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# DEFENCE TURKEY

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## ADVENT A PLATFORM INDEPENDENT CMS

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## A LOOK AT HİSAR-A AND HİSAR-O

AIR DEFENCE MISSILE SYSTEMS AND TEST ACTIVITIES

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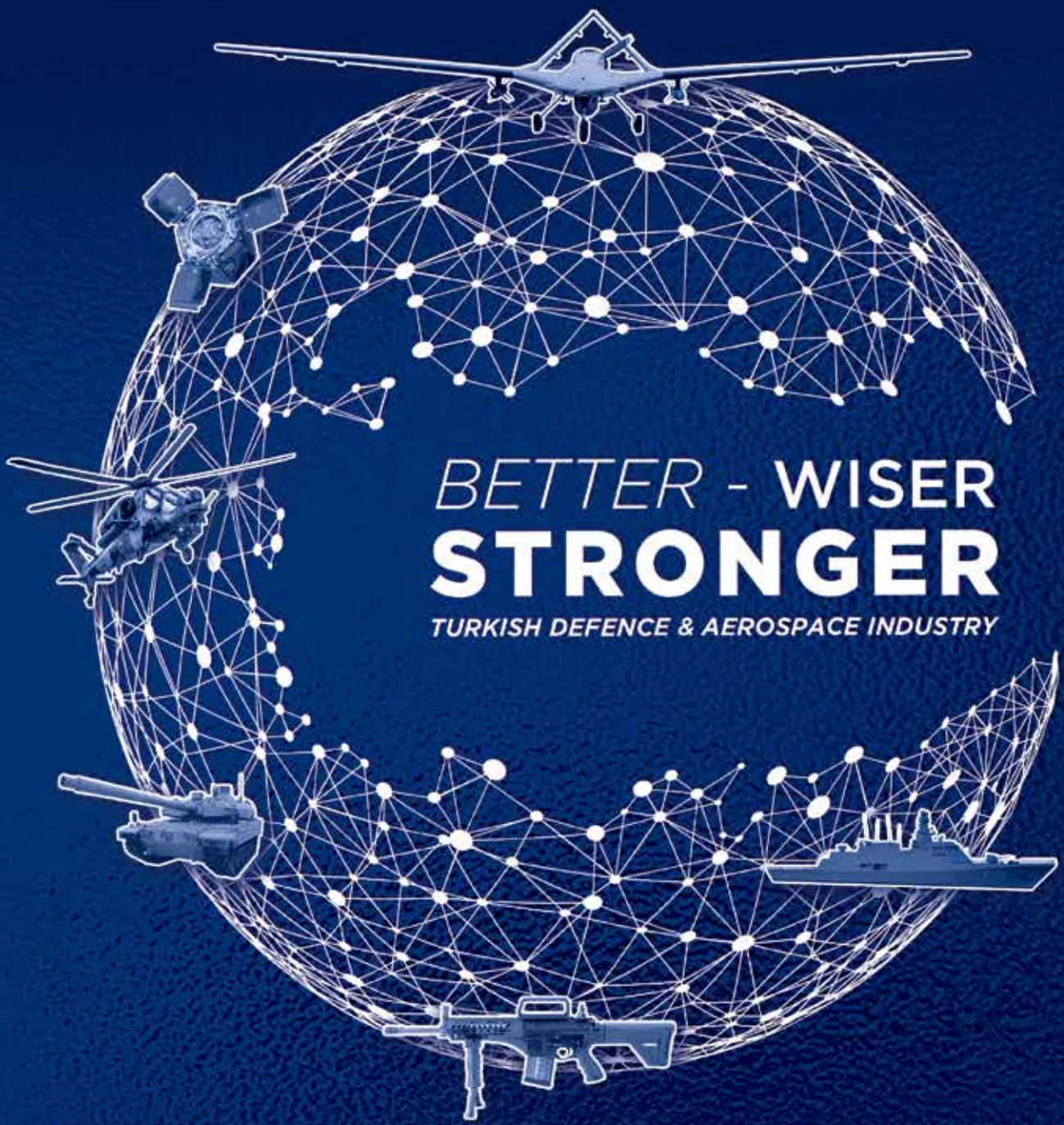


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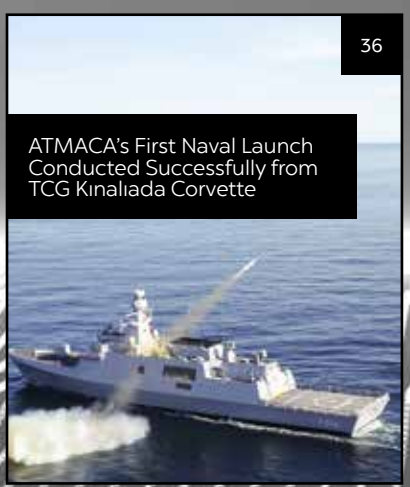



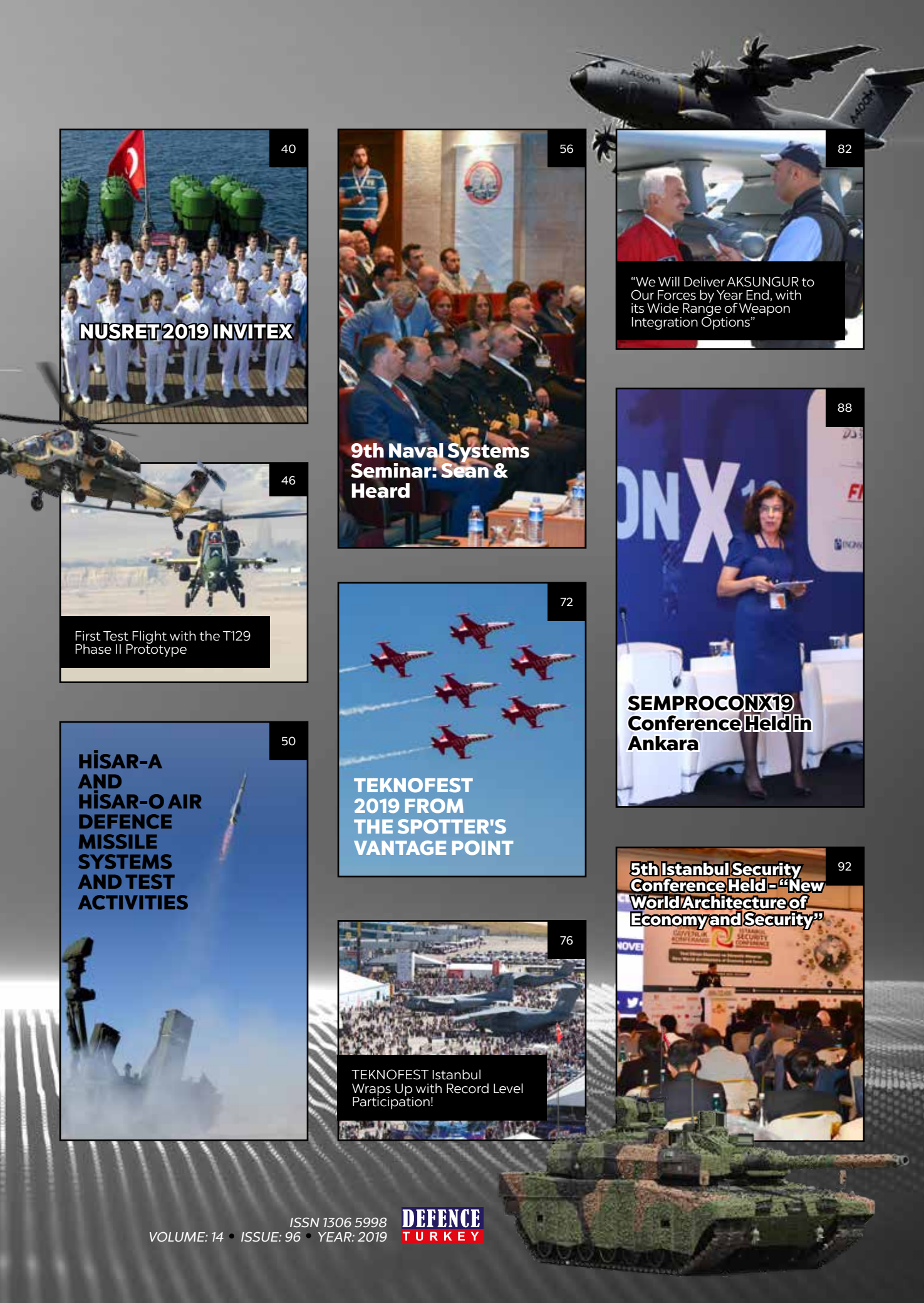




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DEFENCE TURKEY

# DEFENCE TURKEY

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# Turkish Defense Industry Passed Crucial Thresholds on Foreign Dependency

**Ayşe AKALIN**
Publisher & Editor in Chief

As we gradually left 2019 behind; We witness that the Turkish Defense Industry has passed significant thresholds in important projects. On November 3, the first Ship-Launch Test of ATMACA Surface-to-Surface Guided Missile was successfully conducted from our national ship MILGEM TCG Kınalıada Corvette. After the launch test, the Presidency of Defense Industries announced that the ATMACA Guided Missile would be put into service in the second half of 2020. Another critical development that will reduce Turkey's foreign dependence in the defense industry was the HISAR-A Low-Altitude Air Defense Missile System test-fired against a high-speed live target on October 12 and successfully destroyed the target with 100% accuracy the final system tests. After this successful firing test, President of Defense Industries Prof. İsmail DEMİR shared the good news with the public and announced that the serial production of the system would start. During this period, both the first test launch of the BOZDOĞAN Air-to-Air missile and the first test flight of the T129 ATAK Phase-II Helicopter were successfully completed. In the light of these critical developments that will pass significant thresholds in the defense sector, we see that the Turkish Defense Industry is gradually accomplishing substantial stages in the Land, Sea, Fixed and Rotary Wing Aircraft programs, and successfully started serial productions in various areas with foreign dependencies such as critical systems, subsystems, ammunitions, and platforms with even some systems entering the TAF's inventory. We see that every field-proven defense industry product that is added to the inventory of the Turkish Armed Forces, an outstanding power multiplier in the world and its region, continues to increase the number of its customers in global markets.

The Defense Industry Export figures, which achieved a significant increase in 2019 compared to the previous year, shows the potential of our country in this respect. The defense industry export figures, which were US$2,188 billion in 2018, are expected to reach US$3 billion in 2019 with the addition of sales revenues from overseas services and indirect exports. We hope that these figures will continue to increase in the coming years with the valuable contributions of our main industry companies, SMEs, sub-industry companies, research institutes, universities, and decision-makers that invest in R&D, development, production, and human resources. In this context, the foreign currency provided by our companies will surely increase the added value in our country and make a significant contribution to reduce our dependence on foreign countries.

Dear readers, we would like to thank Mr.Alper ÜNSOY, Vice President/Chief Marketing Officer at ALTAY; SaSaD Secretary-General Mr. Hüseyin BAYSAK and Deputy Secretary-General of SaSaD Mr. Yılmaz KÜÇÜKSEYHAN once again for their valuable contributions. In this issue, you will find the latest news about the numerous defense industry events and military exercises as well as the latest developments in the Turkish and global defense industries.

Enjoy...


# Airbus Program Updates Shared with Media at the 8th Trade Media Briefing (TMB 2019) in Germany

**Together with Airbus Helicopters, Airbus Defence and Space (ADS) held the 8th edition of its traditional Trade Media Briefing (TMB 2019) at its facilities located in Donauwörth and Manching in Germany, November 4-6. The three-day event was attended by some 60 journalists representing defence and aerospace media around the globe including Defence Turkey Magazine from Turkey. The last TMB event was held in June 2016, also in Germany. Airbus Helicopters has been participating in the TMB event since 2016.**

Over the course of the three day Trade Media Briefing 2019 event, press representatives got first-hand information and updates on current ongoing programs from Airbus Helicopters and ADS such as FCAS/Combat Cloud, SmartForce, H145M, H160M, A400M, A330 MRTT, C295 and Space. Detailed presentations were delivered by senior Airbus executives including Dirk HOKE, Chief Executive Officer (CEO) of Airbus Defence & Space.

During the event, in addition to facility tours that took place at the Donauwörth Airbus Helicopter site and the Manching ADS site, media representatives were also hosted at the 74th Fighter Wing of the German Air Force's Neuburg Air Base, the smallest air base of the Bundeswehr, on the afternoon of November 5th.

Hosted by the Lieutenant Colonel Swen JACOB, Commanding Officer the 74th Fighter Wing (JG74, Takt LwG 74) at Neuburg Air Base, media representatives found the opportunity to be briefed on EuroFighter operations by the German Air Force. During his address Lt. Col. JACOB provided his perspective of the EuroFighter Typhoon and provided fascinating insight into a recent aircombat training encounter with USAF F-35s. "F-35s came here recently from Swindon and said lets dogfight/visual. They did their 60 knots high Angel of Attack (AoA) maneuver, and we still gunned them... It was a four-on-four engagement in 90 seconds with neutral and offensive maneuvers..." said Lt. Col. JACOB. According to Lt. Col. JACOB the JG74's EuroFighter Typhoons get scrambled ~60 times a year, with about a dozen of these cases leading to aircraft getting airborne. The reasons for the scrambles usually get resolved in the 12 minutes taken to get airborne. Most scrambles are due to radar contact loss.


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*Ayşe AKALIN - Editor in Chief of Defence Turkey*

## November 4, 2019 Donauwörth Airbus Helicopter Site

On November 4, talking to journalists at the Airbus TMB 2019 in Donauworth, Germany Airbus Helicopters Defence Programs Executive Vice President Matthieu LOUVOT stressed that their proposal under the LAND 4503 Program (Armed Reconnaissance Helicopter [ARH] replacement) will cover not only the upgrade of the current Tiger ARH fleet of the Australian Army but also the delivery of an undisclosed number (believed to be 7) of H145M Armed Light Helicopters to provide additional ARH capability. The three contenders lining up for the LAND 4503 Program include Airbus Helicopters, Textron subsidiary Bell (AH-1Z), and Boeing (AH-64E). The LAND 4503 Program involves the acquisition of up to 29 attack helicopters. The new helicopters will serve as a replacement for the Australian Army's current stock of 22 EC665 Tiger ARHs. The Tiger ARH Upgrade proposal would use technologies developed for the French/German Tiger Mk III Program. Airbus Helicopters is marketing its Tiger Mk3 as the "Tiger platform beyond 2020" that will provide not only a serviceable platform with local industrial opportunity for Australia, but also a cheaper alternative. According to Airbus, by selecting the Tiger Mk3 Upgrade Australian taxpayers and the Army shall save up to A$3 Billion (US$2 Billion). "The Tiger Upgrade and H145M together will provide enhanced capabilities and will cost A$3 Billion less than buying a new helicopter type," LOUVOT said. LOUVOT also underlined that the H145Ms offered for LAND 4503 would be in addition to Airbus Helicopter's bid for the Army's special operations support helicopter program being delivered under LAND 2097 Phase 4, which covers the off the shelf purchase of up to 16 helicopters in the four-ton weight range along with a range of requirements for various mission roles for use by Special Forces based out of Holsworthy. Entry into service is scheduled for 2022. The Tiger Mk III Program is now the subject of de-risking activities, prior to the selection of a definitive configuration, but will likely involve a significant enhancement of the existing helicopter's avionics system, for which the Thales FlytX System developed for


© Airbus

*Matthieu LOUVOT- Executive Vice President of Airbus Helicopters*

the H160 helicopter is being considered, together with new mission systems and enhanced and additional sensors. LOUVOT confirmed that Airbus Helicopters is proposing to extend the life of Australia's Tigers out to at least 2040.

As part of the ongoing H145 development programs the service entry of the H145 and H145M with 5-bladed main rotor system are expected in Q2 2020 and Q2 in 2021 respectively. Retrofit for the 5-bladed main rotor system takes 220 hours (15 days). Thanks to new 5-bladed main rotor system the H145/M helicopters MTOW increases 100kg, which is equal to +150kg useful load. Showcased at TMB 2019 to trade media and journalists, the versatile & multi-purpose H145M is the new Battlefield Support Helicopter designed for demanding operations.

Fitted with HForce, which was introduced as a "cost-effective, retrofittable, plug & play approach for attack helicopter capabilities" the H145M can be armed with wide range of air-to-ground weapons including HMP400 12,7mm Gun Pod, NC621 20mm Cannon Pod, FZ231 70mm Rocket Launcher, Air to Ground Missile (on request), Air to Air Missile (growth potential) and FZ275 Laser Guided Rocket. HForce is a modular suite of avionics and weapons that can be installed on all Airbus helicopters. For HForce qualification & deliveries are expected to take place in 2020. Roketsan's CİRİT Laser Guided Rocket is also expected to be integrated on Airbus Helicopters H135M and H145M Helicopters via HForce and to the Tiger UHT Attack Helicopter. For this purpose, in June 2016 Roketsan signed MoUs for the integration of the CİRİT Laser Guided Rocket to H135M and H145M Helicopters during Eurosatory with Airbus Helicopters and to the Tiger UHT during ILA 2016 with MBDA Deutschland GmbH.

While each A400M can carry one H145M, up to four H145M helicopters can be carried aboard a C-17A Globemaster III and up to six H145Ms can be carried aboard a An-124 transport aircraft. As of August 2019, 51 H145M helicopters have been ordered, 15 for German Special Forces, 5 for Royal Thai Navy, 6 for Serbian Air Force, 3 for Serbian Police, 20 for Hungary Air Force and 2 for Luxemburg. Meanwhile, Germany Army Aviation (HEER) is set to receive the first of seven H145M LUHs configured for SAR operations 'imminently' according to Airbus helicopters. Additionally, the Philippines Coast Guard is about to take delivery of its sole example.

Airbus Helicopters operates in 148 countries with a € 5,934 Billion turnover as of 2018. 2,450 military helicopters of Airbus are in service operated by 160 military customers. Military Markets account for 50% Airbus Military Revenues. Airbus Helicopters is also a forerunner in the training helicopter field. Today over 130, modern twin-engine H135 training helicopters are in service for military training worldwide. The H135 is also expected to be offered to meet the Turkish Army's new training helicopter requirement. In July 2019 the Turkish Presidency of Defense Industries (SSB) issued a tender/ RFP document to acquire basic training helicopters for the Turkish Land Forces Command (TLFC). Airbus Helicopters is one of the potential contenders of this project.

Speaking at Donauwörth Airbus Helicopter site on November 4, H160M Program Manager Vincent CHENOT underlined that the H160M, a dedicated military version of the Airbus Helicopters' clean sheet civilian six ton H160, includes 68 new patents. According to CHENOT, the H160M configuration is the result of 10 years of joint collaboration between Airbus Helicopters and the French Armed Forces (Army, Navy and Air Force).

The Hélicoptère Interarmées Léger (HIL, Joint Light Helicopter) Program of the French Armed Forces will be officially launched in France in 2021. The Airbus Helicopters' H160, civilian variant, is due to enter service next year, whereas the H160M Guépard (Cheetah) prototype is expected to make its first flight at the end of 2023. The first delivery of next generation medium helicopters H160M Guépard (Cheetah) will be to the French Army in 2026, the French Navy in 2028 and then the French

*H160M*

Air Force. The French Armed Forces split on the 169 H160Ms it requires is: 80 for the Army, 49 for the Navy and 40 for the Air Force.

Airbus continues its efforts to obtain EASA certification for the H160 before the end of this year. Once the approval of the EASA has arrived, Airbus is planning to obtain American FAA approval within the following six months. If Airbus Helicopters can obtain EASA certification before the end of 2019, the H160 will be the first fly-by-wire civilian helicopter that is certified. The Bell 525 is also in the race. After starting series production, Airbus Helicopters plans to produce around 30 H160s per year. In 2026 when the first deliveries of the H160M will take place Airbus would increase the production rate to 50 units per year. Other countries are also interested in the H160M, but the French Armed Forces are given priority.

The H160 and H160M helicopters have a number of other innovations in addition to the fly-by-wire control system. Both versions are completely built in composite material and are equipped with a full glass cockpit and with Blue Edge rotor blades. The Blue Edge rotor blades realize a significant reduction in helicopter noise. Airbus prides itself on being able to talk in the H160 without headsets. Powered by a pair of Safran Arrano turboshaft engines (certified in June 2019), each generating 1,280 shp and offers a 15 percent fuel-burn reduction compared to similarly powered engines. The H160M Guépard (Cheetah) features the Thales FlytX Avionics Suite, with four 15-inch touchscreen displays that will be used for display of all data, including imagery from sensors and other tactical displays. In addition to 2 pilots, the H160M will also be able to carry 5 fully equipped commandos (12 passengers in civil configuration) at a cruising speed of 150 kts. The flight range is 458 nm (with 20-minute reserve). The H160M Guépard (Cheetah) is being tailored to meet the French program that is replacing five of aging helicopter types currently serving in the French Army, Navy, and Air Force. As part of the militarization, the H160M will be equipped with a range of communications systems, tailored to meet cyber-security requirements and varying levels of data classification. Sensors planned for the H160M Guépard (Cheetah) include a EuroFLIR 410 Electro-Optical System (EOS) and a Thales multirole tactical radar that is currently under development. The radar will offer various search and targeting capabilities and will feature three flat electronically scanned antenna arrays that will be located in an arrangement that provides near 360-degree coverage around the helicopter. Weaponry will comprise axial side-mounted gun and rocket pods, including the ability to fire laser-guided rockets. The naval version will also be able to launch the MBDA Sea Venom anti-ship missile. 7.62 mm pintle machine guns and pintle sniper rifles can be mounted in the cabin doors. The H160M Guépard can be also equipped with an Air-to-Air Refueling Probe for which technical feasibility has been demonstrated and the development launch is to be confirmed by the French Armed Forces.

C295 FWSAR


## November 5, ADS Manching Site

On November 5th at Airbus TMB 2019, the event started with Alberto GUTIERREZ, Head of Military Aircraft at Airbus Defence and Space (ADS). “Our building blocks supporting our future growth in 2019 are:

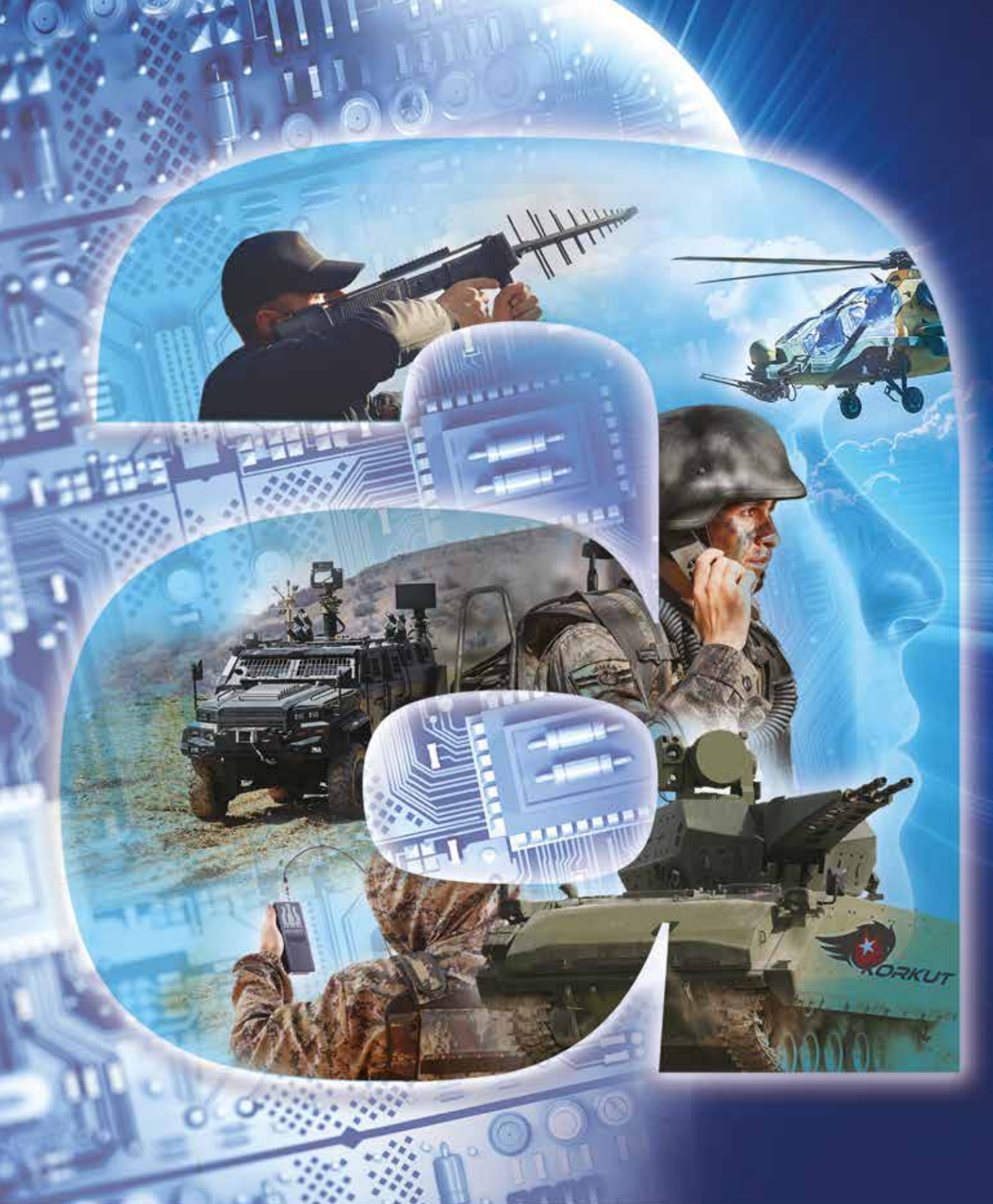

*Alberto GUTIERREZ - Head of Military Aircraft and Head of Airbus Spain*

A400M Stabilization, LTE (Long Term Evaluation) for EuroFighter Typhoon, Smart A330 MRTT, the FWSAR (Fixed-Wing Search and Rescue) for C295, Digitalization with SmartForce and FCAS (Future Combat Air System)" GUTIERREZ said. He also underlined that their biggest MRTT opportunities are in Europe, Asia-Pacific and Middle East. "You will hear more about this at the Dubai Airshow 2019" GUTIERREZ added. According to GUTIERREZ there is no plan for the MRTTneo version. Regarding the A400M export order GUTIERREZ said "The sooner the better." Answering questions about the ADS approach to the Indian market GUTIERREZ said Airbus is still talking to the Indian Government about AWACS having already been selected once and also bidding for the tanker with the A330 MRTT having won the competition twice already. He also expressed his belief that the A400M is the right sized airlifter for India.

