issue as well. A few meetings were held, too. Our ambassadors in certain countries also have activities in this area and they are willing to support us on this issue. The second problem at this point is that perhaps we need to tell the staff leaving our country the following words: 'You go ahead and stay there for 3 years, and please know that your salary and job will be waiting for you when you return.' Furthermore, we need to guide them in this respect. There is an opportunity here; companies are opening their doors to our staff. They are opening their doors in terms of technology as well. For the time being, bringing back 10%-20% of the staff who left for foreign countries is possible. We must meet with them, point out a target for them for their future and ask them to stay there for a while but to return to their country afterwards. We have to act rationally on this point. Our major companies in particular, have to work on ways to benefit from the staff that are leaving instead of losing them completely."

Following the review of agenda items, the 41st TOBB Defence Industry Assembly Meeting was concluded with the Q&A session.

The 4th Battery Technologies & Energy Systems Workshop Held in Kayseri

by İbrahim SÜNNETCİ

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4th of the Battery Technologies & Energy Systems Workshop organized by Aspilsan Enerji A.Ş. in cooperation with Erciyes University (ERU) Engineering Faculty's Energy Transition Research and Implementation Center was held on December 19-20, 2019 in Kayseri with the participation of the representatives of the sector in our country, scientists and the significant stakeholders in the eco-system. Held annually by Aspilsan Enerji, first of these traditional workshops was held on December 23, 2016, the second took place on December 21-22, 2017 and the third was held on December 21, 2018.

Enhancing its product range with its recent accomplishments, in addition to its achievements in civilian and military aviation, Aspilsan Enerji has become an enterprise that contributes greatly to Defence Industry with nearly 150 products composed of electronic and optronic systems, battery cells of hand-held/man-pack radios and combat equipment, accumulators, batteries, battery blocks, chargers, and string manipulation designs of the printed circuit board components. As a critical actor in the energy storage industry, Aspilsan Enerji is the only company in our country and one of the few companies in the world that are capable of producing all types of mobile system batteries and energy storage systems as well as helicopter and aircraft accumulators. Categorized as one of the ten research universities of our country by the Council of Higher Education, Erciyes University has been revealing remarkable researches on energy issues.

A total of six different panels in two sessions, one in the morning and one in the afternoon, were held during the event where the recent developments on battery technologies in Turkey and the world were examined, and the latest status of the ongoing activities in various energy storage systems, fuel cells, thermopiles and lithium batteries were discussed. Throughout the Workshop that gathered prominent representatives of major companies in various sectors such as defence, aerospace, rail systems, automotive and telecommunication as well as academicians from leading universities, the following panels were held with the speeches of experts: Technological Developments in Cell Batteries and Storage Batteries, Utilization Areas of Battery Technologies in Defence Platforms, Battery Technologies in Telecommunication, Electronic/Software Systems in Energy Storage, Battery Technologies in Alternative Transport Sector and Battery Technologies in Transport Sector. A report on "Energy Storage: Battery Market and Access


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to the Market" will be prepared after the evaluation of discussions and recommendations made during the panels. Initially, the academicians who participated in the event will share their studies on "The Developments in Battery Technologies," and then "The Technology Road Map" will be prepared with the participants.

Osman COŞKUN - Board Member of the Presidential Science, Technology and Innovation Policies Council (BTYK), Sadık PİYADE – Acting General Manager of the Turkish Armed Forces Foundation (TAFF), Erhan SİPAHİOĞLU – Head of TAFFs Financial Operations and Investments Group, Bedri DURSUN – Aspilsan Enerji's Vice Chairman of Board, Ferhat ÖZSOY – General Manager of Aspilsan Enerji, Prof. Dr. Recai KILIÇ – Erciyes University Vice-Rector and Chairman of Erciyes Technopark's Executive Board and many academicians, sector representatives and students attended the workshop held at the Sabancı Cultural Center at Erciyes University. The opening remarks of the Workshop were delivered by Bedri DURSUN – Aspilsan Enerji's Vice Chairman of Board, Prof. Dr. Recai KILIÇ – Erciyes University Vice-Rector and Sadık PİYADE – Acting General Manager of TAFF.

Delivering the initial speech of the Workshop, **Bedri DURSUN - Aspilsan Enerji's Vice Chairman of Board** pointed to the increasing number of participation in the event and underlined the necessity of the production of advanced technology products in our country for creating high added value in the economy in our times where technology is transparent and accessible for anyone. Mentioning the positive developments towards the production of technological products in Turkey, DURSUN said, "Hopefully, we will be filling the gaps in the sector in a short time, and we will keep up with the times." Reminding the audience of the increasing requirement for different mobile energy supplies in addition to battery cells and battery technologies in the Defence Industry, DURSUN continued, "For instance super-capacitors, Li-ion capacitors, thermopiles and so forth. Therefore, as the sector, we need to continue and increase our efforts to minimize the foreign dependency by closely following the novelties in the global production technologies regarding battery cells and battery production and their types in various platforms, through the launch of local production and their acquisition to our country's industry." Telling that they made their mark on critical and notable projects at the Kayseri R&D Center launched in January 2017, DURSUN added that they have been manufacturing indigenous batteries for Defence Industry and that within this scope, they are carrying out their activities intensively with highly competent engineers presently. In his speech, DURSUN stressed that they launched an activity for the establishment of a new battery factory in Kayseri in 2019 and added, "We will have accomplished the production of the first indigenous and national li-ion battery on account of this factory which we will start to be built in 2020." Stating that they will be proceeding towards their goals as one of the three enterprises in Turkey having the European Aviation Safety Agency's Certificate, DURSUN

Sadık PİYADE- General Manager of TAFF

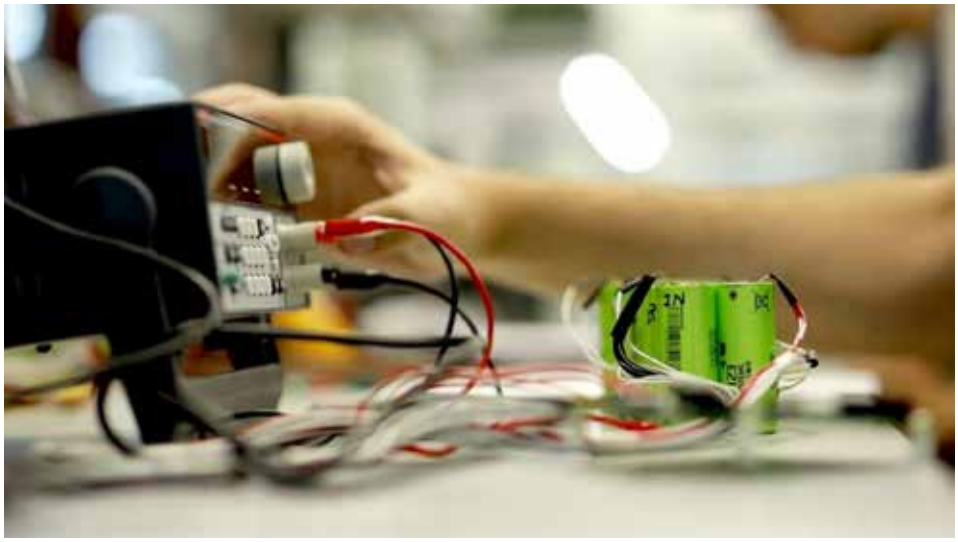
concluded, “In parallel with this development, we will shortly be manufacturing the 100% indigenous aircraft/ helicopter accumulator, including the electrode, and availing it to the civil aviation sector as well.”

ERU Vice-Rector Prof. Dr. Recai KILIÇ gave information about their university in his speech. Vice President KILIÇ said, “With its 19 Faculties, 1 Institute, 1 Academy, 2 Vocational Academies and 39 Research and Implementation Centers, our university achieved a potential by being categorized among the medium and large-scale universities. We left 40 years behind and we are about to complete our 41st year. Our total number of students in the levels of Associate’s Degree, Undergraduate Degrees and Ph.D. is 52.000. There are 2.241 academicians in our university and 43 of them are from foreign countries. The number of our existing registered international students is over 2.000. So far, the number of our graduates is 157.000.”

Acting General Manager of TAFF Sadık PİYADE underlined in his speech that their Foundation, with its 57 companies including the affiliates, was owned by the nation and said, “We are a 32-year old enterprise with a unique mission in Defence Industry. We are collaborating with 18 R&D companies in 14 Technocities. We are working with nearly 6.000 sub-contractors and proud to be a big family with almost 100.000 donators and approximately 20.000 employees. We aim to increase the war power of the Turkish Armed Forces (TAF). This year, the amount we allocate to the TAF Projects reached TL 550 Million. We achieved this hand in hand with our nation. Our donators are our greatest source of income and they are followed by the profit shares we receive from our companies. We transfer these amounts to a pool and then allocate 80% of the amount accumulated at the pool to the projects.”

Stressing the accomplishments of Aspilsan in his speech, PİYADE expressed that the foundation of an ultramodern company that will manufacture lithium batteries will be laid in March 2020 in Kayseri. Telling that Aspilsan will be continuing its production at the new factory to be built in Mimarsinan Organized Industrial Zone, PİYADE continued, “A very favorable location within Mimarsinan Organized Industrial Zone has been allocated to Aspilsan with the support of our Chamber of Industry, Chamber of Commerce and our University. This factory will be built over an indoor area of approximately 25.000 square meters, and we will produce Lithium and battery cells for civil aviation and rail systems. Hopefully, we will hold a groundbreaking ceremony with the participation of our Board of Trustees in March, and we will start production in the spring of 2021. Currently, our Chairman is in Japan and continues his efforts to start this business as soon as possible. On account of this factory, we will be increasing the employment and manufacturing products that will stand out in the energy sector.” Acting General Manager of TAFF TSKGV PİYADE mentioned in one of his previous speeches during

his visit to Aspilsan Enerji in November 2019 that production activities were going to be launched at the new factory within two years and added, "Our costs may reach TL 100 Million and even further. We will be employing nearly 100 employees. This figure will reach 250-300 with our staff employed here." With this factory which will be Turkey's first Li-Ion Cylindrical Battery Production Plant, Aspilsan Enerji will be fulfilling the battery demands in critical areas while contributing to the indigenization campaign. With this investment, another product in which Turkey has foreign dependency will be manufactured locally. According to open sources, an import bill amounting to US$ 65 Million was issued for batteries merely in 2016. This facility is aimed to conduct technology-intensive production will have a production capacity of nearly 2 million batteries per year in the beginning. Previously, the launch of the construction of the factory was planned to take place until mid-2019, and according to that schedule, the plant would be installed as of November 2020 and mass production would be launched in March 2021.



Following the opening remarks, the Workshop continued with the 1st Panel titled "Technological Developments in Cell Batteries and Storage Batteries" that was moderated by Ahmet ALTINAY - Aspilsan Enerji Ankara R&D Manager. Faculty Member of Yalova University's Department of Polymer Engineering Ozan TOPRAKÇI, Faculty Member at the Department of Chemistry at Akdeniz University Edip BAYRAM, Faculty Member at Medipol University Billur Deniz KARAHAN, Energy Analyst at Shura Energy Transition Center Hasan AKSOY and AVL Turkey's Battery Systems Team Leader Burak ALİEFENDİOĞLU attended the panel as speakers.

The second Panel titled "Utilization Areas of Battery Technologies in Defence Platforms" was held at the afternoon session of the first day of the Workshop. Moderated by Murat ALTUĞ - the R&D Program Manager of Aspilsan Enerji, the Vice General Director of Advanced Technologies and Systems Kemal Atılgan TOKER, Aselsan HBT Electronic Design Manager Yalçın AYDIN, FNSS Electric – Electronic Design and Integration Manager Mustafa KANTAR, THY Technic R&D Manager Sedat KARAKAŞ and TUSAŞ UAV Avionics Manager Lütfü AKÇİL attended the panel as speakers.

You can find our exclusive article about the topics and information shared by the panelists in these two panels in our next issue!

26m Patrol Interceptor Vessel by ARES &BMT Delivered to the Royal Oman Police Coast Guard

BMT, based in Southampton, custom-designed a New 26m Patrol Interceptor Vessel (PIV) for Oman. The 85 Hercules PIV was received by the Royal Oman Police Coastguard after its journey from Ares Shipyard, Turkey.

On 3th December, BMT announced the launch of the first 'ARES 85 Hercules' Patrol Interceptor Vessel (PIV) for ARES Shipyard in Antalya. The new interceptor capable of speeds in excess of 50 knots adds to BMT's proven track record in the Fast Interceptor and Patrol Boat market. The vessel built by ARES Shipyard for the Royal Oman Police Coast Guard (ROPCG), is a continuation of the partnership between BMT and ARES which is responsible for a range of fast patrol boats between 18m-48m.

The ROPCG contract program for 14 Patrol Boats to be acquired within 4-years is well underway with the first vessel now delivered, and multiple other vessels in various stages of fit out. The vessels, which are fully customized to meet the ROPCG's needs, will provide the agency with a much-expanded capability to patrol and secure the nation's waters.

John BONAFOUX, Director of Business Development at BMT said: "Another first has again been accomplished by BMT and ARES. The interceptor, has now been delivered to the Coast Guard division of the Royal Oman Police, is the first unit of a new vessel series of high-performance vessels."

"Supporting operations conducted by coast guards, police forces and navies, the boat can be deployed in marine patrol and surveillance in territorial seas, anti-smuggling interceptor duties, marine law enforcement operations, special forces operations, and rapid response actions. It can also be used to support offshore and fast patrol vessels during operations at sea." added BONAFOUX.

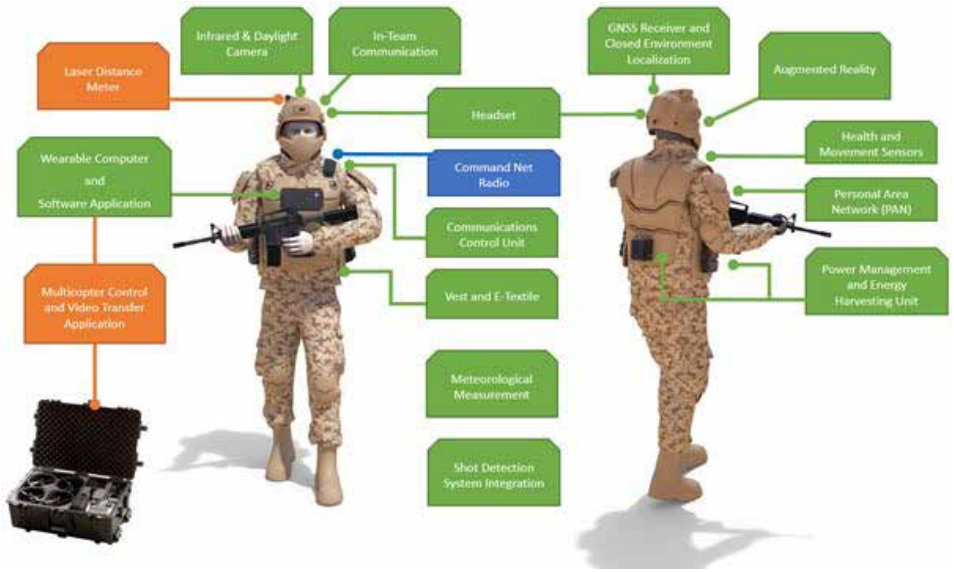
This latest contract for a governmental customer signifies BMT's expansive reach into a growing market area for larger, faster interceptors – an urgent technology requirement that's needed to combat threats at sea.

During initial sea trials the vessel was praised for its exceptional performance reaching a speed of 52 knots, highlighting the high efficiency of the vessel whilst maintaining superior seakeeping performance and maneuverability. With its upright wheelhouse providing excellent visibility alongside low noise attenuation throughout, the vessel will undoubtably prove to be an excellent asset to the ROPCG in active duty.

BMT has a proven history in designing naval vessels. Its breadth of naval expertise and comprehensive range of high-performance patrol vessels, from 9 meters to 220 meters, has offered their commercial and government customers with unrivalled seakeeping, speed and reliability. The international design consultancy has a wealth of commercial experience in naval architecture, including hull form development, class level design and detailed production and outfit engineering on a wide range of vessel sizes. Its skilled team of naval architects and engineers have worked closely with ARES to develop 'award winning' designs for Offshore and Littoral Waters Law-Enforcement, Open Sea Rescue Operations, Naval and Coast Guard Duties, Offshore Patrolling and Escort, Search and Rescue, Anti-smuggling Operations, Anti-Terrorist Protection of Offshore and Coastal Installations and Critical Infrastructure.

Cenker Tested at Eğirdir Mountain Commando School

The CENKER Team and Single-Soldier Command Control System developed by the Aselsan Defence System Technologies Department within the scope of the Network Assisted Capability Project, was tested at the Eğirdir Mountain Commando School and Training Center Command. With the participation of military personnel, a command center was established, and an exercise was conducted in accordance with the predetermined scenario in open land and in a residential area. Prior to the exercise, command cycles were established with tactical radios developed by the Aselsan Communication and Information Technologies Department. The command-control, location, position, health, ammunition information production and sharing services as well as voice command, target detection and intelligence gathering features of the CENKER system were tested in the tactical field. The interoperability of CENKER, which has an open and upgradeable architecture, with the GEZGIN Electro-Optical Target Detection and Tracking System and SERCE Unmanned Aerial Vehicle System developed by Aselsan Microelectronics, the Guidance and Electro-Optics Department was examined by the Land Forces Command during such field tests. The targets detected with GEZGIN were processed on the tactical map, and the sharing of the detected target coordinate information with fire support elements was notable.



Aselsan's Future Soldier- CENKER

Aselsan utilizes the CENKER Team and Single-Soldier Command Control System, which was designed considering the needs of the Turkish Armed Forces to allow Turkish infantry to be able utilize the benefits of products with the latest technology. Since its revealed at IDEF' 15, the CENKER system – which was also one of the main focuses of the event - attracted a significant amount of attention by proving itself to be the first defence system solution in Turkey in which wearable electronics technologies are used.

The CENKER system, which is indigenously designed and developed by Aselsan, constitutes interconnected system elements such as a military grade wearable computer, personal and team communication networks, smart power management system, health and situational awareness sensors, day-night vision systems, augmented reality applications and a high-tech vest. Having the flexibility to satisfy the needs of different operational needs, the CENKER system with its single-soldier, commander and reconnaissance-surveillance configurations is capable of operating under the rapidly changing conditions of the battlefield.

Aselsan has already upgraded the CENKER system by utilizing both the modern technology experience in Wearable Technologies, Sensor Systems, Power Management Systems, Communication & Command Control Systems and the considerations about the battlefield conditions for Turkish Armed Forces and Security Forces. Along with its advanced capabilities which satisfy the requirements of urban warfare, which is the common battlefield of our times, the CENKER system will provide the Turkish soldier with the required military technology.

With the support of the Presidency of Defence Industries (SSB) and Minister of National Defence (MoND) the "International Future Soldier Conference" will take place March 23-24, 2020 with the coordination of SaSaD, Defence Turkey Magazine, ODTÜ Teknokent and the Teknokent Defence Industry Cluster (TSSK) in Ankara. CENKER Team and Single-Soldier Command Control System are expecting to be demonstrated at a static display area. Aselsan will also make an presentations its future soldier programs and capabilities throughout the conference.

U.S. Will-Burt's Crucial Investment in Turkey!

by Cem Akalın

Accepted today as one of the world's largest suppliers of mobile telescopic masts and lighting systems and coming to the fore with US$ 65 million worth of drone purchases from Turkey recently, the U.S based company Will-Burt entered into a partnership with the Turkish company Molekulas, providing advanced engineering services primarily to the defence industry, developing and producing critical subsystems, and in consequence Masttech joint venture company was founded. 55% of Masttech's shares belong to Molekulas, 40% to Will-Burt Turkey and 5% to Orbis. Masttech will develop and manufacture mobile and fixed telescopic masts (MAST Systems), lighting and dimming systems and elevation platforms (semi-trailer, positioners, etc.) in Turkey.

The factory, which was recently launched at Ankara Sincan Organized Industrial Zone, is planned to be the production, maintenance, repair and logistics center of Will-Burt's sales outside the U.S. Now, the design and testing processes of prototype products are being carried out at the factory, which was launched with an investment of US$ 2 million at the first stage. According to the information we have obtained, the first export production will start at the factory in January 2020. In addition to the production of Will-Burt products apart from the United States, Masttech also has design, manufacturing and integration capabilities. The company currently has 8 different products of its own design. On one hand Masttech will be able to realize the cost-effective production of their products in the Will-Burt portfolio in Turkey, and on the other hand design, develop, manufacture and integrate its own indigenous products according to customer requirements. The company will also provide maintenance, repair and logistics support to its customers for the products.

Underlining that the engineering and manufacturing infrastructure in Turkey is exceptionally suitable and cost-effective for their technology, executive officials of the company said the design of their new-generation systems will also be made in Turkey. All products will be produced in the newly established factory at Ankara Sincan Organized Industrial Zone and 95% domestic participation is aimed in the production process by utilizing the domestic subindustry. This partnership is also expected to provide significant opportunities to Turkey in areas of technology transfer, export revenue and the owning of such products at low-cost.

The company has other investment plans for the establishment of logistics, maintenance and repair facilities in Europe and the Middle East in the upcoming period.

About Will-Burt

Headquartered in Orrville, Ohio, USA, Will-Burt, a world leader in mobile elevators (telescopic masts), towers, pan-tilts (allowing movement in both directions) and positioners, announced the establishment of Will-Burt Turkey in April 2019 in Ankara, Turkey.

As a 100% employee-owned company founded in 1918, it offers any kinds of payload elevation and integration solution from the top brands; Will-Burt, GEROH, Integrated Tower Solutions (ITS) and MAD – for defence, government, first responders, cellular, broadcast, energy production and other markets. Will-Burt also offers contract manufacturing, metal fabrication, powder-coating, and rapid prototyping services.