Addressing journalists at Airbus TMB Day 2 at ADS' Manching facility in Southern Germany on November 5, Kurt ROSSNER, Head of Combat Aircraft, Military Aircraft at ADS underlined that the EuroFighter LTE (Long Term Evolution) will be an enabler of the European Future Combat Air System (FCAS). The German Air Force (Luftwaffe) is planning to retire its 38 Tranche 1 EuroFighters and replace them with Tranche 3 aircraft fitted to the new Quadriga configuration. ROSSNER disclosed that ADS is close to signing a contract with the German MoD to replace the Luftwaffe's 38 Tranche 1 Eurofighters under a the Quadriga Program. The retired Tranche 1 EuroFighters would then be sold to the international market before being replaced in Luftwaffe service by new-build EuroFighter Tranche 3 aircraft that will include the E-Scan Mk 1 Active Electronically Scanned Array (AESA) radar and updated software. "I would say that we are within weeks of signing the Quadriga contract with the German Government, we are now in the final stages," ROSSNER said. He added, "Project Quadriga will be a 38 German new production aircraft requirement for 7 twin seaters, 26 single seaters plus 5 single seaters optional. It will replace German Tranche 1 fleet." ROSSNER also disclosed that Switzerland would be a good match also as it looks to replace its ageing Northrop F-5E/F Tiger II and Boeing F/A-18 Hornet fleets. ADS has proposed up to 40 Eurofighters, built to Quadriga configuration, for Switzerland, with type selection by the Federal Council due at the end of 2020 or early 2021. According to ROSSNER, 110 Luftwaffe EuroFighter Tranche 2 and Tranche 3 aircraft will begin receiving the E-Scan Mk 1 AESA radar from Q2/2022 to be followed by 19 Spanish Air Force EuroFighter Tranche 3 in Q3 2022. ROSSNER also disclosed that the first EuroFighter Typhoon will be delivered to Kuwait Air Force in 2020 April and the aircraft will be equipped with pre-series Radar Mk 0 previously known as Mk1+. According to ROSSNER German Air Force is seeking Tornado replacement (estimated at 85 Eurofighter, 45 with "strategic" capabilities and 40 with offensive jamming capability) beginning in 2030 and ADS is proposing Electronic Combat Reconnaissance (ECR)/ Suppression of Enemy Air Defences (SEAD) version of to meet Luftwaffe's Tornado replacement requirement.

The ECR/SEAD variant of the EuroFighter Typhoon is expected to be in twin-seat configuration with an Electronic Warfare Officer (EWO) in the back seat. The front and rear cockpit will be independent from each other and the EWO will have a multi-function panoramic touch display and a dedicated mission


*Kurt ROSSNER - HO Combat Aircraft Systems*

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*Dirk HOKE - CEO of ADS*

cockpit at its disposal to perform Electronic Warfare (EW) & Electronic Attack (EA) missions. However, the computer-generated images of the EuroFighter Typhoon ECR/SEAD variant does not feature the conformal fuel tanks that would free-up three underwing pylons. The configuration presented by ADS shows the EuroFighter Typhoon ECR/SEAD variant carrying two Escort Jammer Pods, three 1,000 liters fuel tanks and six MBDA SPEAR-EW air-to-ground missiles (under development for the Royal Air Force), in addition to the standard air-to-air armament including of four Meteor and two IRIS-T missiles. Some images also depict the capability to employ the AGM-88B HARM or the AGM-88E AARGM. The Escort Jammer Pods will be complemented by two Emitter Locator Systems installed into the EuroFighter Typhoon's wingtips. According to an infographic provided by ADS, escort and stand-in jammers can be carried simultaneously on the same aircraft.

The ECR/SEAD configuration is part of a wider Long-Term Evolution (LTE) plan for the EuroFighter Typhoon combat aircraft that will span the coming decades. During Paris Air Show 2019 the Eurofighter Jagdflugzeug GmbH and the Eurojet Turbo GmbH consortiums announced that the NATO Eurofighter & Tornado Management Agency (NETMA) have assigned contracts worth € 53,7 Million to support the LTE of the EuroFighter Typhoon combat aircraft. The initial capability for the Eurofighter ECR is expected by 2026 with a podded solution, while the full capability will be implemented by the end of the 2020s into the new airframes built as a EuroFighter Typhoon LTE Program standard. The new technologies will be further developed and fully integrated into the FCAS.

Addressing journalists at ADS' Manching facility on November 5, Dirk HOKE, CEO of ADS underlined that a European approach to Defence has been created again and added, "Our ambition is to be at the heart of the future European aerospace power. Our key differentiator: We know how to manage large programs in a complex set-up. No other company in Europe can provide such diverse resources than Airbus. We continue to push Europe to use a common approach (to defence) not a national approach so that we can compete with the likes of the USA and China." Commenting on whether Tempest & FCAS could merge in the future, HOKE said, "Once Brexit clears, I strongly believe British pragmatism will offer a solution. It would be a major step back for Europe to have two competing defence projects, same negatives as Rafale vs Typhoon... I hope when Brexit is settled there will be some discussion with the Tempest FCAS partners about the future. And maybe work together. It's not good to have two different FCAS solutions that will split European collaboration and sales..." Regarding the A400M Program HOKE said, "We are very optimistic that the speed of discussions (with new customers) will increase as we continue to demonstrate capabilities." HOKE also stressed that with a certification flight test executed in early October for the simultaneous dispatch of 80 (40+40) equipped paratroopers from both side doors of an A400M on a single pass, Airbus has demonstrated clearly that this capability is on the right track. The flight test for the simultaneous dispatch of 116 (2x58) paratroopers is expected to be carried out soon. Certification activities for the A400M paratroopers dispatch capability are planned to be completed in the first half of 2020. According to HOKE, ADS is optimistic and confident about existing efforts in India. "We have been running campaigns there for a decade. Avro-replacement contract for transport aircraft is super-important for us and for India, because it is a real 'Made in India' contract. We would build 16 C295s in Europe and 40 with Tatra in India" HOKE said. In October 2014 Airbus announced that it has teamed up with Indian private firm Tata Advanced Systems to bid for the US$2 Billion deal to replace 56 aging Hawker Siddeley HS-748 Avro transport aircraft, which were in service since its induction from 1962. Under the project ADS has offered its C295. HOKE believes that there is a market for up to 150 C295s in India.

# Airbus Unveils LOUT Stealth Testbed

**After more than a decade as a secret project, Airbus Defence revealed the LOUT (Low Observable UAV Testbed), a holistic platform approach to stealth, covering Signature Reduction, Electromagnetic Emission Control, Electronic Countermeasures**

On November 5, during TMB 2019 Airbus unveiled for the first time a 4-ton classified Low Observable UAV Testbed (LOUT) that it has been developing in secret for almost 12 years at the Manching facility with a Shunk Works approach for the German Government. The Editor of Chief of Defence Turkey Magazine also attended the launch ceremony held at the ADS Manching facility where the LOUT model was revealed in a hangar with an anechoic chamber. On this non-flying 12m x 12m diamond-shaped subsonic UAV, Airbus has been working on very low observable (VLO) technologies in terms of designs, coatings and antennae that might be fed into the Future Combat Air System (FCAS) Project. LOUT design is focused on broadband radar, IR and acoustic signature reduction. It is claimed that the LOUT's stealth profile makes it completely undetectable from air defence threats and radar-based detection. "It will make a valid contribution to the FCAS," said Mario HERTZOG, FCAS Senior Project Manager.

According to HERTZOG the initial concept work on LOUT began in 2007 through Airbus internal funding, and the development continued in Skunk Works-like secrecy. LOUT was contracted by the German MoD in 2010 as a VLO ground testbed to demonstrate wideband signature reduction technologies and refine configuration and material choices for a potential configuration of a VLO-platform. Noting that ADS has been involved in VLO technologies for several years, HERTZOG said, "Bringing all our experience into one program was a logical conclusion. "Stealth is and will remain an enabler for survivability," he added. During the development process, several configurations were elaborated. The company started with 2D platform evaluations, followed by 3D layouts, and then 3D configurations. The testing of the three most promising configurations was launched in 2014, and following the tunnel tests of scale-models, Airbus decided on a diamond platform shape in 2015.

LOUT covers all aspects, from simulation and development to production and measurement. The program aims to demonstrate a holistic approach to low observability. It is designed to offer visual, acoustic, radar (VHF to Ka-Band), and infrared signature reduction against ground-based threats, as well as the use of electronic countermeasures and electromagnetic emission control. The aircraft features an internal weapons bay located in between the engines with all-aspect stealth design features. The model has low-RCS diverterless air inlets mounted on top of the aircraft and a thrust-vectoring flat exhaust nozzle that is protected against ground-based sensors. LOUT also features a cockpit to test the properties of several transparency technologies that do not affect the aircraft's low observability. The canopy represents the installation of electro-optical sensors and does not indicate any manned capability for the aircraft. To further contribute to the low-observability, the aircraft features minimized gaps between surfaces as well as surface-wave attenuation that decouples mutually spaced scattering effects.

The model, which does not incorporate any traditional flight control surfaces, bears a striking resemblance to the twin-engine Airbus SAGITTA UAV that flew for the first time on July 5, 2017. Airbus launched the SAGITTA demonstrator in 2010 to jointly develop advanced technologies for unmanned flight. The project started as a feasibility study for the flying-wing configuration and developed in conjunction with institutes from the technical universities of Munich and Chemnitz, the University of the Federal Armed Forces (Universität der Bundeswehr), the Ingolstadt University of Applied Sciences and the German Aerospace Centre (DLR). Airbus stated that the research vehicle was constructed to a scale of 1:4 with a 3m wingspan, which corresponds to the 12m wingspan LOUT design.

The LOUT Program does not aim to produce a flying testbed; it intends to provide the means for developing and understanding low observable technologies. It focuses on testing radar-absorbent materials, LO structure, radar frequency, and infrared signature reduction, as well as analyzing the acoustic characteristics of such a design. Airbus affirmed that it completed contracted work on LOUT, and the first phase of testing has been completed but stated that additional phases could follow. It is expected that the technological gains from the LOUT Program will be available for EuroFighter Typhoon Long Term Evolution (LTE) activities and the proposed Future Combat Air System (FCAS/SCAF) being developed by France, Germany, and Spain.


*Jana ROSENMAHN - Head of UAS at Airbus Defence and Space (ADS)*

## November 6, ADS Manching Site

The last day of Airbus TMB 2019 began with Jana ROSENMANN, Head of UAS at Airbus Defence and Space (ADS) providing an update on the Unmanned Aerial Systems (UAS) of Airbus including European MALE RPAS, Zephyr and FCAS. Being developed by France, Germany, Italy, and Spain, the European MALE RPAS (Medium-Altitude Long-Endurance Remotely Piloted Air System) is planned to perform its maiden flight in early 2023. During her address ROSENMANN underlined that Airbus is now heavily engaged with its partners Dassault and Leonardo, as well as with the Organization for Joint Armament Cooperation (OCCAR), in closing out two critical aspects of the European MALE RPAS (also known as either EuroDrone or EuroMALE) to form part of the Future Combat Air System (FCAS). "We are now in a very intense convergence phase of the program, with the four nations and OCCAR. We hope to conclude later this year in determining the scope and price of the system, which is the culmination of two-decades of collaboration," ROSENMANN said. She stressed that EuroDrone hasn't replaced 'European MALE RPAS' official name yet, but they would rename it once they sign the contract. According to ROSENMANN European MALE RPAS is an important 'brick' in what they are building on the FCAS, and a major step for Europe. ROSENMANN also pointed out that if a development program begins now, they would be able to prove a Typhoon + remote carrier (fighter + drone set) capability under a Manned-Unmanned Teaming (MUM-T) approach by 2026-27, and it will be a big step towards the first FCAS delivery in 2040. Germany, France and Spain announced the start of the Future Combat Air System (FCAS) Project at the Paris AirShow in 2019. As an integrated system, FCAS is not limited to creating a sixth-generation stealth fighter, other than that, the FCAS Project also includes engine support with new technology, air combat cloud, various advanced sensors and remote carriers. In a video presentation at the ADS Manching facility, ROSENMANN showed the pattern of deployment of remote carriers from the Airbus A400M heavy transport aircraft. In the simulation, the A400M ramp door can launch up to six wingman drones for FCAS. Unlike drones that are launched from the surface, the design of a remote carrier is identical to cruise missiles, characterized by the presence of a folding wing shape. The remote carriers which act as an extension of fighter jet eyes by expanding the radar range are also popularly referred to as Loyal Wingman. The presence of a 'companion' drone can provide pilots with an overview and extensive information about the battlespace.

After ROSENMANN, Eric ISORCE, Head of Flight Test & Operations at ADS and Ioannis PAPACHRISTOFILOU, Head of Marketing at ADS provided updates on the troubled A400M Program. In his address ISORCE disclosed that the Thales automatic low-level flight system on the A400M certified down to 150ft in VMC conditions and night flight test with the IMC will be performed in 2020. ISORCE pointed out that as part of Air-to-Air Refueling (AAR) tests with A400M dry contacts with H225M Caracal helicopter performed in September 2019 and wet contacts will be performed between the two platforms in December 2019. With this test, 10 years of H225M AAR development will be completed. Certification for A400M AAR capability is planned to be completed in 2021. According to ISORCE, scheduled to be delivered in 2020, the A400M MSN 104 will be first aircraft with full airdrop capability. Out of 174 A400Ms that were ordered by 7 European Launch Nations and the sole export customer Malaysia, 85 of them have been delivered. 31 delivered to Germany, 20 to the UK, 15 to France, 9 to Turkey, 6 to Spain and 4 to Malaysia. As of October 2019, more than 60,000 flight hours have been flown by the A400M fleet. According to Ioannis PAPACHRISTOFILOU, ADS has slowed the A400M production rate to 8/year to extend the window to attract more export customers. "The decision was taken with our existing customers and ensures the even flow of deliveries to them," PAPACHRISTOFILOU said. He stressed that the A400M has brought strategic lift into tactical


situations and they have had very positive feedback from users on the A400M's performance in unpaved runway operations. "The A400M is now proving its game-changing characteristics," PAPACHRISTOFILOU said.

Then Dider PLANTECOSTE, A330 MRTT Head of Program took the stage together with PAPACHRISTOFILOU to provide update on the A330 MRTT (Multi Role Tanker Transport) Program under which ADS received 60 orders and has already delivered 41 of them to 13 nations around the globe and accumulated over 200,000 flight hours. During the Dubai AirShow 2019 the United Arab Emirates (UAE)' Air Force and Air Defence (UAEAFAD) announced on November 19th that it was in the closing stages of negotiations with ADS for the procurement of 3 more A330 MRTT aircraft. The UAE already has three MRTTs and the platforms are used heavily in support of UAE Air Force fighter deployments and operations across the region. No details of a contract value for the additional MRTTs has been revealed. According to PLANTECOSTE apart from the capacity (payload) and ability to distribute fuel in the air, the A330 MRTT Tanker Aircraft that is classified as a Strategic Vehicle, is equipped with a number of self-protection systems/sensors able to provide adequate protection standards to the end users. In this context, the Airbus A330 MRTT has been equipped with a cockpit armoring and self-protective DIRCM (Directed Infrared Countermeasure) to deal with potential infrared guided MANPADS missile attacks. In addition to protection from the threat of attack from the surface, it turns out that the tanker that has been used by Singapore also has secure communications features for low detectability and

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*Ioannis PAPACHRISTOFILOU - HO Marketing Defence and Space*

tactical scenarios that are integrated with the Onboard Information Terminal (OIT) and there is a provision of NRBC (Nuclear, Radiological, Biological, Chemical) suits. In his address PAPACHRISTOFILOU disclosed that the A330 MRTT has achieved 94% market share in the past 10 years and announced an improved variant of the A330-200 MRTT aircraft. According to PAPACHRISTOFILOU the improved aircraft is geared toward a number of expanding roles and capabilities with a goal to evolve the market-leading tanker-transport aircraft into a versatile multi-mission platform of choice for future customers. As outlined by PAPACHRISTOFILOU, the expanded roles include VVIP transport; Intelligence, Surveillance, and Reconnaissance (ISR); and as an airborne communications node through enhanced connectivity. The new capabilities center around predictive maintenance and Automatic Air-to-Air Refuelling (A3R). PAPACHRISTOFILOU disclosed that the A330 MRTT's New Mission Planning System has been certified and delivered to customers and the certification of the A3R capability on the A330 MRTT will be achieved in 2021.

Delivering a C295 briefing to media representatives at Airbus TMB Day 3 at ADS' Manching facility, Ioannis PAPACHRISTOFILOU, Head of Marketing at ADS underlined that the renewed configuration of the C295, which is dubbed "The New C295" has been configured mainly to meet Canadian Fixed-Wing Search and Rescue (FWSAR) Program requirements. Under the Canadian FWSAR Program contract was awarded in December 2016. The renewed configuration is built around an enhanced avionics suite as well as other system and performance improvements. As explained by PAPACHRISTOFILOU the New C295 configuration features; Collins Aerospace Pro Line Fusion avionics suite that includes 14.1-inch (35.8 cm) touchscreens compatible with Night Vision Goggle (NVG), improved situational awareness with a head-up display (HUD), Enhanced Synthetic Vision System (ESVS), Weather Radar (with wind shear and turbulence prediction), Terrain Awareness and Warning System (TAWS), a FITS Mission System Tactical Situation Window and video feed to the cockpit, a Next Generation FITS Mission System with larger 24-inch screens and more powerful processors, a Gravel Deflector on the landing gear to protect the aircraft's underside during rough-field operations, improved ditching characteristics with a strengthened under-fuselage and an escape hatch in the forward upper-fuselage, tweaked winglets, 50% more electrical power generation and aerodynamic improvements (thanks to its newly designed nacelles landing gears are now fully enclosed when retracted so you can no longer see the lower wheels and drag reducing microwaves [vortex generators] are fitted to around the rear fuselage). PAPACHRISTOFILOU said that, while many of these features can be retrofitted (aerodynamic enhancements etc.), some cannot (the structural enhancements for ditching etc.) on the existing C295s. PAPACHRISTOFILOU stressed that with C295's new features that enhance mission capability of the aircraft, strengthening its position as the market leader in its category. According to PAPACHRISTOFILOU the first of 16 Canadian C295W FWSAR (CC-295W FWSAR) aircraft, which was rolled out in its full livery (in the typical yellow-red livery of the Royal Canadian Air Force) on October 8, 2019, will be handed over to the end user before the end of 2019 and the performance based contract (covering 8,525 flying hours per year) also includes simulators, MRO & support services. According to PAPACHRISTOFILOU they are still planning to conduct a flight with a C295 armed gunship (27mm cannon/guided weapons) version and disclosed that they are still in discussions with potential customers on this variant - which was highlighted at the 2017 Dubai AirShow

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# Airbus Defence and Space Operations: A Human-Business Ecosystem Challenging the Future

At the TMB 2019 dinner on November 5, 2019 Barbara BERGMEIER, Executive Vice President (EVP) of Operations at Airbus Defence and Space (ADS) met journalists and shared her comments on how Airbus, as an Operations team manages digitalization in a human centric ecosystem to foster competitiveness, highlighting the importance of people and suppliers that play essential roles in achieving success.

*Barbara BERGMEIER - Executive Vice President of Operations at ADS*

Airbus Defence and Space appointed Barbara BERGMEIER, as Head of Operations and a Member of the Executive Committee as of December 2018. Thanks to her leadership and experience in complex industrial ecosystems performed over the years, she has lead with her expertise and strong international background in many areas such as Manufacturing-Operations, Digital Transformation, Supply Chain Management, Production Restructuring, Design and Set-up of assembly lines.

During her address at the dinner as Barbara BERGMEIER shared, ADS Operations are focused on following concepts:

## Operations in Airbus Defence and Space

Low volumes, huge variability requires flexibility: Defence and Space manufacturing processes have low volumes but huge variability. Airbus' products, whether they are satellites or military aircraft are highly sophisticated products, requiring specific competences that might differ significantly from one program to another. This requires huge flexibility, which put its people at the center of its factories.

## Enterprise of the Future - Digital Transformation in Operations

**The factory of the future technologies on the shop floor: 3D work orders, mixed reality.** Transformation of an A330 aircraft to a multi-role tanker and transporter is done with smart glasses equipped with virtual reality (VR) and augmented reality (AR) technology, which simulate the results of all actions taken by technicians on the aircraft.

It is easier and more reliable than ever before for a technician to install meters of cables on the plane or to work on avionics systems using these technological glasses. Also, the company's training documents are incorporated to the system and integrated its internal training processes with VR technology. Every time the employees put on the glasses, they find themselves in a classroom and can see all the course notes.

The introduction of 8 Digital Initiatives in ADS Production has improved company's processes by far – today daily routines, work orders, production controlling and remote support are based on digital tools and by this it has decreased the lead time and is improving the Quality of ADS' Products the same time.

In Space Systems, Airbus is introducing these technologies currently as well, one example is the next generation CO3D high resolution satellite which will be produced on a Pulse Line with a high degree of automatization and supported by digital tools.

**Standardization of its processes: Digitizing its processes, Lean, Excellence System.** Lean principles and digitalization shall go hand in hand. Since

the company wants to improve in terms of efficiency and flexibility in all areas of its manufacturing businesses – FALs, Aerostructures, Spacecraft and MRO Airbus does not forget this fact and puts a lot of emphasis on its Operational Excellence System to improve continuously.

**Connectivity of its systems: Need for Digital Backbone, end to end continuity.** Standalone innovation is quite common. Connecting all innovations initiatives is another challenge. For this reason, Airbus is aiming for a standard digital backbone with One Single Enterprise Resource Planning or One Single MES (Manufacturing Execution System) and a full end to end digital continuity from Engineering to Production, Quality and even to its suppliers. This is the necessary step to maximize the full benefits from the data analytics revolution. This will be fully tested in new FCAS and EuroDrone (MALE RPAS) programs.

Airbus wants to secure an end-to-end digital continuity from Engineering to Production, from design to manufacturing and services, with a complete digital visibility and continuity of data.

This is granted by the program DDMS - Digital Design, Manufacturing & Services. It is about designing, building, supporting and operating complex products and services.

It enables the movement from sequential production processes to an end-to-end approach having data stored centrally which will create value by lowering costs and reduce lead time.

**The data revolution, future competitive advantage.** The usage of data basis for artificial intelligence is also providing a competitive advantage in Operations. Airbus has already achieved some successes in this domain such as in reducing the operating costs compared to previous big data analysis. The main idea is to identify patterns in Airbus data and accelerate the company's learning process to improve its product quality. Anticipating issues much further in advance before they arise is a key factor, for example in the case of missing parts or reducing the cost of Non-Quality based on previous big data analysis.

## Digital Ambition Including its Suppliers: Supply Chain Management

Airbus is doing business with approximately 10,000 suppliers from more than 60 countries. In order to maximize knowledge, efficiency and performance within its supply base – and in turn Airbus' overall performance – it is key to work in close and trust-based collaborations.

**The digitalization of supply chain operations** will help suppliers achieve better performance. With information management roadmaps, automation of KPIs and ordering, robotics, digital tools for purchase to payment processes, and data analytics, it is on track in the digital evolution.

**Smart logistics:** Whether it is delivering or storing critical parts in warehouses for its manufacturing operations, many of the technological bricks required to completely transform this activity are available. For instance, Airbus can now follow the goods being transported by a digital tracking tool based in IoT for geo-localization, and smart systems are also being used to manage warehouses, as well as inventory control using drones.

## Production Optimization - Design and Set-up of assembly lines

The Airbus Defence and Space Excellence System provides the best solution for different needs for a smooth, uninterrupted flow of information, material and people to achieve higher value adding operations. It depends on the respective circumstances and production rate equal to customer demand with the lowest life cycle cost.

A moving assembly line has been proven as the right system for the C295 Fuselage Assembly to ensure that the customer's needs are met on time. Additionally, for the Integrated Fuselage Assembly of A400M a Pulse Line has been chosen. This approach has already implemented and an increase of 20% of productivity and reduction of lead time and inventory around 9% in ADS' Spanish and German production plants has been achieved.

## A Human Centric Organization: Leadership and Values, Safety and Wellbeing, Employee Development and Skills Ready for Digital

In order to embrace the enterprise of the future, having Value driven Leaders as role models and those who develop their employees and create the best work environment is essential.

Safety and wellbeing are at the core of Airbus activities. Ergonomic projects through the assessment of each work station improve working conditions. Health and Safety communication and improvement campaigns are deployed to secure the awareness and the engage of all Operations employees. Key competences are also critical and this is becoming even more true with the deployment of its new digital solutions ■

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# **ALTAY** Turkey's Experts in Military and Civilian Customer Specific Software

We talked with Alper ÜNSOY- Vice President/Chief Marketing Officer at ALTAY about the company's accomplished projects at home and abroad, ongoing export activities and also its expertise on a global scale...

**Defence Turkey: Founded in 1998 and performing activities in the fields of tactical systems, command control systems and corporate systems in military and civilian areas, ALTAY Software provides solutions using advanced technologies at international standards. Could you please inform us on ALTAY Software's performance for the first half of 2019 as well as the company's 2020 targets and expectations?**

**Alper ÜNSOY:** ALTAY was established in 1957 to provide consultancy, domain expertise and technical solutions. Our company was one of the first companies performing in such a field at that time. During its 62 years in the Turkish market, it has successfully conducted many defense and commercial projects and has been delivering significant services to public institutions, foundation companies and domestic and foreign private companies.

In order to create better solutions in the face of changing needs, in 1998 the company decided to proceed as ALTAY Software. Since then, it has been providing custom information technology solutions at international standards in military and civilian fields for more than 21 years.

Altay Software made Turkey's first defense software export to Norway in 2004 and all products exported have currently been serving the Armed Forces of 21 countries, including many NATO countries. Its main areas of expertise are Enterprise Resource Management and Planning Systems, Tactical Systems, Command and Control Systems, Simulation Systems and Test Systems. More than 60 products have been successfully launched so far.

Having adopted the principle of trust and satisfaction in its business conduct, ALTAY Software successfully delivers the software and technologies it has developed to important requiring authorities. Some institutions and companies that it delivers services to are the Ministry of Defense, National Security Council, Land Forces Command, Naval Forces Command, Air Forces Command, Aselsan, Turkish Aerospace, Roketsan, Havelsan, FNSS, TURKSAT, TOBB, Kongsberg Defense Systems, Kongsberg Maritime, Kongsberg NorcontrolIT, Kongsberg Geospatial, Norwegian Navy, South Korea Navy, Philippines Land Forces, Dyncorp, Telephonics, Denel Mechem, L3 Communications, L3 LINK Simulations, Gamma, Nitromak, Kocatepe Technique, Positive Drilling and Ankey.

In recent years, in the simulator field, we completed the HAWK XXI Communication Planning Simulator for Norway based company KONGSBERG; Link Training Simulator for NATO Air Defense Systems; Computer Aided Training Simulator and Augmented Reality Capability for Aselsan A100 Night Vision Monocular Project; Augmented Reality Project for Borusan-BMW company stores; Combat Aircraft Cockpit Simulator for the Jordanian Air Forces; Launcher Management Simulator and Weapon Management Simulator for Roketsan.