© Masttech

ZMA-15 Vehicles in the Inventory to be Retrofitted by ZMA Modernization Project

Within the scope of the ZMA Platform Modernization Subcontractor Agreement signed between FNSS and Aselsan on December 31, 2019, ZMA Platforms will be modernized and all renovation and improvement activities to be performed for the platform, as well as prototype manufacturing, qualification activities, integration of all mission equipment including turret and serial production and logistics support activities for the platform will be carried out by FNSS. As part of the project, the 25mm NEFER Weapon System, Laser Warning System, Close Range Surveillance System, Driver's Vision System, and the Direction Finding and Navigation System will be provided by the Main Contractor Aselsan.

ZMAs, which have been included the inventory of the Turkish Armed Forces as well as the Armed Forces of the United Arab Emirates, Malaysia, Saudi Arabia, Bahrain and the Philippines since the beginning of 1990s to 2000, will be modernized in accordance with the changing threats and developing technologies. The solution package aiming at enhancing the survivability of the vehicles and equipping them with modern technological subsystems has been prepared with the feedback received from users. With this solution package, while maximizing survivability capabilities, the service life of the vehicles will be extended, and critical subsystems will be renewed within the possibilities to increase prospective growth potential and domestic subsystems will be integrated.

FNSS, which has been implementing the most modern and high performance modernization solutions applied for M113 and ZMA class vehicles worldwide, will be delivering the ZMA Platforms to the Turkish Armed Forces by combining its experience and new generation vehicle development technology competencies, and by integrating Aselsan's modern and high technology firepower and mission equipment.

Turkish Aerospace and TÜBİTAK BİLGEM to Establish Radar Cross Section for National Combat Aircraft

Turkish Aerospace and TÜBİTAK BİLGEM signed a contract for a near field test facility within the scope of National Combat Aircraft (MMU/FX) Contract. With the contract signed, the radar cross section for the National Combat Aircraft will be established at Turkish Aerospace facilities and the tests of the aircraft will be conducted there.

December 26, 2019. The contract was signed by the President and CEO of Turkish Aerospace Prof. Temel KOTİL and TÜBİTAK BİLGEM President Hacı Ali MANTAR. With the contract signed, Turkish Aerospace will be establishing an infrastructure capable of testing the aircraft of 20-25 meters in size. Radar trail measurements at the facility, which is expected to be established in 2021, can be used in MMU design and development activities. Thus, Turkish Aerospace has signed a significant investment contract with a local partnership for the activities of the MMU project.

Speaking about the contract, Prof. Temel KOTİL said, "This infrastructure investment we will make with TÜBİTAK BİLGEM will be a first in Turkey for Turkey's most important project, MMU. We hope that the radar cross section facility for the 5th generation aircraft MMU, which is only available in 4 countries in the world, will be beneficial. We believe that the importance we attach to the development activities of the most important project of our country will be more effective with the domestic cooperation we have made."

President of TÜBİTAK BİLGEM Prof. Hacı Ali MANTAR said, "Our high-level cooperation efforts that started with the National Combat Aircraft continue forward with the Radar Cross Section facility, the contract of which was signed today."


© SSB

Workshop on the Electro-Optical Sector's Roadmap

The Presidency of Defence Industries (SSB) organized a Workshop on the Electro-Optical Sector's Roadmap. Dr.Celal Sami TÜFEKÇİ, Vice President of Defence Industries and representatives from the SSB, universities, research centers and private sector participated in the workshop held in Ankara on December 18, 2019

Electro-Optical and Infrared (EO/IR) Systems provide capabilities to air, land and naval platforms in defence and military areas on intelligence, reconnaissance and surveillance, target detection, precise coordinate detection, and guidance of guided bombs. These capabilities are crucial for the armed forces before and during the operation and increase the operational strength of the troops as a critical force multiplier. Therefore, the need for electro-optical systems has been increasing exponentially, which makes the development of the market inevitable both in our country and in the world.

Through this Workshop on the Electro-Optical Sector's Roadmap, the objective was to review the current status and capabilities of our country in the field of electro-optical, to determine the steps to be taken to properly consolidate the technological capabilities of the sector, to examine the relationship between our technology pool and the products and technologies required by the Turkish Armed Forces (TAF) and the security forces, to determine the roadmap of the electro-optical sector by setting actions that will increase our share in the rapidly growing electro-optical market and by analyzing the state of technology in the world.

Muzzle Energy Record from TUFAN Electromagnetic Railgun System

December 11, 2019, at the opening ceremony of the Electromagnetic Launch System Development Laboratory established at Aselsan facilities, the muzzle energy record was broken during firings with the Electromagnetic Railgun System (TUFAN).

The efforts carried out by Aselsan on Electromagnetic Launch (EML) are progressing noticeably. The Aselsan Electromagnetic Launch System Development Laboratory, equipped with advanced development and test infrastructures, was opened with the participation of Prof. İsmail DEMİR, President of Defence Industries. During the tests performed at the opening ceremony, a record was broken by achieving the highest muzzle energy and efficiency level in this field in our country with muzzle energy above 1 MJ.

The laboratory has Flash X-Ray, Ballistic Projectile Recovery Tank for high-energy tests, a high-speed camera system, measuring sensors for advanced testing, modular, expandable pulsed power supply means and barrel systems suitable for advanced testing. Thanks to the facilities provided by the laboratory, most of the advanced development tests in the field of EML can be conducted without the need for an open field and the related sub-technology maturity levels will be increased with the equipment used.

Electromagnetic Launch (EML) is a cutting-edge technology in the world especially in the field of weapon systems. The weapons called "Railgun" developed using this technology will be effective over long distances and are seen as an important force multiplier in the defence field.

The ammunition fired from the barrel at high speed means that it can be fired at longer ranges than conventional weapons. The "Railgun" systems with the smart ammunition to be developed in our country can be used both as long-range land artillery and very influential air defence weapons.

The activities in our country regarding electromagnetic launch systems, which very few countries in the world work on, are being conducted by Aselsan, TÜBİTAK-Sage and Yeteknoloji under the coordination of the Presidency of Defence Industries.


© TÜBİTAK-Sage

RF Technologies Road Map Workshop Organized by SSB in Ankara

The RF Technologies Road Map Workshop was organized by the Presidency of Defence Industries (SSB) and focused on topics such as integrated circuits, quantum, signal processing, antenna, passive, solid state, material and vacuum. 137 technology topics were discussed in the workshop organized with the participation of the representatives from the TAF, universities, research centers, and the public and private sector.

December 26, 2019. The RF Technologies Road Map Workshop was organized by the Presidency of Defence Industries and Vice President of Defence Industries Dr.Celal Sami TÜFEKÇİ as well as representatives from the Turkish Armed Forces, universities, research centers, and the public and private sector participated in the workshop held at the SSB.

The Presidency of Defence Industries has been planning, monitoring and supporting technology acquisition activities with a holistic approach within the framework of the 2019-2023 Strategic Plan. Investing in the technologies of the future to provide our security forces with superior capabilities is also amongst the strategic targets of the SSB. To this end, technology based R&D Road Maps are prepared by establishing Focus Technology Networks (OTAĞ). With these road maps, the aim is to minimize foreign dependency for the technologies required by our security forces and maximize the competitiveness of our country in the sector. Road maps are prepared by the representatives from the Turkish Armed Forces, security forces, industry, universities and research institutions.

137 Technology Topics Discussed at RF OTAĞ

The RF Technology Road Map Workshop was also held in this context and OTAĞ activities and prominent technology issues were presented to all stakeholders. RF OTAĞ consists of 8 working groups focusing on integrated circuits, quantum, signal processing, antenna, passive, solid state, material and vacuum. 137 technology topics and 190 sub-topics were proposed by these focus groups and evaluated in the workshop. The OTAĞ Final Report is planned to be finalized in 2020 Q1 and the RF Technologies Roadmap will be updated accordingly.

Importance of RF (Radiofrequency) Technologies

RF (Radio-Frequency) technologies form the basis of radar, electronic warfare, military communications and aerospace applications in the field of defence and security. RF technologies are considered an area of fierce competition where countries continually strive to gain advantage over each other and have a direct impact on national income with their commercial applications and on national security with their military applications. For this reason, being self-sufficient in RF technologies, acquiring technologies indigenously and on a national basis, and having the competence to compete globally are of crucial importance for our independence and future.

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ATEŞ- Supply of Mobile Surveillance Units Build-up the Security of EU-Turkey Borders

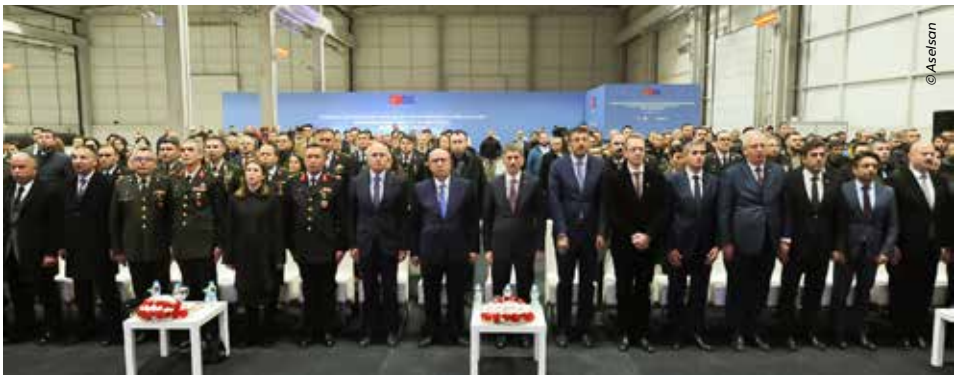
27 More HIZIR Vehicles in the Land Forces Command's Inventory

by Cem AKALIN

Within the scope of the Project for "Supply of Mobile Surveillance Units for Increasing Border Surveillance Capacity of Borders between Turkey and EU", the beneficiary of which is the Ministry of Interior General Directorate of Provincial Administration and 75% of which is funded by the European Union and 25% by a National Contribution, where a total of 57 HIZIR 4X4 armored vehicles are to be delivered within the ATEŞ Project, 27 more vehicles have been delivered to the end user for utilization at borders. 20 Armored Surveillance Vehicles, the production of which were completed in Project Phase-1 had were delivered to the Land Forces Command (end user) by the Ministry of Interior General Directorate of Provincial Administration at the handover ceremony held in May,2019.

Deputy Minister of National Defence Yunus Emre KARAOSMANOĞLU, Deputy Minister of Interior Muhterem İNCE, Vice President of Defence Industries Dr.Celal Sami TÜFEKÇİ,

Head of Cooperation of the EU Delegation to Turkey Andre LYS, Chairman of the Board of Katmerciler İsmail KATMERCİ and many guests attended the ceremony held at Katmerciler's factory in Sincan/Ankara on the 18th of December.



Vice President of Defence Industries Dr. Celal Sami TÜFEKÇİ made a speech at the ceremony and said, "the ACAR Ground Surveillance Radar, SHARPEYE Electro-Optic OD Sensor, SEDA Gunshot Detection System and 9661 V/UHF Ground Radio System, which are produced by Aselsan and currently used by the Turkish Armed Forces as well as by military units of many countries, are integrated onto the HIZIR 4X4 Tactical Wheeled Armored Vehicle produced by Katmerciler. All sensors are controlled by security management software enabling their interoperability and an integrated security system solution is achieved. The ATEŞ security systems meet our Land Forces' requirements for day and night mobile surveillance in harsh environmental conditions. I would like to thank once more the Ministry of Interior, Ministry of Finance and Treasury, our Land Forces Command, and officials of the European Union Delegation to Turkey for the realization of this Project. I would like to express my gratitude once more on behalf of the Aselsan family."

Deputy Minister of Interior Muhterem İNCE said that there are hightened security concerns encountered in the current century and he also mentioned the crisis in Syria which started in 2011. "The century in which we live is much different than other centuries. It is the century where security concerns and needs are at the highest level. We live together in a period in which terrorism, irregular migration, smuggling, cross-border crimes are committed at the highest level and the security needs are highly required. As we all know, we have encountered the Syrian crisis that started in 2011. With the threats coming from our eastern borders, our country and the geography had to assume the responsibility of ensuring the security of Europe as well as the whole world. As a country, we are hosting more than 4 million refugees. In this sense, we have gained the appreciation of the whole world, especially Europe."

Deputy Minister of Interior İNCE: "With the Electro-Optic Tower Project, we will have an opportunity to monitor 350km from our Western border and 740km from the Eastern border."

Mentioning that Turkey has been constructing security walls at its southern and eastern borders, İNCE said, "We are constructing security walls especially at our southern and eastern borders within the scope of integrated border management. Within the framework of this integrated border management approach, we exert utmost efforts to ensure our border security. Of course, we try to maximize the security of our borders by using this high technology in our western borders as well as our eastern and southern borders. In this sense, I would like to share information with you about a new project we have initiated recently; the Electro-Optic Tower Project. The tender of the project has just been finalized. We will have an opportunity to monitor 350 km from our western border and 740 km from our Eastern border. By building these towers at 211 points, our borders will become more secure. This project will cost nearly €108 million. We had previously delivered 82 armored surveillance vehicles to our Land Forces Command and we had also delivered 3,649 passport stamp/seal devices to the related departments. In parallel, the training activities are ongoing. Almost 2,500 staff in charge of this project were trained. The

thermal camera project for utilization at our southern border is now underway."

Noting that 20 mobile surveillance vehicles had been delivered previously, İNCE said that 27 vehicles were delivered in the second phase and added that they would like to finalize the delivery of the remaining 10 vehicles as soon as possible. "We have already delivered 20 of the mobile surveillance vehicles to the Turkish Land Forces Command. We are delivering more 27 vehicles today. Delivery of the rest of the 10 vehicles will be completed as soon as possible. In this way, the greatest contribution will be made to the efforts that provide for the security of our country as well as for Europe and our region."

Deputy Minister of National Defence KARAOSMANOĞLU: "Armored Vehicles will be utilized by the troops in Edirne and Kırklareli"

During his speech, Deputy Minister of National Defence Yunus Emre KARAOSMANOĞLU announced the regions where the 27 vehicles are to be utilized. KARAOSMANOĞLU: "We are here for the delivery of 27 vehicles which will make a significant contribution to border line security in the second phase of the supply project of mobile surveillance vehicles in order to increase the border surveillance capacity. We are altogether here on the occasion of the delivery of these tactical wheeled vehicles and systems designed on the vehicle to our border units serving troops in Edirne and Kırklareli. Turkey is located within a region where intense political crises and conflicts exist. One of the most important areas of homeland security is undoubtedly border security. Border security is not only the problem of our country but also the major problem of the world. Turkey is one of the countries that attaches great importance to border security with utmost effort. Turkey has been struggling to prevent thousands, hundreds of thousands from migrating into the country, while preventing the passage of irregular immigrants to the EU. In our country, we host 3 million 650 thousand Syrian immigrants and approximately 5 and a half million immigrants in total. The ongoing conflicts and crises in the region may further increase this wave of immigration. Turkey has been exerting efforts to prevent such an increase. So far, we have secured a total area of 8 thousand 100 square meters in Syria, where the terrorism threat is intense with 3 separate operations. As of now, nearly 365 thousand Syrians in our country have voluntarily and safely returned to Syria. Our objective is to send back 2 million Syrians."

Following the opening speeches, the vehicles were delivered to the end-user and the Deputy Minister of Interior Muhterem İNCE and Deputy Minister of Defence Yunus Emre KARAOSMANOĞLU signed a protocol. After the ceremony, the capabilities of armored vehicles were demonstrated to the participants at the factory's test field.

ATEŞ: Advanced Technology in Border Security

In the ATEŞ project, Hızır 4x4 Tactical Wheeled Armored Vehicle produced by Katmerciler are preferred as the Armored Vehicle Platform, while the electronic sensors on the vehicle and the security management software enabling interoperability of these sensors are the systems indigenously designed and produced by Aselsan. Within the scope of the project, Aselsan product the ACAR Ground Surveillance Radar and SHARPEYE-OD Electro-optical Sensor System which is used for day and night surveillance of human and/or vehicles up to 40 km, while the 9661 V/UHF Ground Radio System, SEDA Gunshot Detection System and all other sensors are safely controlled by SECANS Security Management Software, which are also designed by Aselsan. Thanks to the on-vehicle sensors, during day/night and under adverse weather conditions, the troops' short/medium/long range mobile surveillance requirements are met, while a target detected by the radar or a sharpshooter firing detected by the gunshot


© Aselsan

detection system can be determined on the digital map with coordinates, monitored in real time by thermal cameras and can be covered with fire simultaneously.

In the European Union funded Project, which was initiated in 2017 and implemented under the responsibility of the Ministry of Interior and Aselsan as a contractor, Aselsan won the tender with the best offer price and technical solution. The contract for the procurement of 57 Armored Surveillance Vehicles with a total contract value of approximately €30 million were signed on May 29, 2017 and the design and production process was initiated. Katmerciler was selected as the platform subcontractor within the scope of the program.

The 4x4 HIZIR ATEŞ has a 400 horsepower and V-Type monocoque hull providing high mine protection. The vehicle has a 6-crew capacity and 6 doors/gun ports and has blast seats. The armored vehicle with a maximum weight of 16 tons, can reach a maximum speed of 120 km per hour, while the maximum cruising range is 700 km. Equipped with a CBRN air filter system and a hydraulic recovery winch, ATEŞ has an automatic fire suppression system and independent suspension and differential locks. The tires of the power steering vehicle are Run-Flat.

Thanks to the vehicles and systems to be used by border troops serving in Edirne and Kırklareli provinces, a significant contribution is aimed to be provided to EU-Turkey border security by detecting irregular immigrants and traffickers.

With the delivery of 10 more vehicles in January 2020, the project for the supply of 57 ATEŞ Mobile Surveillance Vehicles will be finalized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UGVs to Actively Assist Security Units in Theater

Within the scope of the Light Class Unmanned Ground Vehicles (UGVs) Development Program carried out by the Presidency of Defence Industries (SSB), three different types of domestic light class unmanned ground vehicle prototypes, weighing 1, 3, and 6 kilograms, were developed by four companies. The throwable, light class unmanned ground vehicles which can climb obstacles and perform various tasks with different payloads were designed in line with the demands of the security forces.

Within the scope of the project carried out by the Presidency of Defence Industries to increase and diversify local solutions in the field of unmanned ground vehicles, the qualification tests have been completed for the prototype vehicles which can operate in day-night conditions and can be equipped with various weapons, reconnaissance & surveillance modules and CBRN detectors. Providing information about unmanned ground vehicles developed in various sizes and configurations, President of Defence Industries Prof. İsmail DEMİR said: "These vehicles will be little assistants of our security units during cave-clearing, in close quarters, in multi-story buildings, and field operations. We will start the serial production phase after developing the vehicles in line with the needs of our security units. We will continue to work on such projects. We invite everyone interested to present their ideas and designs to us, to participate in our competitions, and to stand by us in this race."

The unmanned ground vehicles, which were planned to be developed within the scope of the Presidential 100-Day Action Plan, were grouped into three main categories: the light, medium, and heavy classes by the SSB. The light class UGVs were later subcategorized into three different levels. The 1st Level Light Class Throwable Unmanned Ground Vehicles can operate in different environments such as dirt roads, caverns, caves, indoors for day or night reconnaissance & surveillance purposes. The remote-controlled vehicles weigh less than 1 kilogram and can operate silently in closed areas with an operational duration of up to 2 hours.

The 2nd Level Throwable Unmanned Ground Vehicles can carry out pre-operational reconnaissance & surveillance, trap detection, and security operations on dirt roads, caverns, caves, tunnels, residential areas/ indoors, and multi-story buildings. The throwable vehicles weigh less than 3 kilograms, can climb stairs (17 cm vertical obstacle climbing, 60% gradient/30% side slope), have adjustable speed control, and can be equipped with reconnaissance & surveillance modules with optical and digital magnification capability. The 2nd Level vehicles can be controlled remotely or can operate in fully autonomous and semi-autonomous modes if necessary. The 3rd Level Unmanned Ground Vehicles, on the other hand, are capable of mapping large areas and buildings/rooms in residential areas to provide decision support before an operation. Weighing less than 6 kilograms, these vehicles can climb stairs and can be equipped with reconnaissance & surveillance, extended surveillance, terrain mapping, and CBRN modules. The vehicles can operate semi-autonomous or can be remote-controlled.

Within the scope of the project, Technology Acquisition Agreements were signed with Altınay, Elektroland Defence, Esetron, and HOYTEK. Following the development of the pre-prototypes, the critical design processes were initiated, and four 1st Level vehicles from two companies, eight 2nd Level vehicles from four companies, and four 3rd Level vehicles from two companies were qualified and tried out int the field by security forces before the serial production phase. Under the coordination of the SSB, the pre-prototype demonstrations of the 1st and 2nd Level Light Class Throwable Unmanned Ground Vehicles were conducted at a test area established by Aselsan with all the necessary features for testing and qualification of all products and prototypes to be produced within the scope of unmanned ground vehicle projects.

SAHA EXPO 2020

SAHA EXPO 2020, an important cooperation platform for the domestic and national defence and aerospace industry, will be held on March 25-28, 2020 under the sponsorship of major defence industry companies and institutions. International buyers will be hosted at SAHA EXPO 2020, where domestic producers show great interest

The sponsors of SAHA EXPO 2020 have almost been finalized. The Expo is organized by SAHA Istanbul, one of Turkey's largest clusters, and a venue where Turkey's high-tech production potential will be exhibited. The exhibition layout plan of SAHA EXPO 2020 is reported to be completed and sponsorship requests continue to be evaluated. The occupancy rate of the SAHA EXPO fair is stated to have reached 80% thus far. The event is to be held under the auspices of the Ministry of National Defence, Ministry of Interior, Ministry of Industry and Technology and the Presidency of Defence Industries, and under the main sponsorship of Defence and Aerospace Industry Exporters' Association.