We are taking firm steps toward the future by increasing our business capacity each year, expanding our know-how and the number of companies/institutions that we work with. Our company is preparing to successfully wrap up 2019 as a year of corporate transformation, progress in projects and development of products. In line with the


importance we place on qualified manpower, we are planning to continue the impetus we achieved in 2019 also in 2020 with our technical and administrative team which grows day by day, and to provide a superior level of businesses both at home and abroad. As ALTAY Software, we place extreme importance on cultivating institutional development so that is can be healthy and sustainable.

We aim to complete the F16 Simulator Maintenance Project for the Air Forces Command; Electronic Warfare Operator Training Simulator (EHOPES) Project for the Naval Command; Network Planning and Design Simulator Project for Aselsan in the field of simulators, and in the field of software MBS Application Software Update services that we have undertaken for re-organizing the New Military Service System of the Ministry of Defense, as well as many other projects that we have been executing.

By transferring knowledge that we acquired from the simulator projects mentioned above, to various products and projects, we look forward to making a difference and a big breakthrough in this field in 2020.

In the forthcoming period, we aim to create system solutions that quickly respond to the needs of our customers by bringing together small and medium sized companies with which we have established strategic partnerships and who are specialized in their fields. Our core team that we established with companies having deep technological expertise and diverse capabilities operates under a single roof in line with ALTAY's market experience and technical knowhow. We think we have established a devoted team and we believe we will put our sign under projects that will capture considerable attention.

**Defence Turkey: What would you like to tell us about the main export activities of ALTAY Software, the most important export markets and the share of export in the company's turnover? Could you also inform us on the share of defense and civilian products/software in exports?**

**Alper ÜNSOY:** Turkey's software exports, which are estimated around US$ 200-250 million today, are continuously increasing. With the momentum achieved in the last year the software market grew by 20% in Turkey, and we see that foreign companies are increasingly paying attention to software experts in Turkey. This plays a key role as we see that recently many foreign companies have turned their eyes to software companies in our country and they are willing to create more business opportunities with these companies.

Today, one of the most important reasons why investors prefer our country, particularly in the software industry, is the low-cost but high-quality workforce that we provide. The rapid increase in costs in developed countries creates a situation where foreign investors tend to start looking toward countries that have a low-cost but qualified labor force.

ALTAY Software accomplished Turkey's first defense software exports and we strive take firm and resolute steps forward with each passing year. We want to increase our exports either by taking part in the systems exported by main contractor companies or by being a direct software solution partner of foreign companies. We focus utmost efforts on achieving an export volume that is sustainable, increasing our export potential in existing markets, accessing new markets and expanding our product range. In line with our objective to increase our export


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activities, we also are pursing a level of exports that will constitute an important part of our total sales figures.

In the recent period, we have made value-added agreements with foreign companies that will allow us to gain various capabilities. One of our most important goals is to continue these projects successfully in the forthcoming period and to increase the number of foreign companies with which we work, recognize and appreciate the strong support of the Presidency of Defense Industries (SSB).

**Defence Turkey: What would you like to say about your new software, which was developed within the scope of the Smart Production Management System and Test Infrastructure & Automation Project. It was released last year for Digitalization in Industry (Industry 4.0) exports and can perform automatic testing and debugging on software running on the chip (chip). What is the level of interest for this software on the export market? What type of feedback have you received so far?**

**Alper ÜNSOY:** With the new revolution called Digitalization in Industry (Industry 4.0), the entire production and value chain from the first supplier to the end user is fully integrated using the most advanced digital technologies. With these technologies, a Smart Production infrastructure is created in which all the data generated in all processes are stored, processed with user-defined formulas and algorithms, is transformed into significant information for process managers through Big Data Analytics, and autonomous production processes are established with rule-based scenarios in the system architecture, where all the equipment in the production area is identified with a special internet address. In other words, an ideal integration of all hardware and software within the company's assets is aimed.

The software that dubbed as Smart Production Management System enables SME-sized companies to monitor and manage their production. The system has two important features, one of which is that the machines communicate with each other, and the other is the physical monitoring of the products on the production line. While monitoring the production lines, we ensure that the production is planned correctly, the production processes are properly implemented and the production rate is increased. This software is integrated also with the companies' accounting and other corporate applications. In the coming period, we will try to rapidly expand the capabilities of this product and make it widespread.

With this product, companies will be able to see that they can achieve sustainable improvement. In this way, we anticipate that the demands from many companies will continue to increase and the product will mature and serve our customers efficiently. Many companies wish to complete the process of digital transformation and especially the companies in OSTİM show considerable interest in our efforts on this matter. To this end, we are exerting great efforts with OSTİM Management and OSTİM Technical University in order to lay the foundations of a structure that will turn into a product family together with our digital transformation team.

**Defence Turkey: What would you like to say about the types of software your Company currently uses in projects at home as well as abroad?**

**Alper ÜNSOY:** Our Company has many projects abroad. We have developed and delivered 4 different types of software to KONGSBERG, a Norwegian based defense industry company operating in the fields of unmanned aerial vehicles, air defense systems, and the security and efficiency of vessels, for the NASAMS II Air Defense System, and we have increased the number of countries to which we exported our products to 21 during the last 15 years. 22 different types of software that we developed are currently used in 21 countries comprising the U.S, Germany, Australia, Azerbaijan, Indonesia, Philippines, Finland, South Korea, Netherlands, Spain,

Italy, Sweden, Qatar, Lithuania, Malaysia, Norway, Poland, Chile, Oman and Greece.

**Defence Turkey: Could you please inform us on ALTAY Software's R&D approach, number of R&D personnel, amount of R&D resources allocated to R&D studies activities that were certified as an R&D center by the Ministry of Science, Industry and Technology as of June 2017?**

**Alper ÜNSOY:** Having adopted the R&D and innovation culture in Turkey, offering continuous R&D activities through innovative approaches, developing new products and technologies, ALTAY Software delivers services with its more than 150 R&D personnel at its own facility that spans 2,650 m2. Our facility, certified as an R&D center by the Ministry of Science, Industry and Technology since June 15, 2017, has an information processing center and laboratories where CMMI-3 level software design and development, testing and inspection as well as R&D activities are conducted. ALTAY Software facilities have "National Secret" and "NATO Secret" Facility Security Clearance.

We, as the company, regard our human resources as our most valuable treasure. For us, one of the main criteria regarding human resources quality is time. Therefore, we allocate most of our time to R&D activities.


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While the changes made to adapt software or an infrastructure to a new application or customer are outside the scope of R&D, redesigning certain modules of software, changing its technology and infrastructure are considered as to be a new R&D study. Therefore, our new R&D software that provides specific solutions and our efforts to gain added value to the currently used software are part of our R&D activities. With more than 62 years of experience and know-how and a company culture based on long-term sectoral experience, our Company develops custom solutions for projects and applications, qualified solutions and conducts R&D studies in the following areas of expertise:

- Command and Control Systems
- Simulation and Training Systems
- System and Software Test Solutions
- Tactical System Solutions
- Tactical Data Link Solutions
- Autonomous System Solutions
- Sensor Integration and Data Fusion
- E-Government and Institutional Solutions
- Industry 4.0 Solutions
- Integrated Logistics Support Solutions
- Defense Products and Services
- MRO
- Industrial Products
- Mine Clearance Services
- UXO Clearance Services
- Unexploded Ammunition Clearance Services


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*Alper ÜNSOY and Şebnem AKALIN*

*Murat DURAL, Prof. İsmail DEMİR and Hans KONGELF*

**Defence Turkey: As a company registered by the Norwegian Armed Forces, ALTAY Software is authorized to participate in Norway's top secret projects. On May 1, 2019, you signed a cooperation protocol with KONGSBERG at IDEF 2019 with the participation of the President of the SSB Prof. İsmail DEMİR. What would you like to tell us about the scope and objectives of the protocol?**

**Alper ÜNSOY:** On May 1, 2019, ALTAY Software signed a cooperation protocol with KONGSBERG, one of the leading technology companies in Norway. The signing ceremony was held with the participation of the President of Defense Industries Prof. İsmail DEMİR, ALTAY Software Chairman Murad DURAL and KONGSBERG Vice President for Missiles and Marketing Hans KONGELF.

Delivering a speech at the signing ceremony, President of Defense Industries Prof. DEMİR stated that two rival companies operating in the same field established fruitful cooperation and expressed that it would be an important precedent for international collaborations to be made in our country.

Being aware of the potential of the software and defense market in Turkey, KONGSBERG wants to take part in our country's related market by developing solutions to meet the needs of institutions. To this end, the company has made strategic cooperation with us and considered ALTAY as part of its ecosystem. As Mr. Murad DURAL, Chairman of the Board also stated at the ceremony, the protocol covers a 4-year period and as ALTAY we aim to add at least 3 new countries to our collaborations in the coming period.

**Defence Turkey: Could you please share with us ALTAY Software's vision, targets and expectations for the next 10-20 years?**

**Alper ÜNSOY:** Since our establishment our vision has been and continues to be that we offer special solutions with added value to our customers in the light of our knowhow, experience and professionalism achieved by applying universal business ethics. We will continue to engage in activities on the local and international market within the framework of the win-win principle by improving our capabilities.

We are working intensively to become a company that directs the technology of our age in the field of software, simulation and defense systems in our country and in the world, taking all necessary measures for customer and employee satisfaction and developing solutions in accordance with quality standards. Without slowing down, in line with this goal, we believe that ALTAY will become one of the companies that will be positioned in the defense and aviation industry pyramid just below the main contractors.

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

**Alper ÜNSOY:** Today, the software, simulation and defense sector is a dynamic market that is changing day by day, creating new needs and opportunities. As ALTAY Software, we endeavor to increase our experience and develop our capabilities by placing importance on building a qualified work force in order to meet these changing needs and to provide diversified products and services. In order to respond to the needs of our customers appropriately, we constantly advancing our experience and projects in software, simulation and system solutions.

We are focusing on developing system solutions that respond quickly to the needs of the market. Our team is built as companies are brought together having superior experience and specialized talents. At the same time, we are always ready to work with all institutions, organizations and companies in line with this target. We would like to sincerely express that our doors are open to those who are looking for a reliable and capable solution partner in software, simulation and defense systems

## 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*

## GÖKBEY

*MULTIROLE UTILITY HELICOPTER*

**MULTIROLE HEAVY COMBAT HELICOPTER**

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TURKISH AEROSPACE

# Technology Entrepreneurship Stakeholders Gather in Sapanca Meeting

# Hosted by METU and ODTÜ Teknokent

by Cem Akalın


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Technology entrepreneurs, investors and key players of the ecosystem met in Sapanca on November 1-2, 2019. At the meeting hosted by ODTÜ Teknokent, success stories were told and "New Ideas New Jobs 2019 (YFYI)" initiatives were introduced. On the other hand, entrepreneurs had the opportunity to meet other players in the sector. Also YFYI 15th anniversary special event called “Inspiration Weekend” was held. In this way, YFYI entrepreneurs came together with investors and key players in the entrepreneurial eco system. In the two-day program, participants had the opportunity to listen to the special content such as inspirational speeches, investor conversations and views of YFYI graduates on entrepreneurship.

On the first day of the event, guest speakers delivered their speeches and entrepreneurship related topics were discussed through interactive presentations by leading people of the sector. YFYI Demo Day was held for the first time at the Inspiration Weekend.

24 entrepreneurs taking part in YFYI Acceleration Program, which supported both entrepreneurs in idea stage and startups in need of commercialization support, made their presentations on Demo Day in the morning of November 2, the second day. Entrepreneurs that came together with YFYI business partners and investors during two days had the opportunity to meet their first customers and make investment talks by taking advantage of the YFYI wide network.

Serdar ALEMDAR, ODTÜ Teknokent President/CEO, talked about the plans of ODTÜ Teknokent for the year 2020 and stated that they would introduce the B2B commercialization program for entrepreneurs trying to reach their corporate customers, B2G commercialization program that supervises the sales through the state channel and LabdaKuluçka program for the development and commercialization of cutting edge R&D business ideas and that supports TÜBİTAK BİGG process.

Ahmet YOZGATLIGİL, Vice Rector of METU and Acting Chairman of ODTÜ Teknokent underlined the leading role of METU in the field of technology-based entrepreneurship and said, “With the vision of our rector Prof. Mustafa Verşan KÖK, our university has been the most prominent university among the universities in our country within the last three years in the field of entrepreneurship, research and university-industry cooperation.”

On the last day of the event, "Jeans-Only Gala and Award Ceremony" was held. The name of the gala was an emphasis to the world of entrepreneurship not in a tie and suit but with different thinking patterns. At the gala, cash awards provided by YFYI partners and in-kind support awards designed to meet the needs of entrepreneurs were presented. The EarFit initiative, which focuses on health technologies from companies introducing its initiatives in Demo Day, received TL 50.000-award from Elginkan Foundation, while the Powder Tech team introducing material technology initiatives in Defense Industry awarded by TL 50 thousand from Elginkan Foundation and TL 20.000-award presented by Orhan AYDIN, President of OSTİM. The UlakFin initiative that focuses on financial technologies received TL 15.000 from Tüpraş, while the Fado initiative which aims to earn money to its users by watching ads received TL 25.000 from TEB within the scope of the event. The Solar Roof Track initiative, which generates electricity from solar energy, was presented an award of TL 25.000 by Elder and Energy Market Regulatory Authority. Another award at an amount of TL 25.000 given by Elder and the Energy Market Regulatory Authority was to the Volte. The Tvoystol.ru initiative, which offers Russia-specific solutions, received and advertising

support from Onedio at an amount of TL 50.000 and TL 20.000 worth shopping prize from ePttAVM. The Renty initiative, which allows easy and quick product leases at an affordable price, received Onedio's TL 50.000 worth of advertising support. Another award received by Renty was ePttAVM's shopping prize worth TL 20.000. The Persona initiative, which aims to reduce employee turnover due to employee dissatisfaction, also received Onedio's TL 50.000 worth of advertising support award. At the ceremony, YFYI entrepreneurs were also informed that they have offices at ODTÜ Teknokent business incubation center.

## YFYI Program

New Ideas New Jobs (YFYI) Acceleration Program in cooperation with METU and ODTÜ Teknokent aims to promote and support technology-based entrepreneurship. This program provides a suitable environment for students and new graduates with innovative and technology-based business ideas to realize their ideas and support them to become successful business people.

The project owners that were evaluated in the acceleration program of the YFYI initiative and deemed successful will participate in the trainings covering various different topics until the Demo Day. They also receive intensive mentoring support within the scope of the YFYI acceleration program.

# RÜZGEM - Large Scale Wind Tunnel to be Launched Soon

**In the YFYI event held in Sakarya on November 1-2, Vice Rector of METU and Acting Chairman of ODTÜ Teknokent Prof. Ahmet YOZGATLIGIL evaluated the activities of the Middle East Technical University regarding university-industry cooperation and stated that one of Europe's largest wind tunnel is planned to put into service very soon.**

**Organized by METU and ODTÜ Teknokent and held in Sakarya on November 1-2, the "New Ideas New Jobs" event celebrated its 15th anniversary for the first time outside the METU campus in order to be closer to Istanbul. "This year, investors and entrepreneurs were brought together for the first time outside of the METU campus," Prof. YOZGATLIGIL said.**

**Underlining that METU is Turkey's most pioneering university in Turkey, as per the study conducted, Prof. YOZGATLIGIL said, "This was also registered by the Council of Higher Education (YÖK). In 2017 and 2018, we were at the top position amongst all universities. We expect this will continue in 2019 as well. We are carrying out critical studies with 29 research centers within our university. The research park is a project where very large scale projects are brought together. We are also exerting efforts to create these centers and infrastructures, which we gather at this research park, and will be at the disposal of all universities and entrepreneurs in Turkey. Because, as you know, university-industry cooperation plays a critical**


**role in the development of technology that includes high technology and will serve many areas of our country and we place great importance on the roles of our research centers in university-industry cooperation."**

**Stating that they are planning to open RÜZGEM center soon, one of Europe's biggest wind tunnels, in wind research and application, Prof. YOZGATLIGIL added, "We will open one of Europe's largest wind tunnels very soon. This wind tunnel will serve the defense industry and wind turbine developers as well as the construction sector. Currently there is great interest. There are very significant projects especially in the field of aviation in Turkey. Like the National Combat Aircraft and other helicopter projects, when this wind tunnel is launched, we will be introducing a very important infrastructure to our country and to the defense industry."**

**Prof. YOZGATLIGIL also conveyed information regarding the design factory, which is performing activities within METU, and said, "This is a center established with the support of our Strategy and Budget Directorate. It is a center where multidisciplinary research is conducted together with the industry and training on prototyping and design thinking are provided. Our university-industry cooperation has been granted the highest achievement award by YÖK. This year, we received this award from the President of the Republic of Turkey. We will continue to exert efforts intensively in this field."**

## RÜZGEM - Large Scale Wind Tunnel

**Built on a steel structure of 50 m x 25 m and consisting of three separate sections, the wind tunnel will serve the Defense Industry, Construction and Automotive sectors. In the test section designed for the aerospace/aviation sector, propeller and aero dynamic tests of UAVs, Armed UAVs, combat aircraft and helicopters will be performed. For the construction sector, especially construction tests of suspension bridges, high buildings, different architectural structures, stadiums and airports will be conducted at this center. The section that is able to reach the speed of 340 km/h is designed for wing profile tests in the wind energy sector. The facility also features a total of six fans, each with 400Kw/H power to generate wind speed.**

**The facility is expected to be launched before the end of this year.**

# PAC to Initiate the Delivery of MFI-395 Super Mushshak to the Turkish Air Force in June 2020

by Cem AKALIN & İbrahim SÜNNETÇİ

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Pakistan Aeronautical Complex (PAC) which participated in the Dubai Airshow 2019 with the MFI-395 Super Mushshak Basic Trainer Aircraft (BTA) will initiate deliveries to the Turkish Air Force in June 2020. According to the information obtained from PAC officials, that we had the opportunity to talk with at the fair, the first three MFI-395 Super Mushshak BTAs to be produced for the Turkish Air Force will arrive in Ankara in June 2020, and if the acceptance tests to be performed are completed successfully, an additional 7 aircraft will be delivered by the end of 2020. Deliveries will be made every 6 months, each containing 10 aircraft and deliveries will be completed by the end of 2022.

As it may be recalled, with the Basic Trainer Aircraft (BTA) Project carried out by the SSB, the aim was to provide the most suitable platform for entry level flight training in order to train pilots who will serve in combat fleets of the Turkish Air Force Command (TurAF) and to speed up their adaptation to new generation aircraft. Currently, T-41 and SF-260D aircraft are being used by the Turkish Air Force for entry level flight training of pilot candidates.


© Defence Turkey

*Cem AKALIN was at Dubai Air Show*

As a result of the evaluation of bids submitted for the tender, the Defense Industry Executive Committee (DIEC) gathered on August 22, 2016 and decided to start contract negotiations with PAC - Kamra Company. Following the completion of the contract negotiations carried out by the SSB, the preliminary agreement under the Project was signed on November 23, 2016 in Karachi, Pakistan and the official agreement was signed at a ceremony held in Istanbul on May 10 within the scope of the IDEF '17 International Defense Industry Fair.

It was aimed that 52 MFI-395 Super Mushshak Trainer Aircraft would


be ordered under the contract and the deliveries of which would be initiated in 2017 to replace T-41 and SF-260D Aircraft, which have completed their life cycles. However, so far, for different reasons, the delivery of the MFI-395 Super Mushshak Aircraft have not yet started.

With the procurement of MFI-395 Super Mushshak Aircraft, flight training will be provided more effectively and efficiently.

With this project, a NATO member Air Force will induct the Super Mushshak BTA in its inventory for the first time and use it in training activities. The solid and unshakable friendly relations between Turkey and Pakistan will become stronger and continues to improve thanks to this project. The MFI-395 Super Mushshak was selected also by the Azerbaijan Air Forces and 5 of the 10 aircraft ordered under the contract signed on July 27, 2017 were delivered in November 2018.


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| MFI-395 Super Mushshak BTA Technical Features |
|---|
| Length: 23.5ft (7.15) |
| Height: 8ft 6 inches (2.6m) |
| Wingspan: 29ft (8.85m) |
| Wing Area: 11.9m2 |
| Empty Weight: 1.785lb (810kg) |
| Maximum Take-off Weight: 2.640lb (1.200kg) |
| Engine Type: 6-cylinder Textron Lycoming IO-540 V4A5 |
| Engine Power: 260hp (at International Standard Atmosphere (ISA) 2.700rpm) |
| Service Ceiling: 22.000ft (6.705m) |
| Sea Level Rate of Climb: 1.220ft/min (6.96m/s) |
| Maximum Rate of Climb: 1.700ft/min (8.636m/s) |
| Unexceedable Maximum Speed: 363km/h (196 knots, 226 mil/h) |
| Maximum Speed: 268km/h (145 knots, 166 mil/h) |
| Cruise Speed: 240km/h (130 knots, 149 mil/h) |
| Stall Speed (Flaps Extended): 76km/h (52 knots, 60 mil/h) |
| G Limit: +6/-3G |
| External Load Capacity: 660lb (300kg [including pylons], at 6 underwing pylons) |
| Fuel Capacity: 47 Gallon (in two separate internal tanks) |
| Crew: In the cockpit, the Trainer Pilot and Trainee Pilot (throw seats) sit side by side, and the rear cabin has a seat option for the third personnel. |
| Range: 440nm (814km) |
| Endurance: 4 hours 15 minutes |
| Structure Life: 9,500 hours |
| User Countries: Pakistan, Saudi Arabia, Oman, Qatar, Iraq, Syria, Iran, Nigeria, South Africa and Azerbaijan |

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# SaSaD: "Event Evaluation & Decision Committee to be Established by the SSB, MoND and SaSaD as a Solution for Event Excessiveness in Turkey."

We talked with the SaSaD Genel Secretary Hüseyin BAYSAK and SaSaD Deputy General Secretary Yılmaz KÜÇÜKSEYHAN about the output of 2019, ongoing & future activities of SaSaD.

**Defence Turkey: Could you please inform us on the number of members of the Defense and Aerospace Industry Manufacturers Association (SaSaD) as well as the activities and events you have performed and/or supported in 2019?**

**SaSaD**: We have 201 members currently. Among these members are cluster associations such as SAHA Istanbul, OSSA, TSSK, BSO, ESAC and HUKD. We would like to express that we are a roof organization representing 800-850 industrialists who are not directly our members but are members of these cluster associations and also in our communication network.

Training activities such as "Patent to Technology", "Project Management", "Paint Surface Protection Applications", "Effects of Personal Data Protection Law on Companies", conferences for promoting the sector at TOBB ETU, HACETTEPE, ÇUKUROVA Universities, B2B activities such as the Paris AirShow and DSEI London, fair and representation activities such as the IDEF Fair, and scientific conferences such as USMOS can be listed as our activities carried out during the year.

**Defence Turkey: Could you evaluate the 10-month export performance of the Turkish Defense and Aviation/Aerospace Industry for 2019? Do you think it will be possible to reach the target of US$ 3 billion?**

**SaSaD**: As it is known, we prepare and publish the Sector Performance Report with a survey based on final financial statements in March of the following year and as a result our report can be published at the end of May, but since the Defense and Aerospace Industry Exporters' Association (SSI) collects data from customs declaration records, the reports are updated accordingly. Based on the information obtained from the SSI, sector exports in the first 9 months of 2019 increased by 37.7% compared to the same period in the previous year and reached US$ 1 Billion 855 million 273 thousand. Last year, according to SSI data, the sector's exports amounted to US$ 2 Billion 35 Million. We announced that this figure was at the level of US$ 2 billion 188 million including foreign exchange earnings from services.

If the trend in the first 9 months continues, we can close the year at the level of US$ 3 billion, which is very probable. Our experience in previous years demonstrates that export activities have accelerated at the end of the year.

**Defence Turkey: SaSaD started its journey with the mission of being the voice and defender of Turkish Defense and Aviation Industrialists in domestic and international platforms in order to represent our country in international platforms and to develop cooperation opportunities of sector players. What would you like to share about SaSaD's 2019 activities also what are your targets for 2020?**

**SaSaD**: As it is known, cooperation protocols (MOUs) have been signed in previous years with friendly and allied countries' Defense and Aerospace Industrialists Associations, such as GIFAS (France) ADS (UK) AIAD (Italy) ROMARM (Romania) KDI (South Korea) and TAWAZUN (UAE).

Within the framework of these cooperation protocols, we organized meetings in 2019 with GIFAS at the Paris AirShow and with ADS at DSEI London so that the industrialists of two countries could discuss cooperation opportunities.

We are planning to take part in the DSA, Eurosatory and IDEAS 2020 events, which will be at a national participation level in 2020. With this participation, we are planning to efficiently promote the Turkish Defense and Aviation/ Aerospace Industry and we will organize meetings where we can bring together industrialists from both sides.

**Defence Turkey: In previous years, SaSaD was organizing Industrial Day Events in the target countries of the Turkish Defense and Aviation Industry with the support of Presidency of Defense Industries (SSB) and the participation of many sector companies under the auspices of the Ministry of National Defense (MoND). Do you plan to continue such activities in 2020 as well? In 2019, you organized a series of cooperation meetings at international defense and aviation fairs such as the Paris AirShow and DSEI. Could you please evaluate the outcome of these types of meetings? Will you continue to organize similar meetings at international fairs in 2020?**

**SaSaD**: We consider the Industrial Day activities you mentioned as platforms that have a valuable impact and where the possibilities of cooperation are discussed. With the support of the Presidency of Defense Industries (SSB), we wish to continue these activities as in the previous years and we conveyed our request to the SSB. We even proposed some target countries as well. However, this request was not responded to positively because the SSB International Cooperation Department preferred to organize cooperation meetings with Turkish Defense and Aviation Industry Companies during their visits in the countries that they planned, and unfortunately we did not have the opportunity to perform such industrial day activities.

*Yılmaz KÜÇÜKSEYHAN*

The event that we organized together with GIFAS at the GIFAS Chalet during the Paris AirShow was appreciated by all participants, as it brought together Turkish and French aviation/ aerospace industry players. The two-day event, which was attended by 70 industrialists from both sides, was a fruitful platform for collaboration. In coordination with ADS in DSEI London.

**Defence Turkey: Could you inform us about SaSaD's cooperation activities, together with the SSI and the SSB, with other associations and clusters performing activities in our country? What further steps do you plan to take to further cooperation activities in 2020?**

**SaSaD**: Unfortunately, we couldn't say we have been active in this area. We have not cooperated much other than participating in the activities of OSSA, ESB and SAHA and participating in the activities we organized as well as supporting the Project Market Activity of the TAF as a participant. We wish and hope that in the coming years, the parties will be more active in planning and conducting events together.