SAHA EXPO Support

Companies performing activities in defence, aviation and aerospace industries have shown great interest in SAHA EXPO 2020 and the major companies of the Turkish defence and aerospace industry have become sponsors of the fair. Companies such as Aselsan, Turkish Aerospace, Roketsan, Baykar, STM, ASFAT, Sarsılmaz and Dener, which are important representatives of the Turkish Defence Industry in the world, have become "Platinum Sponsors" of SAHA EXPO 2020.

TEI, Meteksan Defence, TAIS, Akım Metal, Ermaksan, Saver, CANİK, Unidef, İşbir, Teknopark Istanbul and Yılmaz Makina are "Gold Sponsors" of EXPO 2020 and Havelsan, Kale Grubu, MKEK, Kardemir, Aspilsan, Altınay, OBSS, FNSS, Pavotek, İğrek Makina and Üntel are "Silver Sponsors". SAHA EXPO 2020's "Gala and Hall Sponsor" is the Istanbul Chamber of Commerce (ITO) and the "Bag Sponsor" is Anova.

Companies Finalize Products for the Fair

SAHA EXPO 2020 will be an outstanding event where all stakeholders supporting the National Technology Initiative will come together and the Turkish defence and aerospace industry will meet with international professionals. Many products, systems and designs having strategic importance in the defence industry will be unveiled at SAHA EXPO 2020. SAHA Istanbul Secretary General İlhami KELEŞ said, "As the SAHA EXPO Fair approaches, the excitement of our participant companies increases. Many companies to participate in the fair continue their efforts intensely to finalize the products they want to exhibit at the fair for the first time. In addition to being a fair, SAHA EXPO has become an inspiring meeting point where our domestic companies of different sizes are able to exhibit their new products and projects to the right people."

There will be special sections at SAHA EXPO 2020 which is to be held at a venue that is four times larger compared to the previous event with many more participants. Product exhibition presentation areas will be established in a separate section apart from the booths, and companies and startups will be able to promote their recent designs and newest products in this area.

The SAHA EXPO fair, where participant companies will exhibit their latest products, designs and projects, is expected to be a significant cooperation platform. The representatives of domestic and foreign participating companies and professional visitors coming from all over Turkey and from different countries of the world will be able to conduct meetings in the B2B meeting area. The B2B registration system will be prepared by SAHA Istanbul and will be used by participants and visitors prior to the fair. Industrialists will be able to pre-schedule appointments with the right individuals and companies that they want to meet, before the fair.

Defence Export Market Expected to Expand

KELEŞ stated that the world's leading defence industry contractor companies have been invited to SAHA EXPO 2020 and such companies are not sellers, they are buyers or companies open to cooperation. KELEŞ: "We have invited defence industry companies to SAHA EXPO 2020 from the U.S. to EU countries, and from Ukraine to Malaysia in order to discuss joint investments, technology transfer and cooperation opportunities. As in the previous fair, broad participation is expected at SAHA EXPO 2020 where professional negotiations will occur and we anticipate that our companies will generate agreements to increase their export shares."

Eurasia Airshow 2020 to Host Over 130 Official Delegations

by Şebnem AKALIN

The press conference for Eurasia Airshow to be held on April 22-26, 2020 in Antalya was held on December 25, 2019 in Ankara with the participation of Eurasia Airshow CEO Hakan KURT. Eurasia Airshow CEO Hakan KURT presented the final report of the first fair held in 2018 and shared detailed information with members of the press on the countries to participate in the fair in 2020, the platforms to be exhibited in the static area and the planned demonstration flights.

Expressing that there will be broad participation in the 2nd Eurasia Airshow to take place on April 22-26, 2020, from the U.S., Russia, France, Pakistan, UAE, Qatar, Kazakhstan, Czech Republic, Ukraine, Poland, Italy, China, UK, Brazil, Azerbaijan and other countries, KURT stated that aircraft such as the F-16 Falcon, F-18 Hornet, JF17 Thunder, SU-35, Airbus A350-1000, Boeing C-17 Globemaster III, A400 M, C-130 Hercules, MC-21, Embraer E195-E2, Sukhoi Superjet 100, Boeing 777-300-ER, Bombardier Dash 8, Ilyushin Il-76, Gulfstream G650 and helicopters such as Eurocopter, Sikorsky S-70, Mi 38 & Mi-8, Ansal, and ATAK will be exhibited in the static area during the fair. KURT also added that the approval of authorities is expected for the demonstration of the mock-up of the Eurofighther and Tempest 6th Generation fighter aircraft in the static area.

KURT expressed that the achievement they expect with the 2nd Eurasia Air Show will be far above the first fair and the goal of Eurasia Airshow 2022 is to go beyond the Dubai Airshow in terms of commercial visitors, number aircraft to be exhibited, number of participant delegations and the amount of orders to be received.

400 companies, over 45,000 commercial visitors and more than 170,000 visitors will participate in this year's

fair and over 100 aircraft will be exhibited. Also, more than 130 official delegations from various countries are expected to attend the fair. In addition, it is expected that B2B and G2G collaborations to be made during the fair will create a business volume of US$ 25 billion.

Emphasizing that there will be new aspects in this year's fair, Hakan KURT said that there will be a separate section for the field of space in the fair area and that the fifth Global Satellite and Space Show will take place during the fair. Also, this year within the scope of the "Meet the Buyer" program, companies in defence, aviation, space, MRO, airlines, ground handling services will meet with buyers. Within this framework 3,000 bilateral meetings are planned to be held with the participation of buyers from 30 different countries.

During the fair, the "Eurasia Aviation Industry Summit" for Civil and Commercial Aviation will be held in cooperation with Defence Turkey magazine's sister magazine Aviation Turkey.


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Turkish Deputy Minister of National Defence Alpaslan KAVAKLIOĞLU Awarded with "Order of the Rising Sun, Gold and Silver Star" by Japanese Government

December 19, 2019, Alpaslan KAVAKLIOĞLU, the Deputy Minister of National Defence of the Republic of Turkey, was awarded with "Order of the Rising Sun, Gold and Silver Star" by the Japanese Government at the ceremony hosted by Japan's Ambassador to Turkey.

Alpaslan KAVAKLIOĞLU, whose contributions to the strengthening of Japan-Turkey relations and development of collaboration between parliamentarians for many years were greatly appreciated by the Japanese Government, was decided upon to be awarded with Order of the Rising Sun, Gold and Silver Star by the Emperor of Japan this autumn.

Alpaslan KAVAKLIOĞLU exerted efforts to establish the Disaster and Emergency Management Presidency (AFAD) after attending the Japan International Cooperation Agency's (JICA) disaster prevention program in Japan for 6 months in 2000. AFAD had carried out the dispatch process of search and rescue teams from Turkey following the Great East Japan Earthquake which occurred in March 2011 and carried out search and rescue activities in Japan for three weeks.

Elected as a parliament member for the first time in 2011 as the Justice and Development Party's Niğde PM, Alpaslan KAVAKLIOĞLU had carried out his duty as a Chairman of the Turkey-Japan Inter-Parliamentary Friendship Group for two terms since 2014, for four years.

Otokar Established Subsidiary "Otokar Central Asia" in Kazakhstan


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One of Koç Group's global brands Otokar continues its worldwide expansion with its newly established subsidiary "Otokar Central Asia" in Kazakhstan. Askar MAMIN, the Prime Minister of Kazakhstan presented the registration certificate of Otokar Central Asia to Ali Y. KOÇ, Vice Chairman of KOÇ Holding and Chairman of Otokar.

Turkey's leading and one of the main and globally accepted automotive and defence companies of the world, Otokar continues to strengthen its international presence. As a company that exports products with fully owned intellectual property rights to more than 60 countries on five continents, following its subsidiaries and joint ventures in France, United Arab Emirates and Romania, Otokar now established its new subsidiary company "Otokar Central Asia" in Kazakhstan. Askar MAMIN, the Prime Minister of Kazakhstan presented the registration certificate of Otokar Central Asia to Ali Y. KOÇ, the Vice Chairman of Koç Holding and Chairman of Otokar.

With the establishment of Otokar Central Asia Limited in Astana International Financial Center (AIFC) in Nur-Sultan, Kazakhstan, Otokar aims to be closer to its current and prospective clients in Central Asia and particularly Kazakhstan, and to increase its sales in the entire region together with Kazakh Government.

Currently, Otokar products are actively used in Kazakhstan and other Central Asian countries, and the new company will enable Otokar to act locally in Kazakhstan and serve both Kazakh and neighboring governments in the region by manufacturing in Kazakhstan in a joint venture.

6 Bayraktar TB2 UAVs Delivered to the Turkish National Police

On the 5th of December, 2019, President of Defence Industries Prof. İsmail DEMİR stated that 6 Bayraktar TB2 Unmanned Aerial Vehicles (UAV) were delivered within the scope of the agreement signed in 2015 to meet the needs of the Turkish General Directorate of Security.

Prof.DEMİR announced the news on his official Twitter account and said, "We have delivered 6 Bayraktar TB2 UAVs to the General Directorate of Security. Thus, the number of Bayraktar TB2 UAV/UCAV has reached 98." The tactical unmanned aerial vehicle Bayraktar TB2s are used by the Turkish Land Forces, Navy, Gendarmerie, and National Police and also exported to Qatar and Ukrainian Armed Forces.

Havelsan Team up with Türk Loydu on Cyber Security

December 4, 2019. Türk Loydu and Havelsan signed a cooperation protocol on cyber security. Havelsan and Türk Loydu, with this protocol signed in order to further strengthen the cooperation that has been going on for years, will work together to provide standard identification, cyber security products and services within the scope of activities they have been performing on maritime, industry, certification training services, consultancy, rule development, cyber security, digitalization, and R&D innovation activities. Within the framework of the signed protocol, Türk Loydu and Havelsan experts will cooperate for the development of cyber security technologies and develop products and solutions in many areas.

Chairman of the Board Türk Loydu Foundation Cem MELİKOĞLU made a statement following the signed cooperation protocol and said, "Nowadays information security has been gaining importance and it is crucial to take necessary measures in cyber security. With the protocol signed between Türk Loydu and Havelsan, one of the important national organizations of our country, both the cooperation between the two institutions was reinforced and an important step was taken in terms of developing services and conducting projects for Türk Loydu customers in the field of cyber security. We believe that we will realize many successful projects with Havelsan on cyber security."

MilSOFT`s Maturity Level in Software Development and Integration Once Again Certified

December 6, 2019. MilSOFT has succeeded in CMMI (Capability Maturity Model Integration) Level-5 assessment for the 6th time, which is a widely used standard that measures the ability maturity levels of software companies. CMMI Level-5 enables organizations to forecast their future performance in a disciplined and quantitative manner and to provide innovative products to their customers by taking preventive actions before any problems occur.

The CMMI level not only increases the success of organizations in realizing projects they undertake on time, with good quality and within budget, but also it contributes to the sustainability of organizations by enhancing their capacity to adapt to rising competition and changing conditions due to its "continuous improvement" philosophy. CMMI is used as a model in many critical sectors such as the defence industry, where elements of both quality and schedule are of the utmost importance and is required as a prerequisite for domestic and international tenders.