**Defence Turkey: With the Decree Law No. 696 published in December 2017, the Undersecretariat for Defense Industries (SSM) was affiliated to the Presidency of the Republic by disaffiliating from the Ministry of National Defense (MoND) and on July 10, 2018 it was renamed the Presidency of Defense Industries (SSB). Could you please evaluate the benefits and advantages of the SSB, which has had a crucial role in contribution to bringing the national defense industry to its current position, and its affiliation to the Presidency from the MoND? What were the effects of this change on the SaSaD and the member companies during the last two years?**

**SaSaD**: In our country, as a result of the transition to the Presidential Management System from the Parliamentary System, extensive changes and implementations have started. The General Staff and Force Commands were affiliated to the Ministry of National Defense; organizations such as ASFAT, the General Directorate of Military Factories and the General Directorate of Military Shipyards were established.

With this change, the Undersecretariat for Defense Industries transformed into a Presidency and became an institution directly affiliated to the Presidency of the Republic. We consider that being affiliated to the highest decision-making body is beneficial for our sector and we see the reflections of this in the prioritization of our sector and having full support as well as the presence of the President of the

SSB in the delegations of the President of the Republic. It is incorrect to say that the relationship with the MoND has ended with this change. With the involvement of the Minister of Defense and the Minister of Interior in the members of the Defense Industry Executive Committee, where all important decisions are taken, and with the SSB's appointment for meeting the needs of the TAF as well as the General Directorate of Security and the Gendarmerie General Command as a sole source, positive reflections have emerged for our industrialists.

**Defence Turkey: One of the issues that attracted our attention in the sector in recent years is the great number of events. In recent times, many organizations and associations have been carrying out many events in the sector and even we, as the sectoral media, have difficulties in following all of them. Are they in contact with SaSaD, the non-governmental organization of the sector, in the planning process of events which also have a substantial financial burden on companies? What measures should be taken to prevent this excessive number of events? Do you think the Turkish Defense and Aviation/ Aerospace Industry Ecosystem Coordination Platform, established within the SSB, can play a role in the coordination and planning of sector-related events?**

*Hüseyin BaAYSAK*

**SaSaD**: The defense and aerospace sectors are strategic sectors with high value-adding, innovative and constantly advancing technologies. Involving intensive collaboration, these sectors have been developing and expanding. The conferences, seminars, symposiums, workshops, project markets and fairs are organized in order to raise awareness on the developments in the sector and we generally announce these events to our members. Organizing events has been turned into a commercial activity by some organizations. In order to conduct such events, demands on participation (paid or free), sponsorship, speakers, panelist, stand areas have been increasing as a result. This leads to budget and human resources allocation for our industrialists and has started to cause serious complaints due to the excessive number of events and high costs. Sponsorship and stand expenditures as well as personnel expenses of companies of up to TL million in a year frustrate sector players (Manufacturers, Procurement and User Authorities). For example, from September 2019 until today, 45 events have been held and will continue to be held until the end of the year.

If you want to attend such events by putting your business aside, you can easily find them because almost every day an event takes place. When the outcomes of the events are examined, the achievements on cooperation, business development and technology awareness are not at the desired level. The measure that should be taken in this regard is the establishment of a control mechanism regarding these events. An 'Event Evaluation and Decision Committee' could be established by the SSB, MoND and SaSaD can be a solution for this excessiveness. The event evaluation criteria would be determined by the commission and the event organizer is asked to apply to the commission with a form. The criteria can be defined as follows:

- Alignment of the objective and content of the event to the sectoral priorities
- Compliance of the event with the expectations of the MoND and the SSB
- Whether or not there is any commercial purpose in the organization of the event
- Whether or not the event supports any particular projects and/or target

This type of approach with a committee and approval process will not be welcomed by organizers especially having commercial interests in these events. However, we consider that it is necessary to establish a control mechanism to prevent excessive events.

**Defence Turkey: Thank you very much for sharing your valuable time and insight**

*Yılmaz KÜÇÜKSEYHAN, Ayşe AKALIN and Hüseyin BAYSAK*

# TEST ve SİMÜLASYON SİSTEMLERİNDE ÇÖZÜM ORTAĞINIZ


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3P PROMPTNESS PERSISTENCE PATIENCE

by İbrahim SÜNNETÇİ

# ATMACA's First Naval Launch Conducted Successfully from TCG Kınalıada Corvette

Speaking at the 9th Naval Systems Seminar, which was held on October 14-15, Turkish Naval Forces Naval Technical Commander Rear Admiral Dr. Ramis AKIN, announced that the ATMACA Surface-to-Surface Guided Missile (SSM) would be test-fired from the TCG Kınalıada Corvette in early November this year. Colonel Erkan ÜLKÜ, Acting Director of the Turkish Naval Forces Command's Design Project Office (DPO), also made a presentation at the Naval Systems Seminar and pointed out that there are 4 ATMACA (SparrowHawk) missiles on the port side and 4 Harpoon (Block II) Surface-to-surface Guided Missiles on the starboard side of TCG Kınalıada Corvette.


*TCG Kınalıada Launching, RGM-84L Harpoon Block II SSM at Sea Star 2017 Naval Exercise*

As expected the first naval launch of ATMACA anti-ship missile was conducted in early November at an undisclosed location in the Black Sea. On November 3, 2019 Turkish Naval Forces marked history by firing an ATMACA Surface-to-Surface Anti-Ship Guided Missile from a surface vessel for the first time. The vessel in question was TCG Kınalıada, ADA Class Corvette. The first ever live-fire of ATMACA from a surface platform was reported as successful. Also, on November 4, the Presidency of Defence Industries (SSB) shared a short video film of the launch test on its official Twitter account.

Before the ship-launched live-fire in 2019 two land-based live-firing tests of ATMACA missile were also carried first in May and then in September at Sinop Missile Test Range towards the Black Sea. On September 25, the SSB had shared information on its Twitter page about the firing test, which was conducted in September and released a short video of the test.

In the video which was shared by the SSB on November 4, the moment of the ATMACA Missile (I believe that this missile is one of the 20 or so prototype missiles produced for the testing process without real warheads) leaving one of the four launcher tubes on the port side of the TCG Kınalıada Corvette at 10:15 am during the firing test on November 3, 2019, can be clearly seen in slow motion. Five seconds after the launch, the booster separates from the ATMACA. Another noteworthy point in the video is that during the initial launch phase, the ATMACA missile has an Exocet-like flight profile rather than the Harpoon missile. After leaving the launcher, the Harpoon missile first climbs to an altitude of 600m and then descends toward its target. However, this concept is claimed to pose a higher risk because the ascending flight profile of the missile may reveal the location of the firing platform. On the other hand, the Exocet missile heads towards its target at a lower altitude (100m and below) after launching.

In the first ship-launched firing of the ATMACA missile that was not fitted with a live warhead, a fixed floating net was used as the target. In the shared video, it is seen that the ATMACA missile turns left at the terminal stage with a sudden maneuver while cruising at a 5-10m altitude from the water surface (probably against the CIWS threat on the ship) and then maneuvers to the right again and returns to its previous course. The shared video clearly shows that the ATMACA missile passes just above the radar reflector (orange object) on the fixed floating target at the time of impact. This image proves that the ATMACA missile recorded a direct hit on the target with perfect accuracy (5m and under). As part of the project, a live-firing test using an ATMACA missile equipped with a warhead is expected to be carried out in the future.

The ATMACA missile test video shared by the SSB on September 25 showed that the booster of the ATMACA missile, which was launched toward the Black Sea from a land-based launcher at the Sinop Missile Test Range, separated from the missile approximately 6 seconds later, and the missile hit a fixed floating net target at sea. According to the screenshot of the firing


*At terminal phase following sharp maneuvers at Super Sea Skimming mode ATMACA missile passed just above the radar reflector (orange object) on the fixed floating target, which represents a direct hit to the simulated target*

test, which was conducted at noon on September 18, 2019, the ATMACA missile almost touched the surface of the sea (super Sea-Skimming mode) and went down to 0.93m altitude.

As it will be recalled, the Serial Production Contract for Surface-to-Surface Guided Missile Procurement (ATMACA) Project was signed between the Presidency of Defence Industries and Roketsan in the last quarter of 2018 and was announced to the public on November 2, 2018.

Currently, Low Rate Initial Production (LRIP) Phase studies are continuing in the project. Initially, a total of 64 ATMACA missiles (32+32) were expected to be supplied under the LRIP Phase for use in İSTİF Class Frigates. In fact, ATMACA missile was initially planned to be used on the İSTİF Class Frigates, but when the project was delayed, it was decided to be integrated into the ADA Class Corvettes equipped with ADVENT Combat Management System, and a contract change was made recently. Since the ATMACA missile will also be integrated into TCG Kınalıada and then TCG Burgazada (ADVENT CMS retrofit process is expected to be completed in 2020) Corvettes, additional missile production is expected. The TCG Kınalıada Corvette, equipped with ADVENT CMS with Network Enabled Capability and Integrated Data Capability, does not have a separate operator console (AN/SWG-1/1A) for the Harpoon missile, and the firing functions of the ATMACA and Harpoon missiles can be performed from all operator consoles in the Combat Information Center (CIC). Although there is not any AN/SWG-1A Harpoon Weapon System Console in TCG Burgazada Corvette, which is currently equipped with GENESIS CMS, there are two small cabinets placed under a desk in the CIC and other functions of Harpoon console are embedded in GENESIS CMS software. If the current studies proceed as planned, deliveries under the LRIP phase is expected to begin in 2019 and to be completed by 2020; however, I believe that this schedule may be postponed due to additional missile requirements and embargoes. As a matter of fact, the SSB official Twitter page announced on November 4 that the ATMACA missile is expected to enter the inventory in the second half of 2020. Although the first ship of the İSTİF Class Frigates, the TCG İstanbul (F-515), was planned to be put into service in 2021, the vessel is now expected to be launched in early 2021 and commissioned in the second half of 2023 according to the current calendar.

The prototypes of the ATMACA missile with Aselsan active RF Seeker, capable of anti-ship and land-attack capabilities, were highly successful in the fire tests performed


in 2016, and it was stated that the prototypes reached ranges of over 200 km. ATMACA Guided Missile, which is currently powered by Safran Power Units (formerly Microturbo) TR40 Turbojet Engine, will also have fully encrypted two-way data link capability with the addition of ATMACA Data Terminal (ADT) to be developed under the KEMENT-A Phase of the KEMENT Project in addition to the active RF Seeker + GPS/INS Guidance System and Radar Altimeter. The ATMACA missile, which is believed to have a cruise speed of Mach 0.85-Mach 0.95, will also be able to attack coastal targets like the RGM-84L Harpoon Block II missile.

According to the data on the Roketsan website, the ATMACA missile with a length of 4.8m and a weight of 800kg can carry a high explosive penetrating warhead weighing 250kg over a range of over 200km. Equipped with Aselsan product active radar (RF) Seeker, the ATMACA missile can be used in all weather conditions and have low radar cross-section and three dimensional (3D) Mission Planning capability. At the terminal stage, the ATMACA missile will find its target with its highly accurate Active RF Seeker and will be able to engage the hostile targets by using one of the different attack modes such as the direct attack, top attack, and re-attack. For use in prototype missiles, Aselsan has delivered more than 20 Ku-Band RF Seekers (used in firing tests) with mechanically steerable gimballed antennas utilizing solid-state technology instead of Traveling Wave Tubes (TWT, used in Harpoon missiles). The Teledyne CAE J402-CA-400 Turbojet engine used in the Harpoon missiles provides 2.92kN of thrust and has a running time of 15 minutes while the TR40 Turbojet engine used in the ATMACA missile provides 2.5-3.4kN of thrust and has a running time of 25 minutes.

In 2019, the ATMACA Phase II Project was also expected to be launched. In this context, the ATMACA Block II missile which can be launched from the 533mm diameter torpedo tube of submarines through a special capsule (Encapsulated ATMACA Block II, just like the Encapsulated Harpoon), is expected to be fitted with a more advanced seeker (dual-mode RF+IIR type seeker). In this context, the studies on submarine-launched missile capability have been started, and TÜBİTAK SAGE, one of the companies and institutions working on this subject, explained the underwater cruise missile launch mechanism at the International Load Certification Tests Symposium held on November 4. TÜBİTAK SAGE will also produce a torpedo tube replica with a diameter of 533mm as part of the development process. In the last phase, a launch test is planned to be carried out from a 533mm torpedo tube on a submarine

# NUSRET 2019 INVITEX

Hosted by the Turkish Navy, Nusret 2019 Invitation Exercise (INVITEX) was held between October 4th – 20th 2019 in the Dardanelles and the Saros Gulf

by Cem Devrim YAYLALI

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The aim of the exercise, which takes its name from the legendary Nusret Mine Layer, is to train participants in mine warfare and mine countermeasures, to provide training on planning and execution of mine warfare, and to improve cooperation and interoperability between the Turkish Navy and friendly & allied Navies.

This year, the Italian ITS Vesuvio (A-5329) Command Control Ship, one of the elements of the Standing NATO Mine Countermeasures Group 2 (SNMCMG-2), and the Italian ITS Numana (5557), the Spanish ESPS Sella (M-32), the Greek HS Kallisto (M-62), and the Turkish TCG Amasra (M-266) Mine Hunters participated in the exercise. In addition to the Standing NATO Mine Countermeasures Group, a Hydrographic Research vessel from Romania and Explosive Ordnance Disposal (EOD) teams from the USA, Belgium, and Romania participated in the Exercise.

Turkish Naval Forces participated in the Excercise with TCG Bayraktar (L-402) Command Control Vessel, TCG Burgazada (F-513) Corvette, TCG Türkeli (P-1210) Patrol Boat, TCG Ayvalik (M-267 ), TCG Akçakoca (M-268), TCG Akçay (M-270), TCG Edincik (M-260), TCG Erdemli (M-264) and TCG Edremit (M-261) Mine Hunters (MAG), an S-70B Seahawk ASW/ASuW Helicopter, an Underwater Defense (SAS) Team and a Light Autonomous Underwater Vehicle (AUV) Team. Additionally, two Coast Guard Boats from the Coast Guard Command, two F-16 Fighter Jets, and one C-130 Hercules Military Transport Aircraft (for air-dropped naval mines) from the Air Force Command participated in the exercise.

A total of 62 Observers and 3 Staff Officers from Azerbaijan, Bulgaria, Georgia, Qatar, Kuwait, Turkish Republic of Northern Cyprus, Malaysia, Pakistan, and Romania participated in the exercise.

NUSRET 2019 INVITEX, which was conducted in Çanakkale and the Saros Gulf in odd years and in İzmir and the İzmir Gulf in even years due to their proximity to the suitable training areas, is carried out in four stages including mine-laying, mine countermeasures, and port visits.

The first phase covered the gathering of ships and teams participating in the exercise at Çanakkale Nara Port and port training. At this stage, a press briefing was given on the Exercise on October 5, and defense industry companies engaged in mine warfare and underwater activities exhibited their products and solutions at Nara Castle.

In the second stage of the Exercise, which was conducted by the Mine Fleet Commander from the flagship TCG Bayraktar, the Command Place Exercise (CPX) and mine-laying operations were carried out by air and surface elements at the Exercise Area in the Gulf of Saros.

In the third stage, the Minehunters participating in the exercise detected these mines with their sonars. The detected mines were identified by unmanned autonomous underwater vehicles and subsequently disabled. Meanwhile, AUVs were used in addition to the existing sensors for the detection and identification of mines.

The Light Autonomous Underwater Vehicles, which have been used in the Turkish Navy since 2016 (One of these is the Gavia AUV solution from Teledyne Marine, which operates under the name of ÇAKABEY on Aydın Class ships), can both dive deeper than the other underwater vehicles used on the Minehunters and can safely detect and identify mines without causing any risks to the Minehunters.

While conducting mine countermeasures operations in the Gulf of Saros, the vessels also carried out air defense training with Turkish Air Force F-16 aircraft and force protection training with Tuzla Class Patrol Boats against asymmetric surface threats.

The fourth and last stage of NUSRET 2019 INVITEX covered social and cultural activities within the scope of the Çanakkale Port visit. The exercise ended on October 20, 2019.

## Underwater Defense Industry Products Exhibition

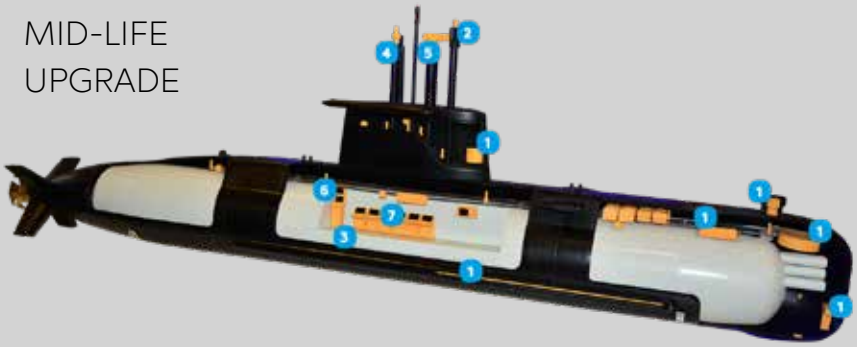
Within the framework of the Nusret 2019 Invitation Exercise (INVITEX), many defense industry companies engaged in mine warfare and underwater activities exhibited their products and solutions at Nara Castle on Saturday, October 5, 2019.

Aselsan, Havelsan, STM, Koç Sistem, Meteksan Defence, Turkish Aerospace, Bayraktar, Roketsan Armelsan, Hoytek, Roketsan, Seyir Savunma, TR ARGE, and Teledyne Marine companies participated in the exhibition.

Aselsan exhibited its solutions for underwater warfare, including the MATESS Mine Detection Sonar System, which is currently used in the TCG Edincik (M 509) Minehunter. An official we interviewed said that the testing phase of the MATESS system is near completion, and the end-user is very satisfied with the performance of the system. He also shared information about the Mid-Life Upgrade (MLU) of the Preveze Class Submarines.

# PREVEZE CLASS SUBMARINE

MID-LIFE UPGRADE




**Aselsan will provide seven different subsystems in the aforementioned project. These are:**

**1 Sonar.** *Aselsan will provide all wet-end parts of the submarine sonar systems. These consist of the following subsystems: Flank Array, Passive Ranging, Intercept (Bow mounted, Own Noise Analyses (ONA) Sonar (The number of ONA sensors will be increased to 32 from 16 with the Preveze MLU), ONA Accelerometers, Active Sonar*

**2 Satellite Communication (SatCom) System** *will be completely indigenous together with its antenna. A new antenna system is being designed for the submarine. It will be around 60cm in diameter.*

**3 Integrated Communication System** *(for internal and external communication) will be updated and replaced by Aselsan.*

**4 Electronic Support Measures (ESM)** *will be updated. ESM Radar identifies and listens to the broadcasts and warns the operator. The Preveze Class Submarines will use ARES 2SC, which is similar to the system used in the Reis Class.*

**5 Radar System** *will be updated.*

**6 WAIS System** *will be updated.*

**7 Harpoon Fire Control System** *will be integrated into the CMS.*



In fact, there is a connection between the Reis Class and the Preveze Class MLU Project. The know-how acquired from the studies on the ESM System of the Reis Class Submarines will be transferred to the Preveze Class. However, the satellite dish to be installed on the Preveze Class Submarines will be a domestic product. The SatCom System of the Reis Class was procured from abroad. Likewise, the sonar system of the Reis Class is of foreign origin, but a domestic product will be used in Preveze. The ceramics parts of the sonar system to be used in the Preveze Class will also be indigenous production. The Integrated Combat System is similar in both submarines. The experience from the Reis Class is used during the modernization of the previous generation system in the Preveze Class. The navigation radar will be new as well. According to the projected schedule, the first submarine TCG Sakarya will be delivered following the sea trials in 2023. Then the other three submarines will be modernized at about ten-month intervals.

In the exhibition, the companies Turkish Aerospace and Bayraktar introduced domestic and national Unmanned Aerial Vehicles, while the company Koç Sistem

# REDET-II Project Deliveries Completed!

**by İbrahim SÜNNETCİ**

On November 9, 2019, the Presidency of Defence Industries (SSB) announced on its official Twitter account that the delivery of the Radar Electronic Support (ES) System was completed within the scope of the New Generation Radar Electronic Support/ Electronic Attack (REDET-II) Project. However, in the announcement no information was shared regarding the delivery of Radar Electronic Attack (EA) Systems, which we consider to be ordered under the same contract, was shared in the related announcement. Aselsan had exhibited the REDET-II Electronic Attack System Vehicle during the IDEF '19 Fair in May 2019. Both based on the BMC 380-26Z Tactical Wheeled Vehicle, a 6x6 chassis with armored cab, the ES System Vehicle detects, identifies and locates the radar transmissions, while the EA System Vehicle ensures that the target radars are jammed, deceived and rendered unable to work.


introduced its data center software for Mine Countermeasures (MCM) operations. With the help of this software, data of man-made objects such as sunken barrels will be collected via the sonars of vessels connected to the system, and inventory of such objects and underwater obstacles will be collected in a data center. The product that attracted the most attention at Roketsan's stand was undoubtedly the model of the ATMACA Anti-Ship Guided Missile (ASM). Most of the visitors asked questions about this new system. The Turkish Navy currently uses the Unmanned underwater vehicles of the company TR ARGE. The company introduced its newly developed autonomous underwater vehicles at the exhibition. These new generation Light Autonomous Underwater Vehicles (AUV) are designed in a modular structure. This allows them to be easily transported and, if necessary, quickly and easily reconfigured on-site. Havelsan introduced the ADVENT Combat Management System (CMS) product at its booth. Although the ADVENT CMS is known as the Combat Management System of the TCG Kınalıada Corvette, ADVENT CMS also suitable modules for mine countermeasures operations ■

As will be recalled, Aselsan had previously signed a US$26 Million contract with the SSB on April 17, 2002, to supply modern Radar Electronic Support and Electronic Attack (REDET) Systems in line with the requirements of the Turkish Land Forces Command to detect and identify target radars, obtain direction and location information and reduce or diminish their effectiveness. Under the project, a prototype system consisting of 2 Radar ES and 1 Radar EA System on MAN 6x6 Tactical Wheeled Vehicle was delivered to the Turkish Land Forces. According to open sources, one of the Radar ES Systems operating in the 0.4-40GHz band range was installed in Kilis near the Syrian border in September 2013.

I believe that 3 ES and 6 EA Systems were ordered for the Turkish Land Forces under the New Generation Radar ES/EA (REDET-II) Systems Serial Production Phase, which was signed on March 9, 2015. REDET-II shares similar technologies with the KORAL Mobile Radar Electronic Warfare (EW) System developed for the Turkish Air Force (TurAF). For example, unlike its predecessor REDET-I EA System, the REDET-II Radar EA System can counter multiple hostile radar systems simultaneously by directing electronic beams through its active phased array jammer/transmitter antennas and active electronically scanned arrays, which are also used in KORAL EA System. Likewise, the REDET-II ES System Vehicle, which was also included in the announcement made by SSB on November 4, has two separate antennas similar to the KORAL ES System Vehicle that based on the 8x8 configuration of the MAN HX77 Tactical Heavy-Duty Truck. The rear high-gain large antenna (Horn Antenna Array) operates on broadband and is used to detect the target broadcast. The smaller cylindrical antenna in front of it, on the other hand, precisely pinpoints the position of the target broadcast detected by the broadband antenna. There are two separate antennas on the REDET-II ET System Vehicle, which I consider to be the Receiver (cylindrical, front) and Transmitter (rear).

Although similar technologies are used in both systems, there are differences between the REDET-II and KORAL Systems in terms of output powers and detecting/jamming ranges. Since KORAL needs to detect and jam hostile radars over longer distances, it is a bigger system than the REDET-II system. While REDET-II is designed to be deployed and operated close (probably up to 100km) to an area of operations (AO), the KORAL Mobile Radar EW System can be used against hostile radars from a few hundred kilometers away.

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by Şebnem AKALIN

# The Turkish Armed Forces Foundation Celebrates its 32nd Anniversary

Celebrating its 32nd anniversary this year, the Turkish Armed Forces Foundation (TAFF) organized a press conference on the activities of the TAFF as well as the areas of responsibility and future plans with the participation of TAFF General Manager Sadık PİYADE, Group Head Responsible for Companies Erhan SİPAHİOĞLU, Head of Foundation Affairs Division Zeki YAĞCI and other executives of the Foundation. After the meeting, members of the press and Foundation executives came together at lunch.

Sadık PİYADE, General Manager of the TAFF, started his speech by thanking the donors who have played an important role in the journey of the Foundation which was established on September 26, 1987 and the press members who have helped to promote the Foundation. Stating that the TAFF's main task is the development of the Turkish Defense Industry, the establishment of new warfare industry branches, the procurement of war weapons, vehicles and equipment, the expansion of the Turkish Armed Forces war power and the provision of the nation's moral and material support, PİYADE said the visibility is highly important while doing so.

PİYADE mentioned that the activities of the Foundation are carried out all over Turkey and said these activities are conducted by the District Governors, who are the legal honorary presidents of the Foundation. Stating that he took office two and a half years ago, PİYADE said, "The Foundation has nearly 83,000-84,000 donors, but this figure was around 30,000 two and a half years ago. Our promotional activities are being carried out not only in Turkey, but also at 54 consulates in more than 15 countries in coordination with the Ministry of Foreign Affairs."

Emphasizing that another task of the TAFF is to organize the IDEF International Defense Industry Fair under the auspices of the Ministry of National Defense, PİYADE said the Foundation is responsible for the management of the IDEF Fair. PİYADE: "We exhibit and promote our high technology systems and platforms at the IDEF Fair. As of 2019, we were ranked number four in the world, this is a great success. For example, in the negotiations held during the Fair, we were ranked number one in the world in terms of the number of agreements signed. Since the evaluation is made on the basis of participation, we are ranked among the top four". PİYADE added that 1,061 companies participated in the last IDEF Fair in May 2019, 580 of which were foreign companies from 53 countries and nearly 76,000 professionals attended the Fair.

TAFF General Manager Sadık PİYADE: "40% of the net sales of the Turkish Defense Industry belongs to Foundation Companies"

Informing the press members on TAFF Foundation companies, PİYADE said, "We have 6 big companies. The

shares of the TAFF in Roketsan and Turkish Aerospace are around 54-55% and we have almost the biggest share of our other companies. We also have affiliates. As of yesterday, one more affiliate joined us. Mercedes has two companies and we have 5% shares in both. TR Test, a Test Company, was newly established. We have shares in DITAS, Koc Netas, TEI, HEAS and you all know their activities. These companies also have their own affiliates. Aselsan, Turkish Aerospace and Havelsan own some other companies. We have 14 companies abroad. When we look at the net sales in the Turkish defense industry, 40% of the net sales belong to our companies and 38% of total exports belong to us. Our international ranking is impressive, Aselsan ranked 52nd, Turkish Aerospace 69th and Roketsan ranked 89th in the top 100 defense industry list. We will go up even further."

Mentioning that the TAFF has five primary sources of income consisting profit shares from foundation companies, donations, the IDEF fair, real estate income and financial income, PİYADE stated that they support projects undertaken from the Ministry of National Defense and the General Staff with these revenues and transfer 80% of their income to the Defense Industry Support Fund and use it for these projects and the remaining 20% is used for operating costs.


*Sadık PİYADE - TAFF General Manager and Zeki YAĞCI -TAFF Head of Foundation Affairs Division*

Continuing to give examples from foundation companies, PİYADE said, "We have two other companies namely ISBIR and Aspilsan; ISBIR is performing activities in the generator industry and Aspilsan in the battery industry. We have started to make remarkable investments in Turkey. Two of our factories are currently under construction. The excavation work of the factory for ISBIR was completed. We will start mass production there. Most of our generators are low noise generators. The investment for Aspilsan will be initiated soon and we will produce lithium batteries in this facility. "

Sadık PİYADE, General Manager of theTAFF, closed his speech by thanking all TAFF donors and supporters and said, "We are celebrating the 32nd anniversary of the TAFF, which was established on September 26, 1987 with the Law No. 3388 to contribute to increase the fighting strength of the Turkish Armed Forces by providing the nation's moral and material support, with great honor and happiness. Our Foundation has been strengthened with a corporate structure with the board of trustees under the chairmanship of the President of the Republic of Turkey, consisting of the Vice President, Minister of National Defense, Chief of General Staff and the President of Defense Industries. Our highly esteemed nation did not fear the sacrifice of life for the sake of our country throughout history, they helped and supported, expecting nothing in return. The will of the state to develop and produce its own defense system products in Turkey was forged as a result of the embargoes imposed on our country after the Cyprus Peace Operation. As a result, they contributed to the establishment of our leading defense industry companies such as Aselsan, TA, Roketsan, Havelsan, Isbir and Aspilsan. In addition to the great support of our valuable donors, we believe that our foundation companies also have significant roles in our country's defense industry achievements. Today, we are very proud to represent a very large family of around 100,000 donors and nearly 2,000 foundation company employees. It will be our greatest effort to use each penny donated by the praiseworthy Turkish people in accordance with the founding purpose of our Foundation. We would like to thank once again, our valuable donors who have contributed to our TAFF affiliates who have been exerting efforts for the development of indigenous and national products and solutions based on advanced technology and their pursuit of becoming global companies."

# First Test Flight with the T129 Phase II Prototype

**by İbrahim SÜNNETCİ**

The first flight test of the T129B Mk-I Tactical Reconnaissance and Attack Helicopter Phase-II version equipped with additional Electronic Warfare Self Protection and communication systems was successfully performed at Turkish Aerospace facilities on November 13, 2019.

President of Defense Industries Prof. İsmail DEMİR announced the news from his social media account on the same day. DEMİR said, "The Phase-II version of the ATAK equipped with Laser Warning Receiver and other electronic warfare systems completed its first flight successfully. We aim to deliver ATAK Phase-II helicopters with additional domestic equipment, after the mid-2020 after detailed tests."

Under the ATAK Project carried out by the Presidency of Defense Industries, a total of 50 T129B Mk-I Tactical Reconnaissance and Attack Helicopters will be delivered to the Turkish Land Forces Command in two different configurations, Phase-I (29 units) and Phase-II (21 units). The first helicopter in the T129B Phase-I configuration was delivered on November 18, 2015, and the 29th helicopter was delivered in October 2018. In fact, it was planned to switch to the Phase-II configuration starting from the 30th (actually the 39th T129 helicopter including the 9 T129A EDHs previously delivered) T129B helicopter in 2018; however, this plan could not be achieved because of various reasons at that time and the 21 T129Bs planned for Phase-II were produced and delivered in Phase-I configuration.

Therefore, after the detailed tests and approval for serial production/assembly, Phase-II configuration is expected to be applied retrospectively to the 21 T129B Mk-I Phase-II helicopters that have been produced and delivered so far.

The main difference between Phase-I and Phase-II helicopters is related to the Electronic Warfare (EW) systems. In addition to the current Phase-I configuration, Phase-II helicopters include 9681 V/UHF (Very High/Ultra High Frequency) Radio and EW systems such as RWR (Radar Warning Receiver) with a digital receiver, capable of detecting the signals of radars operating in C-J bands using Pulsed and Continuous Wave (CW) and their combinations, I-J Band RFJ (Radio Frequency Jammer) which incorporates various advanced technologies such as Active Electronic Scanning Antenna (AESA), Solid State Power Amplifier and Digital RF Memory (DRFM), and LWR (Laser Warning Receiver). We can say that we are in an excellent position for the T129B Mk-I Phase-I helicopters in terms of weapon systems, which is essentially the most critical element of an attack helicopter. In Phase II, it is planned to reach the best stage in terms of self-protection systems and communication systems. In this context, test activities related to the integration of 39 new equipment to Phase-II configuration are continuing. During the 2019 budget negotiations that were held in November last year, President of Defense Industries Prof. İsmail DEMİR announced that the local contribution rate of the T129B Mk-I helicopter was 58%. This ratio will be further increased with the previously mentioned 39 new equipment to be integrated into the helicopters under the Phase-II program.

The first flight test was performed with the T129B prototype with tail number P8, which we have not seen before. We believe that P8 will enter the Turkish Land Forces service next year

under the T129B Phase-II program. Under the ATAK Project, in addition to the first helicopter (which is out of service, crashed in Italy in March 2010) with tail number P1, prototype helicopters with tail numbers P2, P3, P4 (the first helicopter delivered under EDH contract), P5 (the first helicopter delivered under the T129B ATAK Program), P6 (initially, it was manufactured as the 4th prototype [P4] of the ATAK Project, then was re-designated as P6 to meet the tight delivery schedule of the T129A Early Delivery Helicopter [EDH] Project, which was signed between the SSB and the Main Contractor Turkish Aerospace on November 8, 2010), and P7 (an extra helicopter produced in place of the P1 helicopter, which crashed in Italy in March 2010. Currently used by AgustaWestland (AW is now Leonardo) as a test helicopter) were manufactured to be used in tests carried out at Turkish Aerospace and AW facilities.

The P8 helicopter is equipped with a black pod under its right-wing, which I believe that carries test and measurement equipment. On the right and left sides of the helicopter nose, there are two RWR High-Band Antenna Units just below the ASELFLIR-300T Electro-Optic System. Also, on both sides of the newly installed rectangular box behind the 20mm M197 Gatling cannon, there are flat antennas that that I initially supposed were connected to the RF Jammer but later on


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learned from Aselsan that they are not part of Aselsan HEHSIS EW Self Protection System. According to Aselsan they are under Turkish Aerospace responsibility. Additionally, RWR High-Band Antenna Unit, LWR, MWS-TU, RF Jammer Transmitter Unit, MWS-TU, and LWR antennas are located respectively on both modified wingtips of the helicopter. Furthermore, unlike Phase-I configuration, the main landing gear is reinforced at the connection points to compensate for the increased take-off weight, and new RWR Low-Band Antenna Units (three black antennas) are installed under the fuselage.

Between January 1, 2018, and January 31, 2018, Turkish Aerospace delivered 15 T129B helicopters in total, 11 of which were for the Land Forces Command and 4 for the Gendarmerie General Command. As of the end of 2018, Turkish Aerospace delivered a total of 42 T129 helicopters under the ATAK Project. 9 T129A EDH and 29 T129B helicopters were delivered to the Turkish Land Forces Command, and 4 T129B helicopters were delivered to the Gendarmerie General Command under a contract signed with the Ministry of Interior.

Of the 6,500 components on the T129 ATAK Helicopter, 6,300 are domestic production, and the E-mission software of the helicopter consists of 3 million lines of code. Under the ATAK Program, a total of 91 T129 helicopters, 32 of which are optional, will be delivered to the Turkish Land Forces Command and a total of 27 T129 helicopters, 3 of which are optional, will be delivered to the Ministry of Interior (for Gendarmerie and Police Aviation). Therefore, as of December 4, 2019, a total of 54 helicopters were delivered, including 48 (9 T129A EDH + 39 T129B) for the Turkish Land Forces Command and 6 (18 T129B orders in total) for the Gendarmerie General Command under the ATAK Program, in which 118 T129A/B Mk-I Helicopters were expected to be produced in total. President & CEO of Turkish Aerospace, Temel KOTİL, made a statement on his social media account on 4 December for the delivery of the 54th T129 ATAK Helicopter and shared that the 54th helicopter is also the 12th T129B delivered by Turkish Aerospace in 2019.


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# 8th Asian / Australian Rotorcraft Forum Hosted by Turkish Aerospace

**The 8th Asian / Australian Rotorcraft Forum (Asia / Australian Helicopter Society Forum 2019-arf2019), one of the most comprehensive conference series where technological advances in the helicopter industry were discussed and forecasts for the future of the helicopter industry were made, was held with the support of the Presidency of Defense Industries and the main sponsorship of Turkish Aerospace, on October 30-November 2, 2019 in Ankara, with nearly 400 participants from 12 countries and with 102 conference papers published.**

In the Forum organized to increase cooperation and interaction between industry, academic and public sector representatives, the recent developments in new helicopter technologies were discussed, including manned and unmanned systems.

The opening speeches of the event, where the future of air vehicles with rotating wings and vertical landing and take-off features were discussed, were delivered by President of Defense Industries Prof. İsmail DEMİR and Turkish Aerospace Chairman of the Board Prof. Oğuz BORAT.

Underlining the importance of the helicopter industry and technological investments, TA Chairman of the Board Prof. Oğuz BORAT said, "Turkish Aerospace has become a global player especially in design and production. Our helicopter design and production journey started with the Turkish Land Forces Command's kuT129 ATAK. We are expanding and we continue to expand our helicopter spectrum through domestic and national facilities. As you remember, GÖKBEY which was designed and produced with domestic and national resources performed its maiden flight successfully in September of last year. In addition, we have recently started to work toward our Heavy Class Attack Helicopter."


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President of Defense Industries Prof. İsmail DEMİR: "Organizing this conference here is a step that reinforces the ambition of Turkey in the helicopter industry. The issues to be discussed and the ideas to be generated here will contribute to the technology and advancement in the field. Introducing our projects gives us the opportunity to present the level we have reached to people from both industry and academic field who are interested in this subject, across the globe. Thus, our values, which are probably not known very well from a distance, will draw attention here, to Turkey, and we will arouse the interest of more academicians and business people who make efforts in international cooperation and in this field. The conference will also create an environment that will encourage academicians and researchers in the country to come together with colleagues from abroad and collaborate in various fields. Turkey is a country that uses helicopters significantly. As in other fields, we have made significant investments in aviation and helicopter projects in Turkey. We are also very pleased to see the outcomes of our investments. This year, the GÖKBEY helicopter successfully performed its maiden flight. Flight tests have started, and it is undergoing certificate studies. Another project was the Heavy Class Attack Helicopter with Turkish Aerospace. We also support the international defense industry in addition to our Turkish defense industry. Turkey proves that it will be

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*Prof. İsmail DEMİR - President of Defense Industries*


*Prof. Oğuz BORAT - Turkish Aerospace Chairman of the Board*

a strong global player with the products it designs and produces."

Making a statement to press members also on Turkey's position in the F-35 program and the progress in S-400 air defense system procurement, Prof. İsmail DEMİR said, "What we have always said about the F-35 program is that we are a partner in this program and we are a country that has fulfilled its obligations within the framework of this partnership. We had no hesitation and all of our obligations have been thoroughly fulfilled. We have no hesitation in being a program partner on our side. We listen to the statements coming from the other side and see the activity, but from our point of view, we have no hesitation about our F-35 program partnership and our loyalty to what we put our signature under. Therefore, we still want to continue to be an ambitious partner, and in this sense, if the next steps and efforts from the opposite side are positive, we will never be in a negative position. On the S-400 procurement, our President and Minister of National Defense told us about the milestones. They said that in 2020 the system would be active and ready for us to use in April. There's nothing more I will add on this."

Touching also upon the possible offer on a new Patriot air defense system, DEMİR said that Turkey would be open to offers and that the possible offers could be evaluated.

At the four-day event organized under the sponsorship of Turkish Aerospace, leading experts in the aviation industry gave discerning presentations and facilitated workshops on helicopter simulation and modeling of composite materials .


# 8th National Defense Applications Modeling and Simulation Conference

The National Defense Applications Modeling and Simulation Conference (USMOS) is the first and only conference in the field of modeling and simulation in Turkey and is organized biennially by the Ministry of National Defense, Turkish General Staff, Presidency of Defense Industries, the Defense and Aerospace Industry Manufacturers Association (SaSaD) and the Middle East Technical University Modeling and Simulation Center under the sponsorship of defense industry companies.

With the main theme of "Modeling and Simulation in the Big Data Age", the USMOS 2019 Conference was held for the eighth time this year on November 19-20, 2019 at the METU Culture and Congress Center with 542 participants. Chairman of Pınar KARAGÖZ, Vice Rector Prof. Mehmet T. ZEYREK, Chief of General Staff, Force Development and Resource Management Department Head Rear Adm. Hakan ERCAN, SSB Vice President Mustafa Murat ŞEKER, MoND R&D and Technology Department Head Esra ŞENEL participated in the opening ceremony of the conference as speakers. Following the opening speeches, Prof. Erdal ÇAYIRCI, Işık University Faculty Member from Computer Engineering Department delivered a speech titled "Effects and Relationship of Big Data on Military Modeling and Simulation".

During the conference, two training sessions were held by Prof. Veysi İŞLER, Hasan Kalyoncu University Faculty Member from the Computer Engineering Department on "Military Applications of Augmented Reality" and by Gökberk CİNBİŞ, METU Faculty Member from the Computer Engineering Department on "Military Applications of Deep Learning".

During the conference program, 13 parallel sessions were held under the topics of Big Data, Augmented Reality, Engineering, R&D and Testing, Aviation Applications, Simulation Infrastructures, Activity Evaluation, Geographic Information Systems, Analysis and Decision Support, Conceptual Modeling, MODSIM Development Processes and Interoperability. 45 papers were submitted and evaluated by the Academic Committee and 2 of which were deemed worthy of an award.

On the first day of the conference, Hüseyin Buğra Han AYYILDIZ (SSB) moderated a panel titled "Modeling and Simulation in the Defense Industry in the Big Data Age". On day 2, a session was held for the participants who wanted to learn about the experiences of the NATO Modeling and Simulation Group meetings and the projects in the Group. 7 poster presentations were made at the fair area and many companies and institutions from the public and private sector had the opportunity to present their projects and products.

# A LOOK AT HİSAR-A AND HİSAR-O

## AIR DEFENCE MISSILE SYSTEMS AND TEST ACTIVITIES

**By İbrahim SÜNNETCİ**

**Within the scope of the HİSAR-A Air Defence Missile System Project, which was initiated to meet the low altitude air defence missile system needs of the Turkish Armed Forces (TAF) with domestic and national solutions, the prototype missiles armed with warheads similar to the tactical configuration were test-fired against high-speed live targets in the first half of October 2019. These tests provided critical information about the System Level Integration and testing process, which enabled significant progress in the development of the project. The Serial Production contract is expected to be signed by the end of 2019 or the first quarter of 2020 to meet the October 2020 entry into service schedule target in the HİSAR-A Project.**

Within the scope of test-firing activities carried out by Aselsan and Roketsan at Aksaray HİSAR Test Range with the participation of the Presidency of Defence Industries and Turkish Armed Forces representatives, the effectiveness of the HİSAR-A Low Altitude Air Defence Missile System was successfully tested at maximum range and altitude by destroying a high-speed target (Banshee Jet 80) aircraft. During the firing test, the HİSAR-A system detected and tracked the high-speed target with its onboard 3D Aselsan MAR radar, then the command and control system initiated the engagement sequence, and the missile was fired automatically by the fire control system at the most appropriate time. The missile was guided towards the target by the data provided by the HİSAR-A Self-Propelled Autonomous Low Altitude Air Defence Missile System, and in the terminal phase, the missile itself identified and tracked the target independently by activating its IIR seeker. The HİSAR-A missile approached the target using its IIR seeker and successfully destroyed the Banshee Jet 80 target aircraft, which was traveling at about 600km/h, by detonating its warhead.

On October 12, 2019, President of the Defence Industries, Prof. İsmail DEMİR, announced the successful result of the firing test on his Twitter social media account and stated that serial production would begin soon. "The HİSAR-A Low Altitude Air Defence Missile System, developed nationally and domestically by Aselsan and Roketsan under SSB management, successfully destroyed the target with 100% success in the final system tests. Serial production will start soon. Congratulations, and good luck."

In the HİSAR-A Project, the Requirements Definition (Phase-1), System Design (Phase-2), and the Subsystem Development and Testing (Phase-3) phases have been completed successfully, and the System Integration and Testing Phase (Phase-4) studies are continuing. In the project, the ground system operation tests were completed in October 2018. On the other hand, in the HİSAR-O Project, the Requirements Definition (Phase-1) and the System Design (Phase-2) Phases have been successfully completed and the Subsystem Development and Testing (Phase-3) studies still are continuing. The ground systems integration activities have been completed and the missile subsystem integration tests are in progress.

## Firing Tests

The €193 Million + ₺278,371 Million valued Low Altitude Air Defence Missile System (AİHSFS/HİSAR-A) and the €132,113 Million + ₺250,720 Million valued Medium Altitude Air Defence Missile System (OİHSFS/HİSAR-O) Design and Development Contracts, were signed between the SSB and the Main Contractor Aselsan on 20 June 2011.

According to the public information reflected in the media, 11 firing and target tracking tests have been conducted so far within the framework of the HİSAR Projects Missile Development Test Program, which is the first national and domestic air defence missile systems of Turkey. Within the scope of these tests, different numbers of HİSAR-A and HİSAR-O Ballistic Test Missiles (BTM), Controlled Test Missiles (CTM, autopilot/autonomous control but no IIR seeker and TVC), Guided Test Missiles (GTM, Dual Pulse Rocket Motor with TVC capability), and Seeker Guided Test Missiles (SGTM, IIR Seeker activated but no warhead), were fired from the Fixed Firing Platform, Self-Propelled Autonomous Low Altitude Air Defence Missile System and Missile Launching System (MLS) via vertical launch and slant launch techniques and their effectiveness were evaluated in predetermined scenarios. During the tests, catapult-launched target aircraft from domestic and foreign companies were used to simulate low and high-speed aerial targets. Within this framework, four different types of propeller and turbojet engine target aircraft, including QinetiQ product Banshee and Banshee Jet 80 and İVME Unmanned

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Aerial Systems product Cengâver, were used during tracking and live-fire tests.

**October 6, 2013 – HİSAR-A**

Ballistic Test Missile (BTM) firing test, the first flight test within the scope of the HİSAR-A Project, was conducted on October 6, 2013.

**July 23, 2014 – HİSAR-O**

Ballistic Test Missile (BTM) firing test, the first flight test within the scope of the HİSAR-O Project, was conducted on July 23, 2014.

**June 19-24, 2015 – HİSAR-A**

The Controlled Test Missile-1 (CTM-1, autopilot control) and Ballistic Test Missile-2 (BTM-2, Dual Pulse Rocket Motor capability, a first in Turkey) firing tests of the HİSAR-A system were successfully carried out by Roketsan on June 19-24, 2015 in Aksaray, with the participation of the Turkish Land Forces Command, the Presidency of Defense Industries, and Aselsan officials. During the tests, HİSAR-A Missiles successfully left the launcher with their first stage engines, then activated their second stage engines in the air, and completed their flights successfully by performing the programmed maneuvers under the control of the onboard missile autopilot system.


**November 23-December 8, 2016 – HİSAR-A and HİSAR-O System Level**

Within the scope of the HİSAR Projects System Integration Tests, 4 HİSAR-A Controlled Test Missiles (CTM, slant launch), 3 HİSAR-A Guided Test Missiles (GTM, vertical launch), and 3 HİSAR-O Controlled Test Missiles (CTM) were fired from the Fixed Firing Platform (slant launch) and Missile Launching System (MLS, vertical launch) during the firing tests conducte

October 6, 2013 – HİSAR-A

June 19-24, 2015 – HİSAR-A

July 2017 – HİSAR-A and HİSAR-O System Level

July 23, 2014 – HİSAR-O

November 23-December 8, 2016 – HİSAR-A and HİSAR-O System Level

between November 23 and December 8, 2016, at the Ministry of National Defense Firing Test and Evaluation Centre (ATDM) in Aksaray, south of Tuz Gölü, and the effectiveness of the missiles were evaluated in predetermined scenarios.

**July 2017 – HİSAR-A and HİSAR-O System Level**

In July 2017, flight (target aircraft used) and firing tests were conducted within the scope of HİSAR Projects carried out by the Presidency of Defense Industries to meet the air defense needs of the Turkish Land Forces. During these tests, the Aselsan 3D Mobile Search Radar (MAR) was also actively operated for the first time. The MAR radar serves as the main sensor of the HİSAR-A Self-Propelled Autonomous Low Altitude Air Defense Missile System ‘KMOAİHSFS), which is one of the two configurations of the HİSAR AİHSFS. The other configuration is the Missile Launching System (MLS). In addition to detecting and tracking targets, MAR also provides midcourse guidance data required by the missile during flight. The radar, command control/fire control, electro-optic, and communication elements of the HİSAR Systems were also tried the first time during the firing exercise, where the control and guidance capabilities of the highly maneuverable HİSAR-A GTM and HİSAR-O CTM Missiles were tested. Thus, significant progress was made regarding the system-level integration and testing process. Within the scope of the firing exercise, target detection/tracking, command control/fire control, and midcourse guidance tests of the missile were successfully conducted with the target aircraft. In addition, a HİSAR-O (CTM) missile was launched vertically for the first time, and its 360-degree protection capability was successfully tested.

*Banshee Jet 80 high-speed target drone*

**January 22-February 4, 2018 – HİSAR-A and HİSAR-O**

Within the scope of the HİSAR Projects, the first firing tests of 2018 were carried out at the Aksaray Test Range with the HİSAR-A CTM and HİSAR-O BTM missiles in January 22-February 4, 2018. The testing altitude was stated to be 14,000 feet (4,267 meters).

**May-June 2018 – HİSAR-O**

Within the scope of the HİSAR Projects, missile-firing tests were conducted between May 21-June 9, 2018. The testing altitude was stated to be 14,000 feet (4267 meters). HİSAR-O BTM test-firing activities were

May-June 2018 – HİSAR-O

March 2019 – HİSAR-A

October 2019 – HİSAR-A

January 22-February 4, 2018 – HİSAR-A and HİSAR-O

October-November 2018 – HİSAR-A

May 2019 – HİSAR-O


successfully carried out with the Missile Launching System (MLS).

**October-November 2018 – HİSAR-A**

Under the HİSAR-A Design and Development Project, HİSAR-A Seeker Guided Test Missile (SGTM) shooting tests (slant launch) were successfully carried out from the KMOAİHSFS and Missile Launching System (MLS) during the firing tests performed in October-November 2018. In this context, the first HİSAR-A Seeker Guided Test Missile (SGTM) firing test was conducted on October 31, 2018, and the third firing test was carried out successfully on November 13, 2018. During the firing scenario conducted with two aerial targets, the first target was detected and tracked successfully with the IIR seeker, then the missile was directed to the second target. The target tracking capabilities of the missiles were verified during the firing tests, which were carried out with propeller-driven Banshee target aircraft.

The design verification phase of the infrared seeker was successfully completed by conducting rigorous performance, environmental, and hardware-in-the-loop (HIL) tests in the laboratory environment.

Additionally, HİSAR-O Data Link Subsystem design verification activities were completed, and during the firing tests performed in October 2018, the missile successfully established communication through the Data Link.

**March 2019 – HİSAR-A**

The firing tests performed with the participation of Aselsan Fire Control System (FCS), KMOAİHSFS (slant launch) and Missile Launching System (MLS, vertical launch). During the test campaign both HİSAR-A Unarmed Seeker Guided Test Missile (SGTM) and HİSAR-A CTM-3 missile were fired and the vertical launch test of the HİSAR-A CTM-3 missile from the MLS was carried out for the first time.

To test the maximum range and altitude performance of the HİSAR-A System and beyond, two Banshee Jet 80 high-speed target aircraft approaching from different ranges and altitudes were used in various attack scenarios.

During the test campaign, HİSAR-A engaged the high-speed targets, which were detected and tracked by the FCS, with vertically and slant launched missiles from the MLS and KMOAİHSFS, and the missile orientation to the first target, midcourse guidance with radar information, target detection/tracking with the seeker, and target

approach with terminal guidance were tested. Subsequently, with the re-engagement command from the FCS-MLS, the missile was directed to the second aerial target, and the detection, tracking, and terminal guidance phases were successfully carried out.

In this context, after launched vertically, the HİSAR-A missile flew to the first target and locked on the target aircraft. Within the scope of the planned flight scenario, the missile continued its maneuvering toward the second target after successfully passing by the first target closer than the expected distance. The HİSAR-A missile, which passed by the second target in accordance with the scenario, carried out the planned acceleration and aileron commands in the final stage of the flight. After the entire firing test scenario was successfully completed, the test activity was terminated safely via the flight termination system.

Following integrated and functional testing of all the subsystems and support equipment (except the warhead) of HİSAR-A with dual pulse motor, Turkey took its place among the few countries having this technology in the world. Briefly, during the firing tests:

- Closed-loop flight (fly-by-wire feedback control) was performed for the first time,
- The Laser Approach Sensor, which will be produced in Roketsan facilities in the following years, was used for the first time,
- The Gas Distribution System (for IIR Seeker's pre-launch cooling requirement) and Missile Interface Unit, which was integrated by Roketsan into the Missile Launching System, were used functionally in the test activities,
- HİSAR-A successfully performed its maneuvers with domestically produced DC motors, and
- The extremely challenging two-target test scenario was successfully completed, and all the necessary data were collected.

The integrated system level of the HISAR-A Missile reached the product and production line qualification phase with the successful completion of the firing tests, where all tactical elements are used, and critical capabilities such as vertical launch, slant launch, automatic engagement/firing, and terminal guidance are tested. After that, the test-firing phase against live targets was started with prototype missiles armed with warheads similar to tactical configuration.

**May 2019 – HİSAR-O**

Within the scope of the firing test, two Banshee Jet 80 high-speed target aircraft were launched from catapults at the Aksaray HİSAR Test Range. The HİSAR-O System first detected, identified, and tracked these high-speed targets, and then launched its missile from the MLS. During the slant launch test, different parameters such as target approach, radar lock, and seeker performance were evaluated. After the evaluation, it was stated that the system performed 100%, and the launch test was highly successful.

**October 2019 – HİSAR-A**

Within the scope of the HİSAR-A Air Defense Missile System Project, the prototype missiles armed with live warheads similar to tactical configuration were test-fired against high-speed live targets in the first half of October 2019.