MilSOFT was the first company in Turkey that reached the CMMI Level-3 in 2002 and then achieved CMMI Level-5 in 2005 as the "first company" that reached this level in Europe. MiLSOFT, the only company in the Turkish defence industry that reached CMMI Level-5 with 100% coverage in all projects, has been implementing this capability uninterruptedly in all projects assumed since 2005 and has achieved significant success for the 6th time as a result of the assessment performed.

MiLSOFT, one of 619 companies in the world and 27 in Europe with Level-5 certification, is one of the few international companies that has achieved and maintained Level-5 uninterruptedly since 2005.

PLM in the Aviation Industry and the Ege University PLM Excellence Center

Prof. Dr. Semih ÖTLEŞ, Director of PLM Excellence Center

PLM (Product Lifecycle Management) is used in a wide variety of industries, but the first use of PLM was in the aviation industry. The development of new products first required a tool to manage the co-operation of many resources, and with good reason. For example, an Airbus or Boeing plane contains approximately 3.5-4 million parts supplied from more than 2000 manufacturers and PLM is an integral component in this regard.

Aviation and aerospace manufacturers should seek innovative ways to minimize costs and reduce time to market while optimizing product performance. Aviation industry original equipment manufacturers are relying increasingly on global partners to share risks and to maximize product development and manufacturing expertise.

PLM, an important pillar of Industry 4.0, is the management of all processes starting from the idea stage of a product to its complete life, disassembly and recycling.

Among the benefits of PLM for industrial organizations are the increase in productivity gained by efficiently managing business processes which leads to reducing product costs, increasing innovation, shortening the time of delivery and delivery of the product, accelerating cooperation with suppliers, and the ability to reach the right information quickly, which cumulates in improving brand identity.

The first studies on the subject of PLM at Ege University started in 2012 as a result of the negotiations with Dassault. Prof.Dr.Semih ÖTLEŞ, Prof. Dr.Semih GÜNEŞ and two faculty members visited the universities of Kaiserslautern, Aachen, Bochum, Berlin, Bremen, Trier and Fraunhofer institutes and started bilateral cooperation on PLM. In 2014, ÖTLEŞ participated in the Hannover Industry 4.0 fair and the opening of the Turkish-German Year of Science in Berlin.

In 2014, a workshop was held in Izmir with the participation of industrialists, TUSAŞ, TEİ, SSB and other PLM professors from Germany. In 2015, the Ege University PLM Center of Excellence was officially established with the approval of the Senate, YÖK and the Prime Ministry. In 2016, the PLM Master's program started.

In 2014 the PLM Center, a TUBITAK project (organizing a workshop), was conducted by the European Union Erasmus+ project program between 2015-2018. There are 1,505 TEYDEB and 3 BAP projects in progress.

In the infrastructure of the center, there are 30 computers with high operating systems and 1 server. The computers include PLM software from

French Dassault, American PTC and Autodesk and German Contact companies, each of which is costly. In addition, Katia, Creo, Solidworks, Moldex design programs and Logo ERP program are available. The PLM Master's Program consists of; with thesis (2 years, foreign language certificate, ALES score required, free of charge) and without thesis (1.5 years, no documents required, paid). Majority of the students are Mechanical Engineers, Industrial Engineers, then many are Computer / Software Engineers, Electrical / Electronics Engineers, Chemical Engineers, Food Engineers, Textile Engineers, Communication Engineers, and also students from Department of Business Administration and Mathematics.

PLM Master of Science students are already working in the sector. The companies they work with; BMC, Vestel, Volkan Fire Department, Delphi, Obel Bolt, Mechanika, Wing Paint, CTS Machinery, Weber, DMO, Karya IT, Philip Morris, ZF Lemförder Axle, Volt Electric Motors, Rennova Automation, Maxion Wheels, PTI, Noken, ETI, and Dr.Oetker. Industrial collaborations are being developed by enabling the students of PLM to conduct their thesis studies in their own industrial organizations. In the Master of Science Program for PLM; Theoretical and practical instruction is given on topics such as CAD / CAM, data management, industry 4.0, PLM concept and applications, PLM practices in the automotive sector, research methods and ethics, and PDM. Industrialists and software companies are invited to interact with the students.

For more information: https://egeplm.ege.edu.tr/

17 New R&D Projects from the SSB

The contracts of 17 R&D projects initiated by the Presidency of Defence Industries (SSB) were signed at a ceremony held at the SSB Headquarters in Ankara. SSB President Prof. İsmail DEMİR as well as representatives from the Ministry of National Defence, Turkish Armed Forces, Gendarmerie General Command, universities, research centers, public and private sectors participated in the R&D Signature Ceremony.

With a 1.8% R&D share target as part of Turkey's 2023 goals, while 29 projects were initiated as per the directive of the Presidency of Defence Industries in five panels held so far within the scope of SSB R&D Panels launched on December 22, 2016, it was also decided upon to make a call for a wider scope in 16 areas. The 17 R&D projects signed on January 13, 2020, include:

- Development of Alumina Powder for Use in Ceramic Armors (Alumina)
- Development of Aluminum Casting Processes for Aviation (Aslan)
- Nano-Additive Prepreg Material Development (Atlas)
- Development of Boron Carbide Silicon Carbide Light Ceramic Armor Materials (Borkar)
- Development of Carbon and Glass Fiber Epoxy Prepreg (Kartal)
- Customization of Flight Simulator Trainings by Measuring Cognitive Workload (Genius)
- Classification and Identification of Surface Targets Detected with Radar (Görü)
- Artificial Intelligence Commander Assistant Developing Course of Action (Hamle)
- Artificial Intelligence Fire Control and Autonomous Driving for Land Vehicles (Karagöz)
- Global Positioning System Independent Autonomous Navigation System Development (Kerkes)
- Social Media Analysis Performance Development (Pergel)
- Autonomous Discovery, Guidance and Navigation with Co-Robots (Robo-Tim)
- Data Tagging Platform (Veri Kovanı)
- Innovative Software Competing (Y^3) 2nd Term
- Development of New Generation Protective Textile Technology against Chemical and Biological War Agents (Kafes)
- Energetic Material Development with Cocrystallization Method (Kokristal)
- Microbolometer Infrared Detector Kit Development (Mikrobolometre)

While the contractor model in the signed projects is based on the cooperation between SME-Industry-University, there will be a total of 21 contractors or subcontractors in the projects, particularly the universities, institutes and SMEs.

Substantial Capabilities will be Acquired with 17 R&D Projects

In order to minimize our country's foreign dependency, within the scope of the ALUMINA Project, domestic and national Alumina powder, equivalent to Alumina powders currently supplied from abroad, will be developed for ballistic requirements. Again, with the objective of minimizing foreign dependency, the KARTAL project aims to develop prepreg slit tape materials which are reinforced with epoxy resin impregnated glass fiber and carbon fiber, which are subjected to export license.

With the ASLAN Project, the aim is to develop the Aluminum block casting and manufacturing processes of the TEI-PD170 piston engine used in unmanned aerial vehicles. Within the scope of the ATLAS Project, the aim is to to develop an epoxy resin prepreg material cured at 120 ° C, reinforced with nano additives that provide weight gain by improving the strength, toughness and impact resistance of the material it is integrated with. The BORKAR Project aims to improve the process conditions for producing low density, cost effective and high ballistic performance Boron

Carbide - Silicon Carbide composite armors for use in armor applications.

By integrating the methods to be developed under the GENIUS Project into simulators, the aim is to create an infrastructure that will provide an advantage in the design of the next generation of human-machine interfaces with the knowledge, experience and technology infrastructure that will enable the development of new generation user-centered flight simulators based on neurophysiology. The HAMLE Project aims to develop an Artificial Intelligence Commander Assistant who, via the "Reinforcement Learning" method, can learn warfare games, assume an instructor role and provide decision support by determining and evaluating a course of action.

With the GÖRÜ Project, the aim is to develop an algorithm for the detection, classification and identification of surface targets from SAR sensors with artificial intelligence, and the KARAGÖZ Project aims to provide vehicles with artificial intelligence assisted fire control and autonomous driving capabilities.

The KERKES Project aims to provide image-supported autonomous navigation capability to UAV Platforms in combat environments where GPS information is not available or where GPS is jammed/deceived. The PERGEL Project will be carried out for high performance algorithms with deep learning methods on open source data.

With the VERİ KOVANI Platform, the aim is to obtain the tagged data sets needed in projects involving artificial intelligence as crowdsourced, while with the ROBOTIM Project, the aim is to develop cognitive swarm capability for UAVs and ULVs to perform coordinated tasks. In this regard, the Innovative Software Competition (Y^3) 2nd Term Project will also be carried out with the aim of competing today's software in innovative technologies and promoting the software of the future.

Within the scope of the KAFES Project, the plan is to develop CBRN Protective Textile with national facilities, which has superior protection and comfort features against chemical and biological warfare agents by using Metal Organic Frameworks (MOF) and Membrane technologies. The KOKRİSTAL Project aims to introduce new generation energetic materials, with high detonation speed and high insensitivity, to the Turkish Defence Industry which will give the country ownership of new generation energetic material technologies. Within the scope of the Microbolometer Project, the objective is to develop of 12 micrometer microbolometer type infrared detector sets and subsystems for thermal weapon sight and reconnaissance surveillance systems with national facilities.

ALACA 35 GHz Radar Cross Section Measurement System of the Naval Platforms

In line with the projects carried out by Turkish company Meteksan Defence in the field of radar systems, the agreement for design and develop of "35 GHz Radar Cross Section (RCS) Measurement System" for Turkish Navy was signed on July 13, 2018 between Turkish Navy Research Center Command (ARMERKOM) and Meteksan Defence Industry Inc.

The acceptance tests of ALACA 35 GHz RCS Measurement System, developed within the scope of the agreement, were successfully completed by Meteksan Defence and the system is delivered in December 2019 to Turkish Navy. ALACA will be used for; measurement of the RCS of the naval platforms which is an important parameter in protection from guided missiles and fire control radars, for improvement of the millimeter wave RCS of the existing or newly designed platforms and for measurement of the RCS of countermeasure decoy used for the deception of guided missiles likely to target naval platforms. In addition, Inverse Synthetic Aperture Radar (ISAR) capability of ALACA will allow creation of ISAR images of naval platforms. With these functions, ALACA will be a critical system for the survival of Turkish Navy's combat platforms.

Teknopark Istanbul General Manager Bilal TOPÇU: "We Will Employ 40,000 R&D Engineers in 2030!"

Teknopark Istanbul, established in cooperation with the Presidency of Defence Industries (SSB) and the Istanbul Chamber of Commerce (ITO), celebrates its 10th anniversary. Within Teknopark Istanbul, the innovation center of the Turkish Defence Industry, there are major companies such as Aselsan, Roketsan, Turkish Aerospace, TEI, STM, BMC, Altınay, C2Tech, Pavotek and Armelsan, which have realized over 1,600 national projects.

In Teknopark Istanbul is a center of attraction with strong companies operating in focused technology areas. With each passing day advanced technology projects are realized in critical areas such as aviation/aerospace, maritime, energy and health sciences, especially in the defence industry. The companies within Teknopark Istanbul perform important activities to minimize our country's foreign dependency in high technology and in particular defence industry products, setting sights on Turkey becoming a country that exports technology.