According to the Ministry of National Defence 2017 Annual Report, the first HİSAR-A System is expected to enter the inventory in October 2020, and the first HİSAR-O System in May 2021 and the serial production phase is planned to be completed in 2025 (HİSAR-A) and 2024 (HİSAR-O).

Additionally, the first system in the SİPER National Long-Range Regional Air and Missile Defence System Project, which is co-developed by TÜBİTAK SAGE, Aselsan and Roketsan under the leadership of the Presidency of Defence Industries (SSB), is planned to be delivered at the end of 2021

# 9th Naval Systems Seminar:
## Sean & Heard

**by İbrahim SÜNNETCİ & Saffet UYANIK**

The 9th Naval Systems Seminar was held on October 14-15, 2019, with the support of the Turkish Presidency of Defense Industries, Turkish Naval Forces, ODTU-BİLTİR, TSS News Group, and AFCEA-TR, at the Middle East Technical University (METU) Culture and Convention Center. The Naval Systems Seminars was held every year between 2008-2012 and then every two years from 2013 onward. The 10th Maritime Systems Seminar, which is coordinated by Navy Captain (Ret.) A. Zafer BETONER, is planned to be held on October 7-8, 2021.

Aselsan, Havelsan, and STM were the Main Sponsors of the Seminar, which was organized to increase knowledge on naval systems, to develop cooperation, to raise awareness about the capabilities of universities/research institutions and companies, and to share the strategies created by the SSB for the design and production of indigenous naval systems.

During the event, a total of 43 presentations were made by local and foreign companies, and around 30 companies, including Armelsan, Aselsan, AYESAŞ, FNSS, Havelsan, Jotun, Karel, Nova Power Solutions, ONUR Engineering, Roketsan, TÜBİTAK-MAM, and YALTES presented their solutions in the exhibition hall. The event took place with the participation of the Commander of the Turkish Naval Forces Admiral Adnan ÖZBAL, senior officials of the TNFC, Bulgaria Air, and Naval Forces Military Attaché Colonel Doychin DOCHEV, and Greece Naval Forces Military Attaché Eleftherios ZERVAS. Navy Captain (Ret.) A. Zafer BETONER, Turkish Naval Forces Naval


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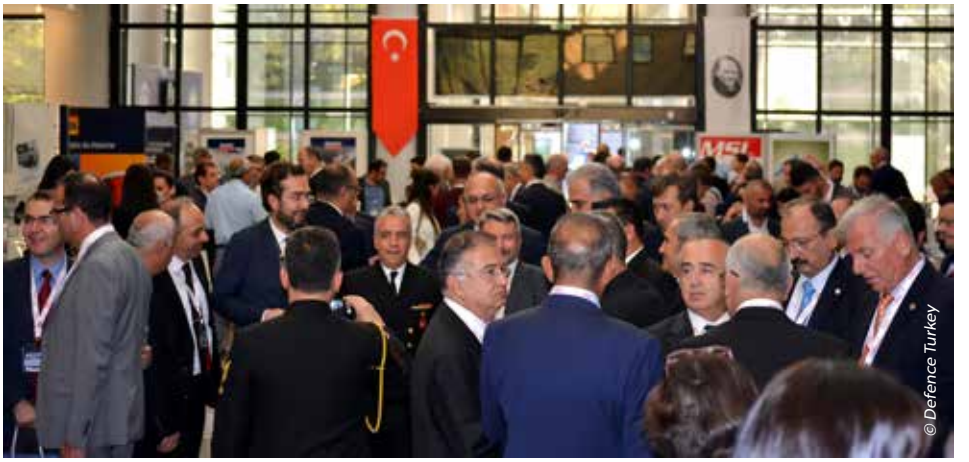
Technical Commander Rear Admiral (Lower Half) Dr. Ramis AKIN, Head of the SSB Naval Platforms Department Alper KÖSE, and Ministry of National Defense (MSB) Shipyard's Deputy Director-General Rear Admiral (Lower Half) Mehmet SARI, and on behalf of the Organizing Committee Dr. Lect. Dinçer BAYER from Piri Reis University Maritime Higher Vocational School made a presentation during the seminar, which was held in two different sessions in the morning and afternoon in three different halls with domestic and foreign participants from the sector.

In his speech, Dr. Dinçer BAYER pointed out that approximately 1,300 people from Turkey and abroad participated in the seminar, where 43 presentations and 28 different promotional activities took place. "The 9th Naval Systems Seminar is organized with the support of the Turkish Armed Forces Foundation, Aselsan, Havelsan, and STM. The 10th Naval Systems Seminar is planned to be held in early October 2021."

Navy Captain (Ret.) A. Zafer BETONER started his speech by expressing his gratitude to the Commander of the Turkish Naval Forces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Admiral Adnan ÖZBAL for his support to the Naval Systems Seminar and to his wife, Mrs. Hülya BETONER for her patience. "There are two issues we had emphasized since 2008 when we started the first Naval Systems Seminar. Firstly, it is disastrous to consume without producing and innovating, and secondly, countries that do not have a domestic defense industry cannot preserve their freedom and independence. That is the reason for all the sacrifices and efforts that we made. We will continue to work together and support our industry. The Naval Shipbuilding Sector has achieved great success both in Turkey and abroad, and its contribution to our exports is enormous. Therefore, our Naval Shipbuilding Sector deserves all kinds of support at the highest level."

Turkish Naval Forces Naval Technical Commander Rear Admiral (Lower Half) Dr. Ramis AKIN delivered a speech on the vision and the capabilities of the Naval Technical Command established in Pendik, Istanbul in 2017. "The Turkish Naval Research Center Command (ARMERKOM), the Design Project Office (DPO), and the Project Control Office (PKO) were united under the Naval Technical Command in Pendik, Istanbul. Its vision is to design, produce and develop modern, national, domestic, and indigenous platforms and systems for the Turkish Naval Forces and to provide all the necessary support by developing all the required capabilities to ensure that they are in a constant state of combat readiness. Currently, the Project Control Office (PKO) is in close coordination with the SSB and private shipyards for the construction of several important ships such as the TCG ANADOLU Multi-Purpose Amphibious Assault Ship and the UFUK Test and Training Ship in accordance with the requirements of the TNFC. On the other hand, the Design Project Office (DPO), formerly known as the MİLGEM Project Office, continues with great dedication in producing all kinds of detail design and technical drawings for the construction of İSTİF-Class (İ-Class) Frigate TCG ISTANBUL, as well as for the contract level design of the TF-2000 Air Defense Warfare (ADW) Destroyer. Meanwhile, ARMERKOM carries out intensive R&D activities on the critical technologies used in the ADVENT Combat Management System (CMS), electronic warfare systems, acoustic systems, and cannon and guided missile fire control systems."

*Rear Admiral (Lower Half) Dr. Ramis AKIN Turkish Naval Forces Naval Technical Commander*

Underlining the importance of the new production line approach, Rear Admiral (Lower Half) AKIN touched upon the role of the Turkish Naval Forces Command in these projects. "Both in both shipbuilding and combat systems, we are trying to establish the appropriate infrastructure that will enable us to proceed with a product line logic, as is the case for ADVENT, and we are increasing our efforts in this direction. I want to emphasize once again that developing off-the-shelf subsystems with critical technologies, such as radars, sonars, E/O sensors, guided munitions, lasers, electromagnetic rail guns, as well as Fire Control Systems and Combat Management systems, requires greater importance than developing the platforms which will use these systems. We believe that building the first ships in military shipyards then constructing the follow-up ships in private shipyards under the responsibility of the Turkish Naval Forces and improving the experience gained from this process will be the most effective solution in terms of ensuring the sustainability of shipbuilding capability and maximizing the use of national resources. Furthermore, I would like to point out that it is essential to develop a comprehensive R&D inventory and a detailed master plan to avoid repeated efforts in R&D activities carried out for the defense projects."

Pointing out that they started to carry out indigenous design activities after 2010, Head of the SSB Naval Platforms Department, Alper KÖSE said that they aim to become a leading country in the Defense Industry by developing advanced technologies in the coming years. "Our vision for 2017-2025 is to make our country a global player in the field of defense with indigenous designs and advanced technological capabilities, to manage the programs that will strengthen the security of our country and improve the capabilities of the defense industry with a holistic approach. Especially before 2000, we were highly dependent on foreign countries, but today, we can design and produce our own products. As the SSB, we aim to introduce competitive and superior designs to the international market by developing advanced technologies for a sustainable Naval Shipbuilding Sector.

*Alper KÖSE - Department Head for Naval Platforms at the SSB*

Moreover, we encourage domestic defense industry companies in the Naval Shipbuilding Sector to expand their production capabilities in order to provide systems, sub-systems, and materials required for the construction of military ships."

Department Head for Naval Platforms at the SSB, Alper KÖSE, shared information about the current state of the SSB's projects related to naval platforms and subsystems. "As the SSB Naval Platforms Department, we carry out our projects under 4 different groups; these are Amphibious Ship Programs Group, Support Ship Programs Group, Warship Programs Group, and Patrol Ship Programs Group. We signed contracts for a total of 263 naval platforms (52 ships, 188 boats, 17 modernization, 6 submarines). We have delivered 132 naval platforms (46 ships, 77 boats, 9 modernization) so far. The construction of 131 naval platforms (6 ships, 111 boats, 8 modernization, 6 submarines) is still in progress. Turkish Private Shipyards have constructed a total of 195 naval platforms (175 boats, 13 ships, 3 wet docks, 3 submarine modernization, 1 design) for export to date. 153 of these have been delivered (143 boats, 6 ships, 3 wet docks, 1 design). 42 of these (32 boats, 7 ships, 3 submarine modernization) are still under construction and waiting for delivery. The SSB Amphibious Ship Programs Group currently carries out the LHD and Logistics Support Ships Projects. The LHD was planned to be delivered in 2021, but we are trying to bring the delivery date forward by one year. The main contractor of the Logistics Support Ship Project declared concordat due to financial problems. We terminated the contract, but we will continue with the Project. It is currently under construction at Sedef Shipyard. We are planning the Landing Craft Air Cushion (LCAC/HAYÇA) Project for next year."

Continuing his speech, KÖSE said, "The SSB Support Ship Programs Group carries out the Fleet Replenishment Ship (DIMDEG) and Emergency Response and Diving Training Boat (ACMB) Projects. Sefine Shipyard is the main contractor of the DIMDEG Project, and DESAN is building the ACMB. We will launch two ships in November, and we are planning to deliver the ships in May of next year. We have received the bids for the Multi-Purpose Offshore Tugboat Project and published a Request for Information (RFI) for the Coastal Tugboat National Device Modification Project. The Research Vessel has been put on hold because it is not a high priority project. Under the Warship Programs Group, the New Type Submarine Project is being constructed at Gölcük Shipyard Command. A total of 6 submarines will be built. The PREVEZE Class Submarines MLU Project is in progress; we signed the contract. 4 submarines will be modernized. Similarly, 4 BARBAROS Class Frigates will be modernized by Aselsan and Havelsan. We have signed the contract of the 5th MİLGEM ship with STM, and its construction will continue at Istanbul Naval Shipyard. The MİLGEM Project Vertical Launching System Project has been signed with Roketsan. We are waiting for the export license from Lockheed Martin. The Acoustics Decoy System for Submarines Project (Launcher) is being carried out by Aselsan. The TF-2000 Project is in the planning phase. The Test and Training Vessel Project (TVEG) is being carried out by STM under the SSB Patrol Ship Programs Group. New SAT Boat and Fast Patrol Craft Projects are carried out by Yonca-Onuk. Two boats will be delivered under the new SAT Boat Project. Six of the eight boats under the Fast Patrol Craft project have been delivered. The other two will be delivered this year. We have signed the contract for the Coast Guard Control Boat Procurement Project. We are also working with STM for the Turkish-Type Assault Boat Design Project. The reason for the delay in the New Type Submarine Project was that initially, there were some design errors. The negotiations with the main contractor took a while, but after a three-year delay, we agreed, and the Project is ongoing."

KÖSE also shared information about the TF-2000 project and the ongoing system indigenization activities. "Under the TF-2000 Air Defense Warfare (ADW) Destroyer Project, the SSB was authorized to determine the Project Model with the Defense Industry Executive Committee (SSIK) Decision dated September 20, 2013. Since the sub-systems that will constitute the ship, including ÇAFRAD, are expected to reach sufficient maturity, we are considering starting the Design Phase in the Project in 2020. During the design phase of the TF-2000 Air Defense Warfare (ADW) Destroyer Project, we aim to design a cost-effective platform by using the capabilities and knowledge of both the private sector

and the TNFC. We are working on the National Vertical Launching System (MİDAS) to replace the MK-41 VLS. We're thinking about Roketsan, or maybe Aselsan. We will replace the Phalanx CIWS and SeaRam with Aselsan GÖKDENİZ CIWS. We will also use the HİSAR Air Defense Missile System in our new projects. Harpoon Guided missiles will be replaced with Atmaca Missiles. The AKREP Fire Control Radar will be used in the BARBAROS MLU Project. We will use the Aselsan AKYA torpedos and Aselsan's DAKA Torpedo Counter Measure System in our submarines. We have SEDA and MÜREN as Submarine Combat Management Systems. TÜBİTAK MÜREN will be used in the BARBAROS MLU Project, and Havelsan SEDA was exported to Pakistan and will be used in Agosta Class Submarines. YALTES and AYESAŞ have command and control console solutions. We can design and develop our propellers. We used our own propeller shaft systems in the DESAN Emergency Response and Diving Training Boat (ACMB) Project. We achieved significant progress on the Pump-Jet propulsion systems within the scope of the Control Boat Project. We are working on Lithium-Ion Batteries. We also carry out studies on Air Independent Propulsion Systems, Unmanned Surface and Underwater Vehicles, Underwater Sensors, and Small Submarines. There is a significant need for a Ship Main Gun alternative. There are some studies on diesel engines, but it is still in the early stages."

In the last part of the speech, KÖSE shared information about the ongoing projects for naval platforms under Technology Acquisition Obligation (TKY) Projects, a method used by the SSB to finance R&D projects. "The Cavitation Tunnel (BARBAROS MLU and LST) is being built at ITU and is supported by Anadolu Shipyard and Aselsan. Hopefully, it will be completed in March or May 2020. The Augmented Reality Supported Mobile Virtual Maintenance System, a project carried out by BİTES, has been completed. Within the scope of the LHD Project, Mine-hunting Sonar is being developed with support from Armelsan. Additionally, the Multi-Purpose Mini Submarine Development Project (SAT Submarine [SATDEN]) will be carried out by ITU. The external construction of the Cavitation Tunnel is completed."

Emphasizing that Turkey is rapidly moving from being a regional power to become a global power, the Ministry of National Defense (MSB) Shipyard's Deputy Director-General Rear Admiral (Lower Half) Mehmet SARI, stressed that General Directorate of Naval Shipyards is one of the driving forces behind this development. In his speech, Rear Admiral Mehmet SARI also shared information about the ongoing projects. "One of the

*Rear Admiral (Lower Half) Mehmet SARI -Defense (MSB) Shipyard's Deputy Director-General*

activities that started with MİLGEM is the National Electronic Warfare Suite (MEHS) project that was developed for YAVUZ Class frigates. It now includes the Electronic Countermeasure (ECM) on top of the Electronic Support Measures (ESM) capability. There are also IR (Search and Tracking) and Laser Warning Systems, so there has been an incredible capability increase. The experience and capabilities gained from these projects allowed additional National Systems to be used in the BARBAROS Mid-Life Upgrade Program. We can say the same for the HİSAR Project. I want to thank Aselsan and Roketsan for the HİSAR-A and HİSAR-O systems. These will be used by the National Vertical Launching System (MIDAS). We are hoping you can work together at this point as well. Because some projects are carried out by SAGE and some by Roketsan and Aselsan. We also provide support for the Submarine Propulsion Component projects. Let's speed up the engine and battery development in the National Submarine (MİLDEN) program. I want to emphasize that there is also demand from abroad, especially for Lead Oxide Batteries and Lithium-Ion Batteries. In the MÜREN Project, we want to see further domestic and national contributions. We don't want to buy the systems that we can produce in Turkey, what is more we want to sell these systems to third countries. The Multi-functional Phased Array Radar can easily be turned into a Ballistic Missile Early Detection Radar by increasing its antenna units from 1000 to 4000. $T_0$ for the İSTİF-Class (İ-Class) Frigates has started. We hope that we will not experience any delays in this project. Unlike the previous ships, İstif-Class will be equipped with a Vertical Launching System (VLS) and national missiles. We also want Aselsan and Roketsan to develop a light-weight torpedo. Previously, we had to find even the torpedo tubes from somewhere else and use them on our ships. We don't want to experience this anymore" ■

# Latest Situation in the Logistics Support Ship Project

According to the information from the sector officials that we had the opportunity to meet at the 9th Naval Systems Seminar held at the METU Culture and Congress Center on October 14-15, 2019, an agreement was made between the Turkish Naval Forces Command and Selah Shipyard for the delayed acceptance of the first ship in the Logistics Support Ship Project and the search for a new contractor was started for the completion and delivery of the second ship.

Under the contract signed with the Presidency of Defense Industries (SSB) in December 2014, Selah Shipyard, which is building two Logistics Support Vessels, TCG Yüzbaşı (Captain) Güngör Durmuş (A-574) and TCG Üsteğmen (Lieutenant) Arif Ekmekçi (A-575) for the Turkish Naval Forces Command, declared concordat due to the economic crisis and this situation was reflected in the written and visual media last September. According to the information we received, the Turkish Naval Forces Command has recently reached an agreement with Selah Shipyard regarding the delayed acceptance of TCG Yüzbaşı Güngör Durmuş (A-574), which was constructed in 2015 and launched on November 8, 2016. The ship, which is stated to be 98% complete, is expected to enter the service of the Turkish Navy in the near future following the acceptance test process. In the meantime, the SSB terminated the agreement signed with Selah Shipyard. In his opening speech at the 9th Marine Systems Seminar held at the METU Culture and Congress Center on October 14-15, 2019, Alper KÖSE, Head of the SSB Naval Platforms Department, also shared information about the contract termination and said, "the Logistics

Support Ship contractor was declared concordat because of financial problems. We terminated the contract, but we will continue the project. So, there will be no loss in the project, there is a delay, but we will continue."

On the other hand, it is stated that the second ship of the project, TCG Üsteğmen Arif Ekmekçi (A-575) which was launched in July 2017, is still missing a large number equipment and the Presidency of Defense Industries (SSB) selected STM for the completion and delivery of the vessel.

The Logistic Support Ships have a length of 106m, a width of 16.8m, and a carrying capacity of 6,000 DWT. The primary mission of the vessels is to provide replenishment at sea (RAS)/ underway replenishment (UNREP) to the Turkish Navy ships and friendly elements. The vessels can carry 336 tons of helicopter fuel, 594 tons of drinking water, and 8 containers of food-cargo-rations. The ships also have a large helicopter deck that allows take-off and landing and can refuel helicopters. The helipad allows day and night helicopter take-off and landing and is designed to support multi-purpose helicopters up to 15 tons. Logistics Support Ships can complement a crew of 82 personnel and are able to reach 12 nautical miles per hour.

# TÜBİTAK Active Sonar for AY Class Submarines

The TÜBİTAK MRC Materials Institute Underwater Acoustic Laboratory participated in the 9th Naval Systems Seminar which was organized with the support of FCEA-TR, METU-BILTIR, TSS News Group, the Presidency of Defense Industries (SSB) and the Turkish Naval Forces Command (DZKK) on October 14-15, 2019, at the METU Culture and Congress Center. The Active Sonar System developed for Submarine Platforms attracted a great deal of attention at the TÜBITAK MRC Materials Institute booth. According to the information we received, the Active Sonar System has been installed to three AY Class Submarines as part of the contract signed, and two of the submarines have returned to service following the active sonar system integration process. The acceptance process of the Third AY Class Submarine continues as of October 14, 2019. The Active Sonar System, which was initially integrated into the sails of three AY Class submarines, consists of subsystems such as, Electronic Control Unit, Power Amplifier Unit, Transmitter Console Unit, EMI Filter Unit, and Connection Box. The Active Sonar System, which was placed in the front part of the sail, has a 20-degree forward view. The Active Sonar System is used both to detect the positions of incoming torpedoes more accurately and to determine if there are any ships above during surfacing. Another product exhibited at the TÜBİTAK MRC Materials Institute Underwater Acoustic Laboratory booth was the TBT-01 Sonar Transducer Element used in the wet-end of the FERSAH Hull-Mounted Sonar System, which will be installed under the BARBAROS Mid-Life Upgrade (MLU) Project.

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# BARBAROS Mid-Life Upgrade (MLU) Project

The contract for the Mid-Life Upgrade (MLU) of four BARBAROS Class Frigates in the inventory of the Turkish Naval Forces Command (TNFC) was signed with Aselsan-Havelsan Business Partnership on April 3, 2018, and the project commenced (T0) on August 9, 2018. Under the contract, the modernization of the first frigate was planned to be completed in November 2022, and the last ship is expected to be delivered to the TNFC in 2024.

Within the scope of BARBAROS MLU Project:

- Replacement of the STACOS Mode 3/ TACTICOS Combat Management System (CMS) with ADVENT CMS. We learned that ADVENT has more consoles (12) than the previous generation STACOS; thus, the Main Contractors consider expanding the Combat Information Center (CIC) on the ships by adding another room to the CIC.
- The old Sea Guard CIWS, which consists of three 4-barrel Sea Zenith 25mm guns, will be removed, and the front gun will be replaced with Phalanx or GÖKDENİZ CIWS. On the other hand, the other two guns located on the port and starboard sides will be replaced with Aselsan's STOP 25 mm Remote Controlled Stabilized Naval Gun System. As the U.S. Congress has not yet given the necessary approval for the delivery of Phalanx Systems, Phalanx Mk-15 Block 1B Baseline 2 CIWS couldn't be exported/delivered to Turkey.
- The AWS-06 Dolphin 3D search radar, which is an integrated part of the Sea Guard CIWS System, will be replaced with Aselsan's MAR-D radar. The Ku-Band TMK Tracking and Fire Control Radar will also be removed.
- The Dual-Band STIR Tracking and Illumination Radars will be replaced with Aselsan's AKR-D Dual-Band Naval Fire Control Radars with over 120km range. Yavuz Class Frigates are equipped with 2 TMK E/O Systems and 1 STIR Radar, while the first two Barbaros Class (Track IIA) Frigates are equipped with 1 STIR Radar, and 1 TMX/TV-EO system and the last two Barbaros Class (Track IIB) Frigates are equipped with 2 STIR Radars.
- The hull-mounted AN/SQS-56 sonar on the vessels will be replaced with the Aselsan product FERSAH Active/Passive Sonar System operating in the mid-frequency band. Aselsan produces the dry end of the FERSAH sonar while TÜBITAK MAM produces the wet end. Aselsan is not currently working on sonar wet ends but is planning to complete the wet end production of a sonar system operating in the medium frequency band in 2023. The first test of the FERSAH Sonar System is expected to be conducted by Aselsan within the next November or December.
- The AN/SLQ-25 Nixie Torpedo Countermeasure System will be replaced with Aselsan's product HIZIR TKAS.
- The Cutlas-1B ESM and Scorpion-B ECM Systems onboard the ships will be replaced with Aselsan's ARES-2NC ESM and AREAS-2NC ECM Systems.
- The national Gun Fire Control System will be integrated into the 127mm (5/54) Mk45 Mod 2 Main Gun.
- Aselsan's Laser Warning System and PIRI-KATS IRST Systems are also expected to be used on the ships.
- In the BARBAROS Class Frigate MLU Project, Armelsan's product, the ARAS-2023 Diver Detection Sonar is included as an option.

After the Mid-Life Upgrade, the service life of the BARBAROS Class Frigates will be extended until the 2040s. Speaking at the 9th Naval Systems Seminar held at METU Culture and Congress Center on October 14-15 2019, Ministry of National Defense (MSB) Shipyard Deputy Director-General Rear Admiral (Lower Half) Mehmet SARI, shared information about the BARBAROS MLU Project. "We will use the national MAR-D 3D radar in the BARBAROS MLU Project. We also are considering the MAR-D for smaller platforms. Aselsan can manufacture the SMART-S Mk2 radar with technology transfer; thus, we especially ask Aselsan to develop a capable 3D Search Radar using their experience and know-how from the ÇAFRAD, MAR-D, ALPER, and SMART-S Mk2 Projects. We want a strong 3D Naval Radar to fill the gap between MİLGEM and TF-2000..."

Aselsan introduced the HAZAR 3D Naval Radar Family for the first time at IDEF '13 Fair with a scaled mock-up of the system. The HAZAR Radar Family can be produced in different sizes as S-Band and X-Band thanks to its scalable architecture. However, no further information has been shared about the indigenous HAZAR Naval Radar Family, which is based on the MAR/MAR-D radar used on KORKUT and GÖKDENİZ CIWS systems. The TNFC's satisfaction with the SMART-S Mk2 3D Search Radar manufactured by Aselsan domestically has also played an influential

role in this situation. An indigenous radar model that could replace the SMART-S Mk2 radar would also be included in the HAZAR Naval Radar Family. Aselsan has previously reported to the Turkish Navy that it can produce a completely indigenous radar with similar capabilities to SMART-S. However, there was no need for an indigenous radar to replace the SMART-S Mk2 at that time, as the Navy was satisfied with the SMART-S and wanted to continue using it.

In June 2018, Aselsan and the Presidency of Defense Industries signed a contract to use the FERSAH Hull-Mounted ASW Sonar in the BARBAROS Class Frigates MLU Project. The FERSAH Hull-Mounted Anti-Submarine Warfare (ASW) Sonar System, which can operate in Medium Frequency (MF) Bands in both active and passive modes, was developed by the Main Contractor Aselsan and the support of Armelsan (sub-contractor agreement was signed between the two companies in August 2018) for frigates and corvettes. In addition to ASW, Aselsan's FERSAH also has a mine-like objects avoidance mode.

We learned that Aselsan would deliver the FERSAH Sonar system for the first ship in the 24th month (T0 + 24 months) under the contract signed within the scope of the BARBAROS Class Frigates Mid-Life Upgrade Project. The remaining deliveries are planned to be carried out at 6-month intervals after the modernization of the ships starts. According to an Armelsan official we interviewed earlier, the Aselsan/Armelsan duo will complete the sonar prototype in the 12th month, and the Factory Acceptance Tests will begin in the 18th month. He also stated that since the FERSAH Sonar System uses the same sonar arrays with the YAKAMOS-1 System, it will be possible to replace it with the existing sonar systems when necessary.