During the press conference held on December 12, 2019, Teknopark Istanbul General Manager Bilal TOPÇU said that they are proud to host the leading R&D projects of the defence industry such as MİLGEM Corvette, ALTAY Main Battle Tank, ANKA UAV, LHD Amphibious Assault Ship.

Emphasizing that major defence industry projects and subsystems such as ALTAY Main Battle Tank produced by BMC, ANKA UAV and T129 ATAK Helicopter of TUSAŞ, the MİLGEM Corvette of STM and the LHD Amphibious Assault Ship of SEDEF Shipyard were realized at Teknopark Istanbul, General Manager TOPÇU said, "We are the most important innovation center where projects are developed that will lead our country to the highest level in R&D and new technologies. We are proud to have such significant companies making great contributions to Turkey's national and domestic technology move under our roof. After the completion of all stages in our teknopark, we aim to achieve an added value of over US$ 10 billion annually to our country's economy."

Bilal TOPÇU -Teknopark Istanbul General Manager

General Manager TOPÇU continued his speech as follows: "In our 10th year, there are over 300 companies and 5,000 R&D engineers at our campus. With the 3rd stage buildings to be commissioned at the end of 2020, we will reach a level of employing of approximately 9,000

people. By 2030 when all stages are completed, we aim to contribute added value of US$ 10 billion to our country's economy by hosting more than 1,000 companies, 300 entrepreneur groups and 40,000 R&D engineers an indoor area of 1 million m^2. We will become a focal point of Turkey's R&D and Innovation Ecosystem. Also, our incubation center 'Cube Incubation' hosting over 90 groups of entrepreneurs will have an area of 10,000 m^2 by the end of 2020 and will become Turkey's largest and one of the world's renowned incubation centers." TOPÇU stated that investments in Teknopark Istanbul without slowing down.

Turkey's Largest Incubation Center to be hosted in 2020!

Significant investments are being made in Cube Incubation which hosts more than 90 entrepreneur groups that conduct R&D studies on innovative and deep technology-based business ideas. TOPÇU noted, "In this regard, we are designing Laboratories and Prototype Workshops to be offered for use by incubation companies within the new block planned to be completed by the end of 2020 within the scope of our 3rd stage activities. Also, shared workspaces, small offices and hybrid offices will be available to our entrepreneurs at the incubation center in the new building.

Technology Transfer Office and Clusters Attract Attention

Teknopark Istanbul companies, acting with the awareness that R&D studies are necessary to be commercialized, support the Technology Transfer Office (TTO) with 4 technology-focused clusters that they established. While the TTO performs activities for obtaining patents and commercialization of R&D projects, clusters such as SAHA Istanbul (Istanbul Defence and Aerospace Cluster Association), ISEK (Istanbul Health Industry Cluster), Turkey Cyber Security Cluster and HISER Turkish Maritime Cluster undertake important tasks to create a synergy environment with institutions working in related focused technology fields and to determine efficient research areas together. These clusters consist of companies that come together to eliminate foreign dependency, increase the production of national technologies, and to establish an ecosystem that will support our country's aim to develop the domestic industry.

First Flight of Eurofighter in Kuwait Air Force Configuration

On the 23rd of December 2019 at the Flight Test Center of Leonardo Aircraft Division in Turin-Caselle, the first Instrumented Series Production Aircraft (ISPA 6) equipped with the Kuwait Air Force configuration successfully completed its first flight.

The aircraft is the first to fly the innovative Captor E-Scan Radar with Phase Enhancement P3Eb and is a key milestone for the entry into service of Eurofighter with the State of Kuwait.

This standard is the most advanced variant of the fighter jet ever made, with a package of capabilities that builds effectively on existing enhancement programs.

A contract for the supply of 28 Eurofighter Typhoon multi-role fighter aircraft was signed between the Ministry of Defence of the State of Kuwait and Leonardo (on 05 April 2016) through its Aircraft Division acting as the Eurofighter Prime Contractor Organization.

With the Captor E-Scan radar and several new additions to the weapon system, this variant will put the Kuwait Air Force at the front-line of fighter technology when the aircraft enters into service with the State of Kuwait in 2020.

While other aircraft in different Eurofighter Partner Companies are testing specific parts of this configuration, including the development of the E-Scan radar in the UK and Germany, this is the first flight of the entire package that will be delivered to Kuwait.

The capability package for Kuwait includes the integration of Storm Shadow and Brimstone and other air-to-surface weapons. Moreover, it foresees the integration of a new advanced laser designator pod (the Lockheed Martin Sniper Advanced Targeting Pod) that will expand Eurofighter's portfolio of cleared laser designator pods; the introduction of the DRS-Cubic ACMI P5 combat training pod and an enhanced navigation aid (VOR).

Lockheed Martin Hosts Bahrain Ambassador at F-16 Production Line

Production is underway on the first F-16 Block 70 for the Royal Bahraini Air Force

17th December 2019, Lockheed Martin hosted Shaikh Abdullah bin Rashed Al Khalifa, ambassador of the Kingdom of Bahrain to the United States, at the company's F-16 production line, where production is underway on the first F-16 Block 70 for the Royal Bahraini Air Force.

"Lockheed Martin's partnership with Bahrain began more than 40 years ago and it continues today with the F-16," said Bridget Lauderdale, vice president and general manager of Lockheed Martin's Integrated Fighter Group. "Bahrain was the first country in the Gulf region to acquire the F-16 and the first customer in the world to procure the advanced F-16 Block 70."

"Bahrain has been a strategic partner and friend to the United States, and South Carolina was pleased to host the delegation today," said U.S. Senator Lindsey Graham. "We are proud of the hard-working folks at Lockheed Martin in Greenville, making one of the best jets to ever take to the sky, the F-16 Block 70."

The F-16s manufactured in Greenville - for international customers - will be the newest and most advanced F-16 production configuration ever offered, combining numerous capability and structural improvements. F-16 production is creating hundreds of new jobs in Greenville - supported by more than 400 suppliers in 41 U.S. states - and positioning the site to grow.

"South Carolina has established a legacy of being capable of manufacturing the most advanced products in the world, and with the help of Lockheed Martin's investment in Greenville, we are further solidifying that legacy," said South Carolina Gov. Henry McMaster.

The Greenville production start coincides with significant, growing demand for new production F-16s around the world. To date, Lockheed Martin has three F-16 Block 70 customers: Bahrain, Slovakia and Bulgaria.

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Leonardo Awarded Contract for 32 TH-73A Helicopters by U.S. Department of Defence

Contract valued at US$ 176,472,608 for aircraft, spares, initial support and training; work to be completed in October 2021

Leonardo, through AgustaWestland Philadelphia Corp., has been awarded a firm-fixed-price contract valued at US$ 176,472,608 for the production and delivery of 32 TH-73A helicopters, initial spares, support and dedicated equipment, and specific pilot and maintenance training services. This contract, as Fiscal 2020 aircraft procurement (Navy) funds, was competitively procured via a request for proposal of various offers. Work will be mainly performed at Leonardo's Philadelphia facility and is expected to be completed in October 2021.

Alessandro PROFUMO, Chief Executive Officer Leonardo said, "On the cusp of celebrating nearly 40 years of operating in Philadelphia, Leonardo is thrilled the U.S. Navy has selected our TH-119-based offer and us as a local and long-term partner. We are proud to be a core contributor to the future of U.S. defence."

Gian Piero CUTILLO, Managing Director of Leonardo Helicopters added, "Today's brilliant news is a ringing endorsement for our solutions setting new industry standards for training. We are committed to working with the U.S. Navy to ensure future pilots meet all evolving service requirements."

William Hunt, Managing Director of Leonardo Helicopters Philadelphia said, "Our plan since day one has been to offer the U.S. Navy the training capabilities they asked for, without compromise. We are honored to deliver on that promise, build the new fleet in Philadelphia and maintain it from Milton, Florida."

Barracuda Program- the start-up of the Suffren Nuclear Reactor

After the launch of the Suffren last 12 July in the presence of the President of the French Republic, Emmanuel MACRON, a new milestone was reached with the divergence of the reactor, a prelude to its first sea acceptance tests prior to its delivery in 2020.

The divergence of the Suffren's nuclear reactor has just been performed by the TechnicAtome and Naval Group teams on the Cherbourg site in accordance with the authorizations issued by the French Nuclear Safety Authority (Autorité de Sûreté Nucléaire - ASN) and the French Defence Procurement Agency (DGA).

Designed under the responsibility of the French Atomic Energy and Alternative Energies Agency (CEA), the nuclear reactor was built under the prime contracting of TechnicAtome, reactor designer, Naval Group being responsible for the production of the pressure equipment's and the integration of the reactor on-board the Barracuda submarines. One thousand employees from both companies are working full time in parallel on the sixreactors of the Barracuda program.

Loïc ROCARD, Chairman and Chief Executive Officer of TechnicAtome, declared "the first divergence of the nuclear reactor is a privileged moment for all those who contributed to make this operational and technological success possible. From the designer to the operator, and including the fitters, testers, welders and so many other trades, this is a rare moment of collective achievement, the symbol of a sector that lives up to its ambitions in the service of the French Navy".

Hervé GUILLOU, Chairman and Chief Executive Officer of Naval Group: "The start-up of the nuclear reactor on-board the Suffren submarine is a new demonstration of the know-how of the French nuclear industrial sector, with TechnicAtome and Naval Group in the forefront. This success gives the country an unequalled defence tool with a high degree of industrial autonomy benefitting the sovereignty of France".

Suffren Nuclear Reactor

Divergence is conducted from the Propulsion Control Station (PCS) of the Suffren. The operation consists in triggering a controlled nuclear reaction in the core for the first time. Lasting only a short time, this operation marks the beginning of the constant monitoring of the nuclear reactor by the operating teams. This operation will be continuous until the decommissioning of the submarine planned for the 2050 decade.

Barracuda Program

The Barracuda is the submarine of the 21st century, designed to meet the operational needs of the current and future navy. It features extensive operational capabilities and the latest technologies. More versatile, higher performing and better armed than its predecessors, the Suffren type SSN will go faster and further. It is designed to control all types of marine spaces, from the high seas to coastal areas.

Launched in 1998 by the French Defence Procurement Agency (DGA), the Barracuda program renews its Ship Subsurface Nuclear (SSN) component composed of six Rubis type SSNs commissioned at the start of eighties. The associated development contract was notified in December 2006.

The Suffren type SSN is equipped with a nuclear propulsion system which offers a remarkable action range and discretion. It also features communication means allowing its integration within a naval force.

The delivery of the six submarines will span one decade beginning in 2020. The Suffren, the first of class, was launched 1st August 2019 and will begin its sea trials in the first quarter of 2020 to arrive in Toulon before the summer.

Czech Republic Signs Letter of Offer and Acceptance for Mixed Fleet of AH-1Z and UH-1Y

Czech Republic becomes first international customer to purchase mixed fleet of H-1 aircraft

December 13, 2019 - the U.S. Secretary of Defence, Mark Esper, and Czech Republic Minister of Defence, Lubomir METNAR, signed a Letter of Offer and Acceptance finalizing the foreign military sale by Bell Textron Inc., a Textron Inc. company, of H-1 helicopters to the Czech Air Force.

"We are privileged to support the Czech people and applaud the Ministry of Defence and Armed Forces of the Czech Republic for selecting AH-1Z and UH-1Y helicopters." said Vince TOBIN, Executive Vice President of Bell's Military Business.

The H-1 mixed fleet shares 85-percent commonality between parts, reducing the logistics, maintenance, and training costs of the AH-1Z and UY-1Y helicopters while offering a lethal combination of integrated weapons systems to counter ground, air, and maritime targets effectively. The AH-1Z is the only helicopter in production equipped with the AIM-9 Sidewinder providing the most advanced air-to-air combat capabilities.

"This mix allows the Czech Republic to accomplish a diverse mission set, from humanitarian assistance and disaster relief to close air support and air-to-air warfare," said Joel Best, Director of Military Sales and Strategy, Europe. "The advanced capabilities of the H-1 program help ensure the safety and security of Czech sons and daughters for years to come."

The purchase of four AH-1Z and eight UH-1Y military helicopters represents the first foreign military sale of a mixed H-1 fleet. Bell anticipates the delivery of the first H-1 aircraft to the Czech Republic will begin in 2023 and complete delivery by 2024.

Bell Boeing Delivers the First Modified Osprey for Improved Fleet Readiness

December 10, 2019 - Bell Textron Inc., a Textron Inc. company, and Boeing have delivered the first modified MV-22 Osprey to the United States Marine Corps for improved readiness and reliability of the tiltrotor fleet.

The Marines have multiple configurations of the MV-22 aircraft in service. Under the Common Configuration – Readiness and Modernization (CC-RAM) program, Bell Boeing is reducing the number of configurations by upgrading block "B" aircraft to the current block "C" configuration.

"Our first CC-RAM aircraft returning to MCAS New River was a key program benchmark," said U.S. Marine Corps Col. Matthew KELLY, program manager, V-22 Joint Program Office (PMA-275). "We are excited to see the capability, commonality and readiness improvements these CC-RAM aircraft bring to the fleet as part of the Marine Corps' V-22 readiness program."

As a block B configuration, this MV-22 was originally delivered to the fleet in 2005. In 2018, the aircraft flew from Marine Corps Air Station New River back to the Boeing Philadelphia facility for modernization.

"This delivery is an important milestone for the Marine Corps' MV-22 readiness and modernization campaign." said Chris GEHLER, Bell V-22 VP and Program Director. "Through this campaign, Bell Boeing, in partnership with HQMC and NAVAIR, is returning improved MV-22s to the fleet where the V-22 continues to be an essential aviation resource worldwide."

The next CC-RAM delivery is expected in early 2020. "We look forward to having the remaining MV-22 Block "B" aircraft rejoin the fleet in a Block "C" configuration," said Kelly.

In November 2019, the U.S. Navy awarded Bell Boeing $146,039,547 to upgrade nine additional MV-22 aircraft under the CC-RAM program, with work expected to be completed in March 2022.

Leonardo's New, Larger Osprey 50 AESA Radar Takes Flight for First Trials

A recent campaign saw Leonardo flying the Osprey 50 radar on a B200 King Air in the UK, demonstrating the second-generation AESA radar's wide range of modes

19th December 2019- Leonardo has announced the first flight trials of its Osprey 50 Active Electronically Scanned Array (AESA) radar, the new, larger-aperture variant of the Company's successful Osprey surveillance radar. The flight trials were carried out in support of production for a Strategic ISR platform and Collins Aerospace's Tactical Synthetic Aperture Radar (TacSAR) reconnaissance system.

Osprey is a multi-mode radar family based on solid-state AESA technology and remains the only system of its type currently available which delivers full spherical coverage with no moving parts. Among other benefits, this allows the radar to be installed on platforms where a rotating antenna would be unsuitable. The Osprey family has been an international success, having been sold to 12 customers. Osprey 50 is the largest and most capable variant, providing enhanced performance for overland, maritime and air-to-air missions. It is ideally suited to medium and large aircraft which can provide the required space and power.

Osprey 50 builds on the established market position of the Osprey 30 model which is available in fixed-panel and gimballed variants and has proven to be extremely popular for manned and unmanned ISR platforms. Customers have selected Osprey for its capability, flexibility of installation and affordability. Osprey 30 is

installed on the US Navy MQ-8C Firescout (where it is designated AN/ZPY-8) and on the Norwegian All-Weather Search and Rescue helicopter, the Leonardo AW101.

Leonardo has also re-used technology developed for the Osprey family to refresh its Seaspray family of AESA surveillance radars, ensuring that Seaspray remains a market-leading long-range radar for maritime operations for years to come. Hardware and signal processing techniques developed for Osprey have been introduced back into Seaspray to increase capability and reduce system weight.

Osprey has been an international success, having been sold to 12 customers. The new Osprey 50 is the largest and most capable variant in the radar family

Germany Orders more Meteor Missiles

MBDA has received an order to build more Meteor missiles beyond visual range air-to-air missiles for the German Air Force. Meteor is the world's most advanced air-to-air missile and has a unique ramjet propulsion system that allows it to fly further and faster than any other air-to-air missile – allowing it to defeat maneuvering targets even at extreme ranges. Éric Béranger, CEO of MBDA said: "The Meteor program can be considered Europe's most successful defence co-operation program, bringing together the best technologies from six European nations to deliver a common military capability that is truly revolutionary. We are very pleased to receive this additional contract from the German customer as a further commitment to Meteor as the primary air dominance weapon for Eurofighter." Signed on 16 December, the contract was awarded to MBDA by the Meteor Integrated Joint Program Office (IJPO) on behalf of the German Federal Office of Bundeswehr Equipment, Information Technology and In-Service Support (BAAINBw). Unlike traditional air-to-air missiles that glide unpowered for most of their flight, limiting their ability to hit agile targets at long distances, Meteor's ramjet provides sustained thrust at speeds in excess of Mach 4 all the way to the target – giving Meteor an unrivalled no-escape zone. Meteor is now cleared for frontline service with all of Europe's domestic fighter aircraft, Gripen, Eurofighter and Rafale.

Tempest Drives Forward as Leonardo Unveils New Radar Sensing Technology

Work is proceeding at pace to meet the ambitious timescale for Tempest, which is expected to go into-service in 2035. The new radar receiver/warner technology is four times as accurate as existing sensors in a package 1/10th the size

18th December 2019 – Leonardo UK has demonstrated the performance of a new radar receiver/warner technology as part of its on-going development work for Tempest, the next generation combat air project which will see the UK, Italy and Sweden working closely together. In a laboratory demonstration for the UK Ministry of Defence and other Team Tempest partners, the new sensor demonstrated a direction-finding performance of four times what is possible with a typical radar warning receiver while being just 1/10th the size of a standard system.

Leonardo UK is one of the four founding members of Team Tempest, which was brought together by the UK MOD to develop a next generation combat air system for the UK and partner nations: since the team was contracted to begin development work in 2018, Italy and Sweden have announced their intent to work with the UK on this project. Leonardo's UK role in the team is to develop Tempest's sensor package and integrate these sensors into the platform's mission system. The ambitious timescale for the Tempest project, which is working towards seeing a new aircraft in-service with the RAF in 2035, means that Leonardo in the UK is already hard at work developing some of the advanced technologies which will be needed to face the threats of the future.

One such area of development, and the focus of the recent lab demonstration, is in radar warning. This technology is used to sense the radio frequency (RF) signals emitted by potentially hostile radars and then use this information for a variety of uses, including warning an operator that an enemy is trying to 'lock on' to their aircraft. Such sensors can also support tasks such as intelligence gathering and combat identification. In future, threat radars are likely to use a range of technologies and software techniques to make it harder to identify their signals, meaning that Tempest's sensors will need to be sophisticated enough to be able to counter such techniques and flexible enough to be updated in response to new technologies as they emerge on the battlefield.

The reduced size and weight of Leonardo's new receiver technology, as well as reduced power requirements, means that it will be possible to integrate the sensor into a multi-function array. This concept, one of a number of innovative ideas being considered for Tempest, could see a number of multi-purpose sensors spread around the aircraft, simultaneously sensing and tracking enemy aircraft, incoming missiles and other threats from all directions, while being fully integrated with a forward-facing radar.

Lockheed Martin's Precision Strike Missile Successful in First Flight Test

Achievement advances missile closer to early U.S. Army acquisition of new long-range capabilities

Lockheed Martin successfully tested its next-generation long-range missile designed for the U.S. Army's Precision Strike Missile (PrSM) program at White Sands Missile Range, New Mexico. All test objectives were achieved.

During the flight test, the PrSM was fired from Lockheed Martin's High Mobility Artillery Rocket System (HIMARS™) launcher and flew approximately 240 kilometers to the target area.

"Today's success validates all of the hard work our PrSM team has put into the design and development of this missile," said Gaylia CAMPBELL, vice president of Precision Fires and Combat Maneuver Systems at Lockheed Martin. "This test flight is the most recent success in a long line of product component and sub-component testing successes conducted as part of our proven development discipline to assure total mission success for our U.S. Army customer."

Test objectives included confirming the missile's flight trajectory performance, range and accuracy from launch to warhead event, validating all interfaces with the HIMARS launcher, as well as testing system software performance.

"We are building reliability into our PrSM at every level," said CAMPBELL. "We are confident that our years of demonstrated experience in delivering unmatched Precision Fires capabilities for our U.S. Army customer and our commitment to ensuring affordability will result in the best PrSM option."

The next-generation precision-strike surface-to-surface weapon system will deliver enhanced capabilities for attacking, neutralizing, suppressing and destroying targets at depth on the battlefield and give field artillery units a new long-range capability while supporting brigade, division, corps, Army, theater, Joint and Coalition forces.

CAMM-ER Completes Major Trials Milestone

MBDA has successfully completed a series of trials of the CAMM-ER air defence missile, validating the high-performance of the system.

The trials have been conducted in the past months and saw a series of successful firings of CAMM-ER that proved the performance of the missile at extended ranges and high altitudes while conducting a number of challenging maneuvers.

CAMM-ER is the extended range member of the new-generation CAMM air defence family of weapons. All members of the CAMM family share the same cutting-edge active radar seeker and soft-launch system, with CAMM-ER featuring a larger rocket motor to provide extended range out beyond 40 km.

CAMM and CAMM-ER form the basis for MBDA's Enhanced Modular Air Defence Solutions (EMADS) offering. EMADS brings together best-of-breed systems and technologies from across MBDA's European base to save time, development costs and provide a flexible system for air defence provision. CAMM-ER, meant to replace the existing Aspide munition, is expected to be integrated in the Air Defence system of the Italian Air Force and Italian Army. CAMM-based air defence systems are known as Land Ceptor and Sea Ceptor by the British Army and Royal Navy. The Italian Navy is also evaluating how to include the missile family with its future surface combatants.

ISSN 2667-8624
VOLUME 1 - ISSUE 2 - YEAR 2019

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