# Stunning Information About ÇAFRAD and ADVENT Systems Shared at 9th Naval Systems Seminar

**by İbrahim SÜNNETCİ / Saffet UYANIK**

**At the 9th Naval Systems Seminar, which was held on October 14-15, 2019, with the support of the Turkish Presidency of Defense Industries, Turkish Naval Forces, ODTÜ-BİLTİR, TSS News Group, and AFCEA-TR, at Middle East Technical University (METU) Culture and Convention Center, valuable information about the Multi-Functional Phased Array Radar (ÇAFRAD) and the Network Enabled Data Integrated (ADVENT) Combat Management System was shared with seminar participants.**

Speaking at the seminar, Turkish Naval Forces Naval Technical Commander Rear Admiral (Lower Half) Dr. Ramis AKIN shared information saying "Together with Aselsan, we have installed the system to the Tuzla Naval Electronic Warfare Test and Training Field of the Turkish Naval Research Center Command (ARMERKOM/TNRCC). We use the prototype system there. We are continuing our efforts to make the final ÇAFRAD System ready for the TF-2000 Air Defense Warfare (ADW) Destroyer as soon as possible."


Aselsan Naval Platform Radars Project Manager Dr. Kıvanç İNAN made a presentation titled Multi-Functional Digital Radar Architecture and the ÇAFRAD Solution for Air Defense Warfare Platform on October 14th. In his speech, İNAN stated that digital radars are one of the most critical requirements of today and noted that Aselsan applies all the digital radar technologies such as electronic beam steering active antenna design and Gallium-Arsenite (GaAs) & Gallium-Nitrate (GaN) transmit/receive (T/R) modules in both ÇAFRAD and all of their new generation radars. "We have applied the Gallium-Arsenite (GaAs) in ÇAFRAD Phase-1, and we are switching to Gallium-Nitrate (GaN) in Phase-2. Thanks to our partnership with AB-MikroNano, it will be possible to localize all these Gallium-Nitrate (GaN) transmit/receive (T/R) modules in Phase-2 and on-going radar projects. When we look at digital waveform design, production, and testing, both ÇAFRAD and all of our new generation radars generate digital waveforms."

Continuing his speech, İNAN also said: "ÇAFRAD is a Multi-Functional Phased Array Radar. What we mean with Multi-Functional is that all activities under the Air Defense Warfare (ADW) and Anti-Surface Warfare (ASuW) are carried out simultaneously. In other words, ÇAFRAD can perform volume search, horizon line search, precise target tracking, fire control, target illumination, guidance data link, target classification, and coordinated Air Defense Warfare and Anti-Surface Warfare. It also provides an Inverse Synthetic Aperture (ISAR) range profile, operational support, precision approach (PAR) support to helicopters and UAVs, and Command Control (C2) support. The radar optimally performs all these activities and prioritizes these tasks with intelligent resource management planning."

Noting that all the capabilities of ÇAFRAD are performed simultaneously, İNAN emphasized that ÇAFRAD is capable of electronically scanning the whole space not horizontally but also vertically. "It has an Active Electronically Scanned Array (AESA) architecture. We use thousands of Transmit/Receive (T/R) modules. The acquired data is digitized and then downloaded at the Gigabit level. All the technologies used in the system, especially the ÇAFRAD Phase-1, are of domestic design. In Phase-2, many of these technologies will also be produced domestically."

İNAN stated that the ÇAFRAD System consists of 4 radars, namely Multi-Function Radar (ÇFR), Illumination Radar (AYR), Long Range Radar (UMR) and IFF System and pointed out that the ÇFR, which has a 400-to-360 degree coverage, functions as the brain of the ÇAFRAD system at close range. "It works in X-Band and can perform all the functions such as volume search, horizon line search, air and surface targets detection, tracking and classification, multi-precision target tracking simultaneously. ÇFR has a range of 150km, and it serves as a fire control radar at close range. ÇFR consists of

more than 1,000 modules which can continue to operate even if the antenna elements are damaged. When we look at the AYR, we can say that it is not a radar but an illuminator. This unit provides data link capability to the guided missiles and can illuminate multiple targets simultaneously. On the other hand, the S-Band UMR is the long-range version of the ÇFR and performs all the functions of ÇFR at long range. It can be considered as the long-range version of the ÇFR with a range of approximately 450km. In general, the UMR detects the target at long range then transmits this information to the ÇFR, which engages against it at close range. Finally, we have the non-rotating IFF antenna system with a range of more than 450km. It works together with the UMR. It supports all modes including, Mode 1, 2, 3, 4, C, S, and 5. This long-range IFF system is integrated with the long-range identifier developed by Aselsan and is currently undergoing testing."

In his speech İNAN also informed the participants about the on-going Phase-1 tests. "In Phase-1, the scaled version of the MFR and the scaled version of the UMR and the final IFF system were produced. The project started in September 2013 and was completed as of December 2018. In this context, the system has been verified up to all sub-components in Phase-1, Phase-2 will only cover the serial production. As the system used in Phase-1 is a slightly scaled model of the final ÇAFRAD system, some of its capabilities are also reduced and scaled. In

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*Dr. Kıvanç İNAN - Radars Project Manager at Aselsan Naval Platform*

fact, the only difference is that its range is a bit shorter than the final ÇFR system. The scaled model has less processing capacity for tracking and signal processing because the software and algorithms used in the scaled model are not the final versions. Apart from that, all of the features are exactly the same as the final ÇAFRAD system. The UMR was not tested in Phase-1, because the UMR is the Naval version of the Early Warning Radar System EIRS project that is already being tested. The reason for using the container structure in ÇAFRAD Phase-1 was that we could first test the system in Gölbaşı Ankara thanks to the containers and then we placed this modular structure on the helicopter deck of the TCG Göksu Frigate. As part of the platform integration process, approximately 80 tons of testing equipment was placed on the deck of the ship, and various tests were performed with the system. Before the cruise tests, we didn't make any alterations to the ship's Combat Management System (CMS); instead, we installed a separate mini CMS on the ship. This mini CMS operated in conjunction with the ship's main CMS, and it was connected to the guided-missile infrastructure on the ship. Thus, the ÇAFRAD system operated synchronously with the whole ship. The indigenous high-speed Şimşek drone developed by TUSAŞ was used in the guided missile (RIM-162B Block 1 Evolved SeaSparrow Missile/ESSM) test performed in Sinop on December 11, 2018. During the test, ÇFR first detected and tracked the Şimşek drone then engaged it with a Guided Missile at a specified range. The ESSM guided missile successfully hit the target at the desired range, which was the longest range ever tested. We tested the system with F-16s, helicopters, naval vessels. Finally, the system was installed at Tuzla Naval Academy. The system is located in an area with intense air and sea traffic. Optimization of the system is carried out there by Aselsan with the participation of the Naval Research Center Command (ARMERKOM/TNRCC) officials. Various activities planned for ÇAFRAD Phase-2 will also be tested at Tuzla."

Underlining that they work with approximately 130 domestic companies under the ÇAFRAD Project, İNAN noted that the ÇAFRAD System could be shaped and scaled according to different platforms. In response to a question, İNAN explained that the Prototype Technology Demonstrator Mast weighs 80 tons, not the final ÇAFRAD system. "As I said, 80 tons is the weight of the whole structure. Antenna subsystems are much smaller and weigh only 2-3 tons."

Naval Technical Commander Rear Admiral (Lower Half) Ramis AKIN and Navy Captain Cihat ERYİĞİT made a presentation about the ADVENT Combat Management System (CMS), which began development in cooperation with ARMERKOM/TNRCC and Havelsan in 2010, to meet the need of a modern Combat Management System with Network-Centered Warfare capability.

Referring to the ADVENT CMS in his presentation Rear Admiral (LH) Ramis AKIN pointed out that the 4th ship of the MILGEM Project, the TCG Kınalıada is equipped with the national ADVENT Combat Management System. "I would like to proudly announce that ADVENT CMS showed its success in defense of the blue homeland in front of the

world about 3 weeks ago. There are probably 3-4 countries that can make such a command and control system in the world. The ADVENT system, which is operated by ARMERKOM/TNRCC and Havelsan under full configuration control of the Turkish Naval Forces, will also be integrated into modernized or newly built submarines with the name MÜREN and maritime patrol aircraft with the name MARTI. ADVENT CMS is planned to be the backbone of the Long Horizon Integrated Maritime Surveillance System (IMSS) Project. Thus, we will acquire sustainable Command Control (C2) capability using standard modules in all surface, underwater, air, and coastal systems with shared development, configuration, and maintenance costs."

Navy Captain Cihat ERYİĞİT (Ph.D.), Head of the Systems Engineering Group at ARMERKOM/TNRCC, shared valuable information about past, present, and the roadmap of the ADVENT CMS in his presentation titled the Network Enabled Data Integrated (ADVENT) Combat Management System. ERYİĞİT stated that during the integration process of the GENESIS (abbreviation of Ship Integrated Combat Management System in Turkish) into the Gabya Class (G-Class) Frigates and the TCG Heybeliada and TCG Büyükada Corvettes built under the MİLGEM project, the Turkish Naval Forces Command started work on a new generation CMS due to the changes in both operational (Networked Capability, higher performance,


*Navy Captain Cihat ERYİĞİT (Ph.D) - Head of the Systems Engineering Group at ARMERKOM/TNRCC*

shorter reaction time, fault tolerance and the need for Turkish language support) and technological (Programmability) needs. Therefore, the analysis studies for the New Generation CMS started in 2009, and between 2010 and 2014, Phase-I studies were started in the development process of ADVENT CMS under the protocol signed with Havelsan. ERYİĞİT emphasized that the studies on the ADVENT CMS were initiated with the signing of the MİLGEM 3rd and 4th ship contract in 2014 and stated that the ADVENT CMS is currently used in the TCG Kınalıada Corvette. Underlining that Network Enabled Data Integration is the most crucial feature of the ADVENT CMS, ERYİĞİT emphasized that the applications and the systems are no longer platform-oriented but task force oriented and Cooperative Engagement Capability (CEC) has been gained with ADVENT. ERYİĞİT noted that the 3rd MILGEM Corvette, the TCG Burgazada would be retrofitted with the ADVENT CMS in the near future, and the first trials on Network-Enabled Capability and Cooperative Engagement Capability (CEC) will be conducted in 2020 with the participation of the TCG Burgazada and the TCG Kınalıada Corvettes.

Underlining that the ADVENT system uses an open-source architecture for security reasons, ERYİĞİT pointed out that the source code is in the hands of the FNFC. Colonel ERYİĞİT stated that the national middleware software called Geniaware is used in the ADVENT CMS with the layered architecture. ERYİĞİT noted that the critical data center middleware makes all application software run independently from the hardware and operating system, enabling the application software to communicate with subsystems and operators. Emphasizing that thanks to the Integrated Tactical Data Link Capability of ADVENT CMS, the Link System can now be accessed from all operator consoles in the Combat Information Center (CIC), ERYİĞİT stated that there is no need for a separate Link Console and the CMS supports Link-11/16/22, as well as the National Tactical Data Link System. ERYİĞİT also pointed out that the wireless communication module developed under the DETTA Project will be used within the scope of the ADVENT Engagement Network. ERYİĞİT stated that the ADVENT CMS will be used in the TCG Anadolu, DİMDEG, BARBAROS MLU, TF-2000, TCG Ufuk, MİLGEM, Burak Class Corvettes (Modernization contract hasn't signed yet) and the Jinnah Class Frigates (Contract signed for ADVENT CMS) built for the Pakistan Navy.

The ADVENT CMS, which has been developed in 3 different facilities of ARMERKOM and Havelsan, is one of the most comprehensive Combat Management Systems both in Turkey and the world with approximately 550 applications and 13 million lines of code. While the ADVENT system with an Open Architecture had 3 million lines of code at the beginning of its development process, this number reached 5 million lines of code at the beginning of 2017. On March 31, 2019, the Presidency of Defense Industries made an announcement on its official Twitter page revealing that Turkish engineers wrote 6 million lines of code for ADVENT software. The GENESIS Combat Management System onboard the Gabya Class, has 3 million lines of code, while the system onboard the TCG Bayraktar (L-402) included national software consisting of 3.9 million lines of code ■

# National Sonobuoy ASELBUOY Ready for Air-Launch Tests!

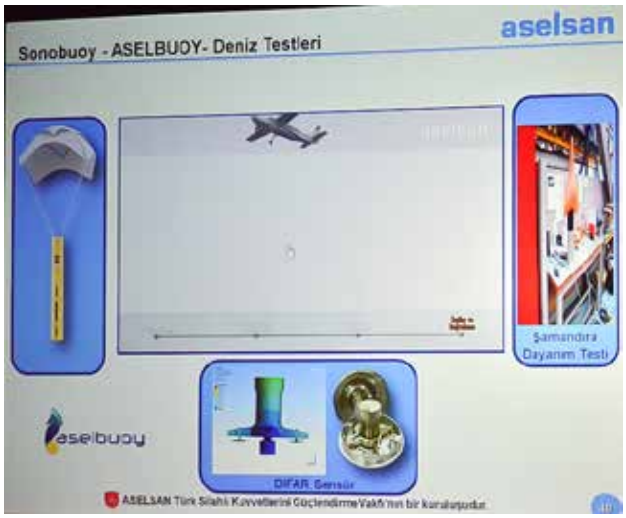
On the first day of the 9th Naval Systems Seminar held on October 14-15, 2019, at METU Culture and Congress Center, the Head of Aselsan Naval Systems Group, Behçet KARATAŞ, stated that ASELBUOY is ready for new air-launch tests. In his presentation titled "Aselsan Combat Systems Solutions for Naval Platforms and the Vision" shared that they are now waiting for a maritime patrol aircraft (MPA) from the Naval Air Command.

Aselsan recently signed a contract with the Turkish Naval Forces Command for the development process of the ASELBUOY Passive Directional Sonobuoy, which operates in the VHF band. KARATAŞ stated that the first tests were carried out with ASELBUOY following the successful completion of the development process, and the system is ready for launching from air-platforms. The first air-launch and listening tests with ASELBUOY were conducted in 2018. Within this framework, ASELBUOY tests were carried out from a launcher mounted on a Cessna turboprop aircraft; however according to the information shared by KARATAŞ, there was a problem with the deployment of the parachute and this problem was solved after the tests and ASELBUOY was made ready for new launch tests. In his presentation, KARATAŞ also shared the images of the ASELBUOY production and integration process as well as the Sea Tests and Buoy Durability Tests.

In his presentation, KARATAŞ shared the following information about Aselsan's work in the field of Sonobuoy:

"We are developing Sonobuoy within the framework of a protocol we signed with our Navy. In fact, we have reached the final phase, and the system can now be launched from an aircraft. We've carried air-launch tests before, but there were some problems with the parachute. At the end of this year, we intend to deliver this as a product that is both mature and capable enough to enter the inventory of our Navy.

On Sonobuoy, we are waiting for the Naval Air Command to allocate a maritime patrol aircraft, then we will carry out our final tests. Although Sonobuoy may seem like a simple thing, its parachute must be deployed properly, it must descend to a certain depth when launched into the sea, and its electronic systems must work flawlessly. Although it is small, it requires technical




knowledge, know-how, and experience. In fact, the Turkish Navy had started another project, but it didn't succeed, so they came to us, and I hope that the tests will be completed successfully by the end of this year. We are planning to qualify Passive Sonobuoy this year, while Active Sonobuoy and Acoustic Detection Systems will be ready for delivery in 2022".

ASELBUOY is a NATO-A size passive directional sonobuoy, deployed from maritime patrol aircraft (MPA) and surface ships alike. ASELBUOY can operate in two different depths (30m and 150m), providing directional acoustic information in the 5-2400Hz frequency band on the horizontal plane. The buoy can send this acoustic information to aircraft and surface ships within a 20km communication range via one of its 96 VHF communication channels (136MHz-173.5MHz). VHF communication channel and operating time (0.5, 1, 2, 4, or 8 hrs) are programmable from the user interface on the buoy itself before deployment. ASELBUOY has two different operational depth modes (30m and 150m), and the VHF communication channel and operating time can also be changed after launch by remote commands. As an expendable system, ASELBUOY scuttles at the end of its programmed operating time.

Aselsan is also developing an active ASELBUOY. Therefore, it will be possible to detect passive and silent submarines, which is not possible with passive sonobuoys. The Active Sonobuoy and Acoustic Detection System will be ready for delivery in 2022, according to the Aselsan Sonar and Submarine Road Map.


# ADVENT COMBAT MANAGEMENT SYSTEM

## ADVENT a Platform-Independent CMS

### "Developed with the Naval Forces for the Naval Forces"

### History of the Combat Management System Concept

The use of ships for military purposes dates far back in maritime history. Even though warships were mainly built for the purpose of transporting soldiers and weapons, they were also given, in due course, the task of fighting at sea and sinking enemy ships.

The mission of warships has constantly grown throughout history in world war. They have been to protect trading ships, to prevent the enemy from shipping trade, to hinder enemy troops from attacking at sea and to carryout sea attacks. The protection of the rights and interests of countries at sea is possible only through modern warships.

As technology has developed so has the warfare capability of warships, and with this increased capacity, warfare at sea has become increasingly complex, and the need to instantly perform critical functions has become indispensable. In order to satisfy the increasing needs in parallel with the development of warfare, the concept of a Combat Management System (CMS) has emerged in order to provide support in command and control coordination and to support the command staff.

The Combat Management System is a system that acts as the brain of the existing war system on the platform to support the combat power of battleships and aims to:

- Increase the situational awareness of the command staff
- Assist in the effective use of weapons and sensors of the combat system
- Provide decision support to the command staff for the operation carried out

In order to achieve these targets, the combat management system compiles the information obtained through both sensors and communication channels, processes the compiled information in accordance with operator inputs or system settings, and is able to both increase situational awareness and generate decision support by presenting obtained data to the operator or by using it in its predefined algorithms.

### CMS History of the Turkish Naval Forces

The first modern combat management system of the Turkish Naval Forces was the STACOS SEWACO system, which was integrated in the TCG Doğan assault boat supplied from abroad at the end of the 1970s. Later, with the Barbaros class frigates, the TACTICOS combat management system was introduced with more effective capabilities.

The K-5 Command and Control System, developed by the Turkish Naval Research Center Command (TNRCC) for the Tepe Class Frigates in the mid-1990s, was a system introduced for the use of Turkish Naval Forces after the abovementioned foreign-based systems in which some CMS functions were also performed.

## GENESIS CMS

After the experience gained from the K-5 project, the Turkish Naval Research Center Command initiated efforts to develop the first national combat management system in 1998 with the aim of modernizing the combat management systems of 8 G class (Gabya) frigates in the inventory. At the end of a 7-year effort, the first national combat management system, namely GENESIS, was acquired.

The GENESIS combat management system has been installed on 12 platforms in cooperation with Turkish Naval Research Center Command and HAVELSAN since 2005 and is being used successfully by these platforms.

## ADVENT CMS

In the course of time, due to the reasons below, the need for developing a new generation combat management system has emerged:

- Maintenance problems due to outdated hardware and software technologies
- Inadequacy to meet increasing and changing user demands
- Failure to provide the desired performance in the future due to the increasing number of tracks
- Unable to functionally meet future needs due to changing operational needs, new war types and non-war operation needs

The Network Enabled Data Integrated Combat Management System (ADVENT) was initiated to be developed in cooperation with Turkish Naval Research Center Command and HAVELSAN in 2010 to meet the need of a modern combat management system for the Naval Forces Command's air, surface, underwater and land-based platforms.

## System Engineering Phase

Within a period of two years, an intensive system engineering process with the joint efforts of Turkish Naval Research Center Command and HAVELSAN engineers was performed. During this process:

- Old systems were reviewed, and deficiencies and problems were identified
- User requirements were determined with operators, lessons learned were taken into consideration
- National and NATO tactical publications, STANAGs were reviewed
- Modern combat management systems were examined
- Literature searches were conducted on non-war operations such as search and rescue at sea, humanitarian aid and maritime control
- The personnel working in the combat elements of the Turkish Naval Forces Command were consulted

With the requirement set determined as a result of all these efforts, the definition of a combat management system that best meets the needs of the Turkish Naval Forces Command was revealed.

Design work started to fulfill the determined requirement set. Within this context, modern software and hardware technologies were examined and reliable and user-friendly technologies that best meet the needs were decided upon.

In ADVENT CMS, a production model having a product line approach was desired. Each ability of ADVENT CMS such as navigation, warfare, search and rescue were considered as a separate building block, and the building blocks for the target platform were brought together to form the CMS.

A similar approach was also used in the integration of platforms on which the ADVENT CMS would be used with the combat system. In this context, CMS - weapon / sensor integrations were planned to be realized as plug and play. ADVENT CMS does not generate behavioral changes according to the platform and system to which it will be integrated but provides tools to allow the platforms and systems to be identified by the CMS.

In this way, ADVENT has achieved a first in its field as a platform-independent CMS.

## Development and Tests

ADVENT CMS development activities have been performed in a coordinated and harmonious manner at three different locations, Turkish Naval Research Center Command, HAVELSAN Istanbul and Ankara facilities. At the end of each stage of the 3-stage development process which lasted nearly 6 years, the system was verified and validated by stringent tests.

With nearly 500 applications having different tasks within the CMS and approximately 10 million lines of software code, ADVENT CMS is one of the most comprehensive combat systems in the world.

## ADVENT at "Blue Homeland" (in Turkish "Mavi Vatan")

ADVENT CMS, after an intensive development and test process, was launched as the combat management system of the TCG Kınalıada, the last Ada class corvette of the Turkish Naval Forces Command. The test activities carried out on the platform were completed with actual firings and the TCG Kınalıada was delivered to the Turkish Naval Forces Command with the ADVENT CMS.

In the following period, the ADVENT CMS was agreed upon and contracted to be used as a retrofit in the TCG Burgazada, and as a combat management system on the TCG Anadolu (LHD), the TCG Ufuk (TVEG) and the TCG Derya (DIMDEG),

the shipbuilding activities of which are ongoing and also on Barbaros class frigates that are set to be modernized. If it is approved by the Turkish Naval Forces Command, ADVENT is planned to be used in all air, surface, underwater and land platforms which are currently under construction and to be constructed in the future, and it is to be exported for use on platforms that will be constructed abroad based on the permits granted.

## What is ADVENT?

ADVENT CMS is a completely national and domestic combat management system that

- Has access to fully integrated TDL functions 11/16/22, SIMPLE, JREAP and VMF through all operator consoles
- Is force-oriented instead of single ship
- Responds to the needs of the network-supported operational approach
- Facilitates the user's quick and accurate decision-making through decision support systems
- Targets a flexible structure in the use of new weapons and sensors

It has been developed in a modular structure that fits multitasking profiles and various platform types and is a platform independent system. With its scalable open architecture, it can be customized for surface, underwater and air platforms as well as for land facilities.

## Modular ADVENT

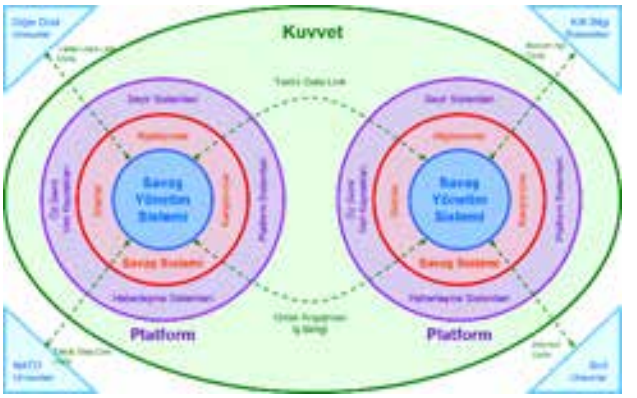
The modules of ADVENT have been independently developed in accordance with the ADVENT style directory, offering different capabilities and services, but providing data interfaces defined by ADVENT.

By bringing together the units from list noted below, which are in the interest of the target platform, the combat management system of the platform is established. The capabilities, which are required for the target platform but not included in the existing capabilities of ADVENT, are developed within the scope of ADVENT's platform integration activities and included in the ADVENT product tree.

- Situational Awareness
- Status Display
- CMS Support
- Operation Support
- Combat Management
- Navigation
- Non-War Operation
- Platform and Intelligence
- Subsystem - CMS Integration (Integration solution is available with nearly 50 systems)
- Training and Simulation System
- Infrastructure and Support

## Network Enabled Capability (NEC)

ADVENT, an effective and fully automatic combat management system, comes to the forefront with its advantages especially in "Network Enabled Capability". Developed in a hierarchical structure in accordance with centralized control and distributed




execution architecture, NEC increases the effectiveness of operations performed by enabling the share of platform capabilities with other platforms. NEC applications available under ADVENT are discussed in the following section.

- ### Mutual Engagement Capability:

In order to respond to the needs of dynamic and rapidly developing air warfare environment, ADVENT CMS uses a mutual engagement capability that enables rapid and efficient planning for the coordinated use of air warfare efficiency of the force over the NEC, proper allocation of resources and coordination of this planning with other platforms.

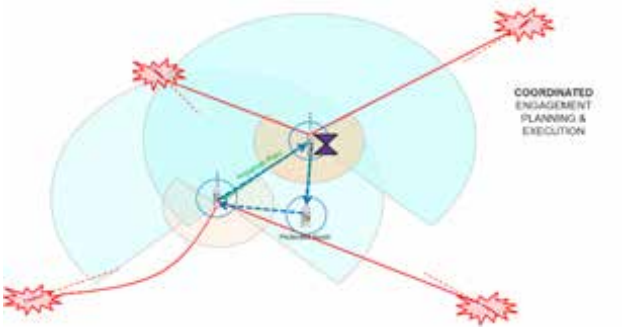
With this method, the weapon and sensor capabilities of the platforms with which the operation is performed jointly are shared over the NEC; plans are made for the overall task force considering the threats, the units to be protected and the resources, the plan is distributed to all task forces and executed in a coordinated manner.

- ### Task Force-Focused Services:

The CMS capabilities, which are offered as ship-focused (navigational plans, regulations, operational plans, search and rescue, etc.), are planned by taking into account other platform capabilities where operations are mutually carried out and shared with other platforms over the NEC and executed in a controlled manner.

- ### Training Capabilities:

With ADVENT CMS, advanced training capabilities are offered in both the virtual environment by simulators



and in real environments by real systems. This training can be performed on a single platform or with other platforms where operations are mutually carried out over the NEC.

## Warfare Capabilities

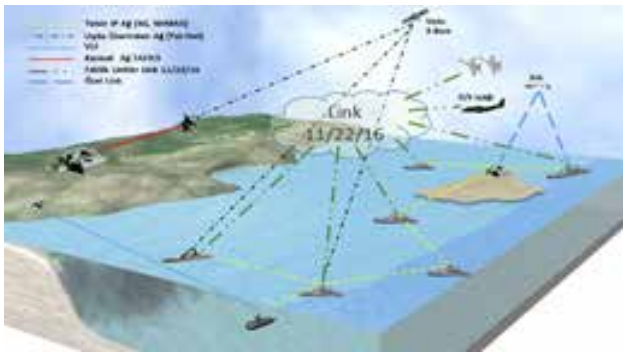
In order to support the main types of warfare performed by warships (surface warfare, anti-air warfare, anti-submarine warfare, asymmetric warfare, electronic warfare, mine warfare, amphibious operations), tactics and identifications (field, area, etc.) given for these warfare types in NATO and National Tactical publications are presented for the use of the command staff within the scope of ADVENT CMS.

## Full Integrated TDL Functions

Link 11/16/22, SIMPLE, JREAP and VMF networks are fully integrated with ADVENT CMS. With this integration, the multi-link system functions can be accessed not only from individual consoles but also from all CMS consoles. The TDL functions achieved in this way are distributed to all CMS applications. It is capable of operating multiple links of a similar type with different types of links simultaneously.

## Non-War Operation

Today, the naval forces have significant roles in so-called humanitarian operations. ADVENT CMS offers a variety of capabilities to support activities such as non-war operations, evacuation, maritime control and search and rescue.




## Navigation and Operation Support

Operators are presented with various solutions that have been offered in the ADVENT CMS to ensure that the platform navigates safely and executes operational tasks, such as planning, preview and execution of the operation, safety controls during the course of navigation, positioning, many navigational assistance services such as navigational planning, execution, anchoring, etc.

## Integration to Platform Systems

ADVENT is a platform-independent combat management system. In order to integrate ADVENT quickly and cost-effectively into any platform, a structure similar to plug-and-play has been used. Thanks to this capability, it is be possible to support the flexible and dynamic integration of new weapons and sensors such as ÇAFRAD, National G/M etc. to CMS, as well as a mutual engagement infrastructure.

## Rule-Based Decision Support System

Performing checks on the tracks continuously and taking actions against the tracks they have detected after these controls are very common for the operators using CMS ADVENT. With its rule-based decision support system capability, CMS ADVENT allows the operator to define the rules that will be valid for the tracks and plan the actions to be taken when the tracks are detected as per these rules.

With the activation of these rules, the system starts to apply these rules on the tracks and performs the predefined action in case of detection. Besides, it also offers display services for the operators to have situational awareness by analyzing the current situation with different perspectives.

## Operational Capabilities

ADVENT CMS, in addition to the current platform capabilities, is able to provide assistance in mine operations, maritime inspection, humanitarian operations,

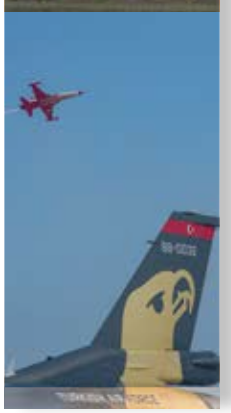
ADVENT CMS offers a user-friendly and flexible operator interface which is developed over modern hardware and software infrastructure. In addition, it also has capabilities such as multiple work space, authorized access to functions, dynamic help, situational menu, Turkish and English language assistance,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

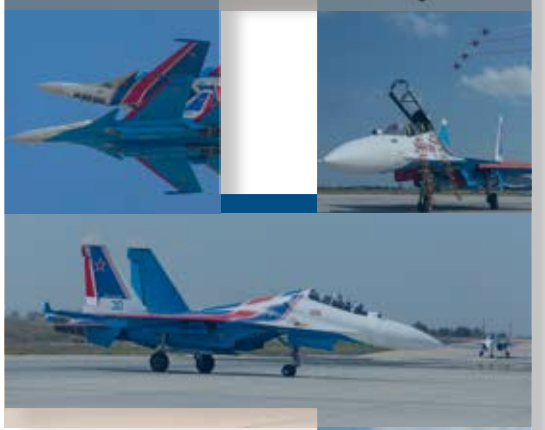
## Summary

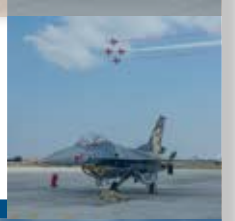
ADVENT CMS has successfully completed tests and has been launched as the combat management system of the TCG Kınalıada corvette. ADVENT is ready to serve as the combat management system of all platforms of the Turkish Naval Forces to be built and modernized today and in the future. Moreover, it is planned to serve the naval forces of friendly and allied countries with the approval of the Turkish Naval Forces.

ADVENT CMS as the rightful pride of Turkey, with its capabilities beyond the era, will take its place amongst the combat management systems of world navies. The greatest strength of ADVENT is that all of the activities, from design to development and testing, have been performed under the leadership of the Turkish Naval Research Center Command and with the contribution of HAVELSAN, one of the leading companies of the Turkish Defense Industry. It has been developed together with the user, not just with information obtained from the user. ADVENT, in its present form, is an exclusive combat management system in the world "developed with the Naval Forces for the Naval Forces".

# TEKNOFEST







# FROM THE SPOTTER'S VANTAGE POINT

by Cem DOĞUT

Teknofest Aviation, Space and Technology Festival was held between September 17-22 at the Atatürk Airport under the leadership of the Technology Team Foundation (T3 Foundation) and the Ministry of Industry and Technology and with the support of public and private institutions. Within the scope of the festival, 19 technology competitions in 44 categories were realized and 17 thousand 373 teams and 50 thousand competitors attended. 10 thousand competitors competed in the final. People from Turkey's 81 provinces and from 122 countries participated in the competitions. In the festival area, many local companies also introduced their products and capabilities to visitors at the stands allocated to them. Turkey's most well-attended festival, namely Teknofest 2019, broke a record this year and hosted a total of 1.72 million aviation enthusiasts, old/young, male/female, amateur/professional, needless to say, a wide variety of visitors participated in this incredible event that spanned a period of 6 engaging days.

Another prominent feature of the festival was the fact that it was the biggest air show in our country. Nearly 480 spotters applied to watch the shows. 60 of them were selected as permanent spotters and 60 as alternates. For the spotters, two towers were prepared in the show area, overlooking the runway and the taxiway. As in the previous year, the Turkish Armed Forces took part in the festival this year with broad participation. The Air Force participated in the festival with the Turkish Stars and Solo Türk demonstration teams as well as with AS532, CN-235M, C-130B, C-160D, A-400M, KT-1T, T-38M, F-4E / 2020 and F-16C, Land Forces with CH-47F, S-70D and T-129B, and Naval Forces with P-235, ATR-72 and S-70B. The institutions of the Ministry of Interior also attended the shows. The Gendarmerie Command attended with the Çelik Kanatlar (Steel Wings) demonstration team with two S-70As and S-70, Coast Guard Command with AB-412EP and CN-235M, Police Aviation with S-70A and Bell 429. The Bayraktar Akıncı Armed Unmanned Aerial Vehicle (SİHA) was exhibited for the first time in the static area, the Turkish Aerospace's Project National Combat Aircraft (MMU) and HürKuş drew great attention from the participants. Together with other participants, 40 aircraft were exhibited in the static area, while 23 different types of aircraft performed in various air shows.

The biggest surprise for the aviation photographers of Teknofest 2019 was the participation of Russian companies and the Russian Air Forces aerobatic demonstration team, the Russian Knights. Founded on April 5, 1991 at the Kubinka Air Base, Russian Knights is a team that performs mostly in Russia and does not travel abroad. Therefore, its participation for an air show in Turkey is very important. The team performed two shows at Teknofest with four Su-30SMs. The United Aircraft Corporation (UAC) representing Russia at Teknofest was the biggest company in

All photos credit by Cem DOĞUT

Russia. The participation of the company with MC-21-300, Superjet 100, Be-200ES and the star of the demonstrations, the Su-35S, was a significant indicator of the recent re-establishment of relations between Russia and Turkey. Thanks to its AL-41F engines having two propulsion-controlled nozzles, the Su-35S, flying by Sukhoi chief test pilot Yury Vashchuk, fascinated aviation enthusiasts with its short take-off ability and maneuvers challenging the laws of physics. The MC-21-300 - İrkut production, a company of UAC - impressed the audience with its maneuvers which were as good as the combat aircraft. The firefighting aircraft, that were on the agenda at the end of the summer due to forest fires, also participated in Teknofest. Beriev Be-200ES and Canadair CL-215 performed demonstration flights.

The air shows of the Turkish Stars and Solo Türk received a great deal of interest and attention from the audience, as usual. Solo Türk made a flight every day during the show and in a way hosted Teknofest. Personnel Search and Rescue exercises jointly carried out by the Ministry of Interior elements and the elements of Land Aviation were also unforgettable moments created for aviation photographers. The surprise among these exercises was the F-16C, providing close air support to helicopters as per the scenario. For this role, the pilot of Solo Türk's air show was Major Emre MERT. During his first-time performance ever, MERT received full marks from the audience. During the exercise scenario, low-altitude flares were fired to simulate the bombs released from the F-16. One of these flares caused the grass near the runway to flame up and the Airport Fire Department responded to the fire.

The show of Gendarmerie Aviation's Çelik Kanatlar (Steel Wings) team with Land Aviation's two ATAK helicopters, together and simultaneous, was truly breathtaking. Gendarmerie and Police helicopters and air vehicles of civilian flight academies conducted inspirational flights for the students. With these flights, 2,013 students had the opportunity to become acquainted with the sky for the first time. Within the scope of the air shows, a total of 825 landings and take-offs were performed including student flights; thus, a very entertaining event was realized both for the audience and aviation photographers. In the last two years, both Teknofest and the Eurasia Airshow have made a great leap forward in this field. With each passing day, there is increasing interest in air shows and in aviation photography. We, as aviation photographers, are very happy to see such organizations in our country, those that are equivalent to similar air shows in the world. Up next for Turkey is the Eurasia Airshow 2020, which will be held in Antalya on April 22-26, 2020

# TEKNOFEST Istanbul Wraps Up with Record Level Participation!

**Turkey's largest technology festival, TEKNOFEST Istanbul Aviation, Space and Technology (TEKNOFEST Istanbul) was held on September 17-22, at Istanbul Ataturk Airport under the guidance of the Ministry of Industry and Technology and the Turkish Technology Team Foundation (T3 Foundation), with the support of the country's important institutions and companies. TEKNOFEST Istanbul Aviation, Space and Technology Festival, which was held for the first time last year and attracted more than 500,000 visitors, was visited by 1,720,000 visitors this year and turned out to be the world's largest aviation, space and technology festival in terms of the number of visitors.**

The Ministry of National Defense, Chief of the General Staff, Presidency of Defense Industries (SSB) and TÜBİTAK SAGE were amongst the stakeholders of TEKNOFEST Istanbul 2019 as institutions and Aselsan, Baykar Makina, BMC, Havelsan, Roketsan, STM, TEI, TR Motor and TA as sector companies. President of the Republic of Turkey Recep Tayyip ERDOĞAN visited TEKNOFEST Istanbul on September 21, 2019 with his family. During his visit, ERDOĞAN was accompanied by some Ministers and Force Commanders.

Within the scope of TEKNOFEST Istanbul 2019, Turkey's largest technology event attracted a great deal of interest from citizens of all ages, 19 technology competitions were held under 38 different categories such as the HackIstanbul 2019 CTF Competition, Robotics Competitions, Robotaxi-Full Scale Autonomous Vehicle Competition, Efficiency Challenge Electric Vehicle


Competition, Flying Car Design Competition, Rocket Competition, Fighter UAV Competition, Technology for Humanity Competition, University Students Research Project Competitions, International Unmanned Aerial Vehicles Competition, Unmanned Underwater Systems Competition, Robotic Conquest 1453 Competition, Artificial Intelligence Competition, Model Satellite Competition, Swarm UAV Simulation Competition, Travel Datathon Competition, Mini Jet Radial Compressor Design and Turbofan Motor Design Competition. A total of 17,373 teams and 50,000 competitors from 122 countries and 81 provinces of Turkey had applied to the competitions and over 2,000 teams and 10,000 competitions qualified as finalists. Heading out with the "National Technology Move" slogan and aiming for Turkey's transformation into a technology producing society, TEKNOFEST Istanbul 2019 also hosted the World Drone Cup 2019 (WDC 2019). In the competitions organized in the specially prepared sections, the pilots competed with the drones they designed and assembled. 64 drone pilots from 32 countries, including also Turkey, China, Japan, Brazil and the United States attended the World Drone Cup 2019 which was executed by STM Company, and exhibited their talents. Five pilots namely Batu ERİLKUN (11), Atakan MERCİMEK (13), Özgürcan ÖZÇELİK (34), Cem KÖSEL (43) and Erdem ÜSTÜNER (30) represented Turkey in the competition. At the end of the qualifying rounds, 32 pilots qualified for the final. Dane GRACE from Denmark won first place in the WDC 2019, followed by Marc ESPUNA from Spain and Alex ZAMORA from the same country. The grand prize was TL 30,000 and the second and third pilots won TL 20,000 and TL 10,000 TL, respectively.

Within the scope of the six-day festival where over TL 3 million-worth awards were given in technology competitions, the awards of the winners were given by President Recep Tayyip ERDOĞAN on September 21 and to other finalists by Vice President Fuat OKTAY on September 22.

During 2019 TEKNOFEST Istanbul, Solo Türk, Turkish Stars, Russian Knights Aerobatic Team flying with Russian Air Forces' Su-30SM planes and Red Bull Air Race pilots with Su-35 combat aircraft juiced up the event with their demonstration flights. 38 different fixed and rotating winged aircraft with different sizes and tasks were exhibited in the TEKNOFEST Istanbul exhibition area. Amongst them were the T129B Mk-I ATAK Attack and Tactical Reconnaissance Helicopter, HURKUS Training Aircraft, S-70İ (one of two helicopters produced at the Sikorsky plant in Poland for the Gendarmerie General

Command, the helicopters were delivered to Turkey in 2018 painted with white, red and dark blue colors of the Gendarmerie, Utility Helicopter, Bell 429 of the Security General Directorate A400M Military Transport Aircraft, S-70B SeaHawk DSH/SSH Helicopter, CH-47F Chinook Heavy-Lift Helicopter, Russian passenger aircraft MC-21-300, Antonov 178 Military Transport Aircraft from Ukrainian Antonov Company, AKINCI PT-2 Attack Unmanned Aerial Vehicle (prototype number two) by Baykar Makina, CEZERİ Flying Car prototype and the AKSUNGUR UAV prototype of Turkish Aerospace. At the land vehicles section of the exhibition area, 9 vehicles were exhibited such as BMC's AMAZON, AMAZON UKS (with Remote Control System) and VURAN Tactical Wheeled Armored Vehicles, KİRPİ MRAP's new version KİRPİ-II, TUĞRA Tank Carrier (TTA), ALTAY AMT T1 Demonstrator and the company's brand new armored pick-up TULGA.

**Aselsan** participated in TEKNOFEST Istanbul with a large booth established on an area of 400 square meters and exhibited a series of latest technology products, particularly the unmanned systems. Utility Helicopter Cockpit, Explosive Ordnance Disposal Robots Ertuğrul-I, Armed Kaplan and Autonomous Kaplan, Remote Controlled Weapon Platform UKAP, ANTI-UAV, Multirotor

*Aselsan's NANO UAV*

Unmanned System Serçe 2, Mini Unmanned Flying System Nano-UAV, KARAGÖZ Aerostat Surveillance System and AKUSTİKA Autonomous Underwater Vehicle, all of which were produced with domestic and national technologies, were introduced at the company's booth during the Festival.

**Baykar Makina**, which had delivered 98 BAYRAKTAR TB2 Tactical UAVs and BAYRAKTAR TB2-S Armed-UAVS to the Turkish Armed Forces and security forces as of November 23, 2019, having completed 150,000 hours of flight, unveiled its newly developed BAYRAKTAR AKINCI Attack UAV System and CEZERİ Flying Car at TEKNOFEST Istanbul.

**Havelsan** demonstrated the HEZARFEN Parachute Simulator (it has been delivered to be utilized during the training of the paratroopers of the Land Forces Command), Sniper Simulator and Helicopter Simulator that have been developed completely with the domestic and indigenous facilities for the Turkish Armed Forces and the security forces. Havelsan attracted great interest with the aforementioned simulators and contributed to the Swarm UAV Simulation Contest held as part of the TEKNOFEST İstanbul 2019 as well. The company also offered the young people visiting its booth the opportunity to experience the Command Control Systems developed for the Air, Surface and Underwater Platforms at the virtual reality environment. Moreover, Havelsan's booth hosted the training for the national operating system PARDUS and the augmented reality cyber security game designed to raise awareness to the cyber threats.

*Cezeri Flying Car*

**Roketsan**, as the Main Sponsor of TEKNOFEST İstanbul 2019 regarding projectile, missile and space technologies, displayed the scale models of air-to-surface-guided ammunition and artillery rockets like UMTAS and CİRİT and Satellite Launch System (SLS) at its booth. At the same time, Roketsan made the dreams of young audience come true with the Rocket Competition it held with TÜBİTAK SAGE. Roketsan was the sponsor of the Rocket Competition conducted with TÜBİTAK SAGE within the scope of TEKNOFEST İstanbul 2019 and due to security measures the event was held prior to the festival on September 4-11, 2019 at Hisar Artillery Range at Akhisar. 570 Rocket Teams applied for two different categories composed of Low and High Altitude (1.500m and 3.000m) and 79 finalists consisting of high school, university and post-graduate students competed at the event where the participants launched their rockets to the air. The rockets competing at the competition were demonstrated at the joint

showground of Roketsan and TÜBİTAK SAGE at TEKNOFEST İstanbul. The competition was accomplished successfully for the first time in Turkey after the U.S. and thus went down in history. Roketsan Chairman Prof. Faruk YİĞİT announced that students ranking the highest at the TEKNOFEST competitions would be hired without any conditions in case they applied to vacant positions at Roketsan.

On the other hand, the young participants built mock-up rockets at the workshop held at the joint showground of Roketsan and TÜBİTAK SAGE. The children and young participants seized the opportunity to learn while they played at this workshop during the festival.

**STM** was one of the stakeholders of the TEKNOFEST Istanbul 2019 and the company took part at the event as the executor of the "World Drone Cup 2019" contest where the world's leading drone pilots displayed their capabilities. Meanwhile at the digital game area built at the company's booth, the visitors seized the opportunity to experience the WDC2019 via exactly the same digital augmented virtual reality game. ALPAGU, KARGU and TOGAN drones and scale models of FocusFlite Flight Simulator as well as LAGARI and PIRISAT satellites were also demonstrated at the STM booth.

*ANKA-S UAV and BAYRAKTAR TB2*

**Turkish Aerospace** presented all its products, in particular the National Combat Aircraft (MMU/TF-X) followed by Turkey and the whole world, to its visitors at the TEKNOFEST Istanbul Aviation, Space and Technology held at Istanbul Atatürk Airport on September 17-22, 2019. Within this scope, the exact mock-up of the 5th generation National Combat Aircraft that was introduced at the Paris Air Show 2019 in France in June was displayed in Turkey for the first time at TEKNOFEST while GÖKBEY, ANKA, AKSUNGUR, Heavy Weight Attack Helicopter (ATAK-2) and HÜRJET were presented to the visitors. HÜRKUŞ Training Aircraft conducted air shows as part of the festival. Turkish Aerospace also introduced newly developed mobile game application named as "Operation ATAK" at TEKNOFEST İstanbul 2019 to the game fans. It was announced that "Operation ATAK" could be downloaded from the application centers without any charges and the application was launched with a surprise event at TEKNOFEST İstanbul 2019.

**TEI** demonstrated the TJ90, TJ35 and TP38 engines developed and manufactured through indigenous resources, the Experimental Turbojet Test Stand developed for the ground tests of the TJ90 turbojet engine and the scale model of the L-39 Albatros jet training aircraft that was imported to be utilized in the flight tests of the TJ90 model and was exhibited at TEKNOFEST for the first time as part of the festival. TEI also held a Mini Jet Radial Compressor Design Competition at its booth at TEKNOFEST 2019. Following the application process that lasted on February 28, 2019, the Preliminary Design Reports were evaluated on April 19, 2019 and the teams that deserve to move onto the next stage were announced. The finalist teams were identified on June 22, 2019 when the Critical Design Reports were announced and the results were declared on September 15 at TEKNOFEST upon the completion of the assembly and test processes.

107 teams attended the competition. The radial compressors designed by three finalist teams were manufactured at the facilities of TEI and the tests were completed as the compressors were installed to the TEI-TJ90 turbojet engine. According to the assessments made after all test processes,

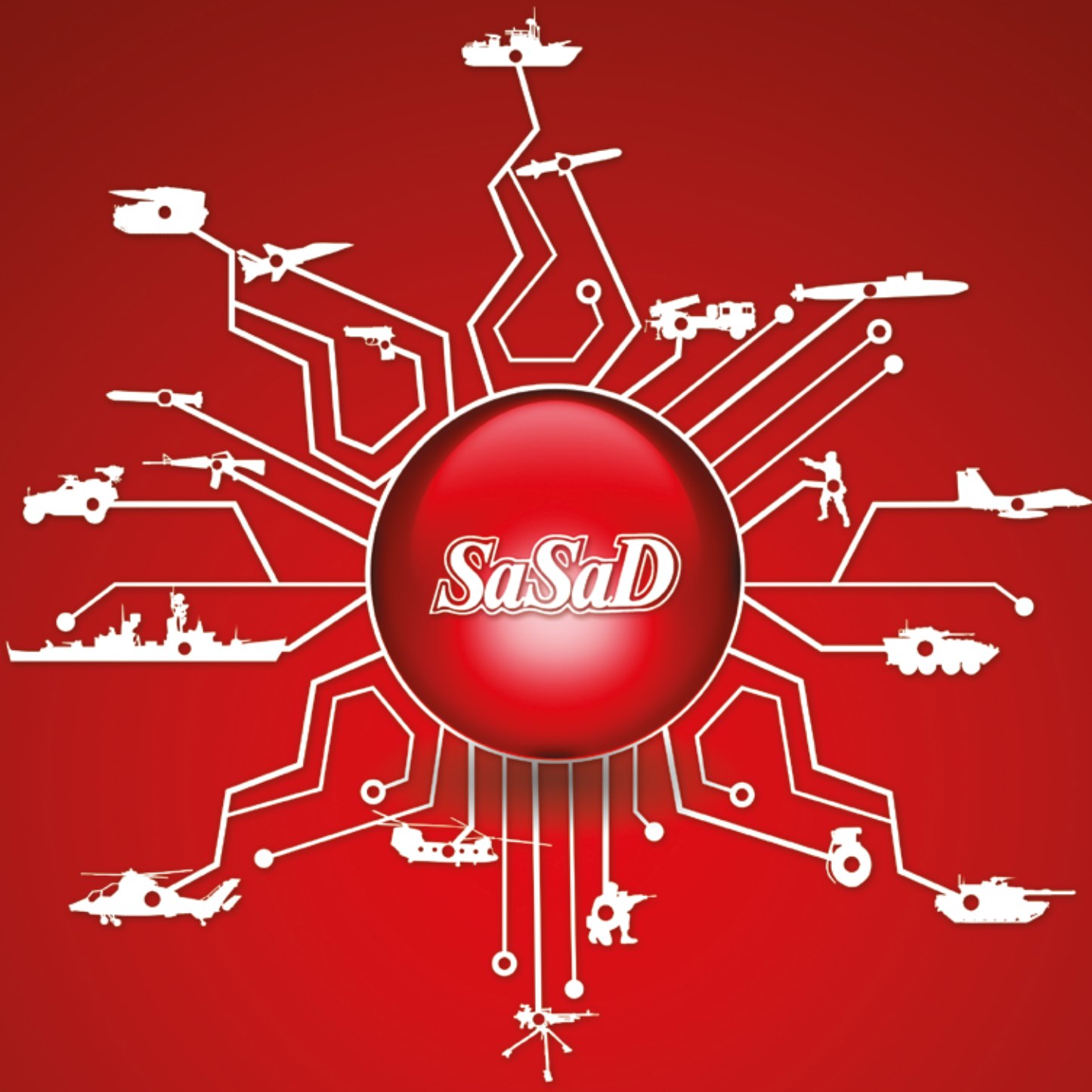
MAX-THRUST Team from Necmettin Erbakan University ranked first, FAMES Team from Gazi University came in second and AERODEBI Team from Eskişehir Osmangazi University came in third. President ERDOĞAN handed the award to the winner team and Vice President OKTAY presented the awards to the second and third teams. TEI announced that it will be employing the members of the winner teams at TEI for their contribution and support to the indigenous engine projects.


**TR Motor**, at its booth at the festival, informed its visitors on the efforts on the development of the indigenous turbofan aircraft engine while it entertained and trained the children, adults and elderly visitors on the working principles of the aircraft engine at the Engine Workshop built at its booth. The mobile section model of the J85-GE-13 turbojet engine utilized at the F-5A/B aircrafts displayed at the TR Motor's booth drew considerable interest. Furthermore, for increasing the interest towards the aviation engines, TR Motor also became the sponsor of the Military Turbofan Engine Design Competition in order to encourage the students to work at gas turbine engine technologies area that is extremely critical for our country. The content of the competition was identified as "the renewal of the turbofan engine of a currently functioning military jet for the year 2029" and with this competition the "improvement of the fuel consumption and propulsion/weight ratio" of the existing turbofan engine is aimed.

TR Motor was the sponsor of the Turbofan Aircraft Engine Design Competition and 112 teams applied to be contestants. TOBB Economy and Technology University's Mechanical Engineering (ETU) students Baran İPER, Burak CENİK, Çağdaş Cem ERGİN and Tacettin Utku SÜER won the competition with the ETU-GRIFFON Turbofan Engine they designed. JET-KILLERS came in second and AIR FLOW came in third at the competition. The number of the teams decreased to 23 after the preselection and only 12 teams out of the 112 applicant teams deserved to attend the final design stage.

**TÜBİTAK** attended TEKNOFEST Istanbul 2019 at its booth of 900 m2 with its products and various events with the participation of its Institutes and Presidential departments (BİLGEM – Informatics and Information Security Research Center, MAM – Marmara Research Center, Defense Industries Research and Development Institute, TUG- National Observatory, UME- National Metrology Institute, UZAY- Space Technologies Research Institute, ULAKBİM- National Academic Network and Information Center, UİDB – International Cooperation Department, BİDEB- Directorate of Science Fellowships and Grant Programs and Science and Society Department in addition to six Science Centers (Bursa, Elazığ, Kayseri, Kocaeli, Konya, Üsküdar) and the DeneYap Workshops.

2019 TÜBİTAK International Unmanned Air Vehicles Competition was conducted as part of TEKNOFEST on September 16-19, 2019 at İstanbul Yenikapı Showground. A total of 112 teams from Turkey and abroad attended the competition held in two categories of Fixed Wing and Rotating Wing air vehicles. INSTITUT TEKNOLOGI SEPULUH team from Institut Teknologı Sepuluh Nopember University came first in the Fixed Wing category, TEAM ALBATROS from Niğde Ömer Halisdemir University ranked number two and APIS R&D Team from Istanbul Technical University came in third. RACLAB Team from Konya Technical University won the competition held in Rotating Wing category




DEFENSE AND AEROSPACE INDUSTRY MANUFACTURERS ASSOCIATION

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# "We Will Deliver AKSUNGUR to Our Forces by Year End, with its Wide Range of Weapon Integration Options"

A Defence Turkey interview with Temel KOTİL, President and CEO of Turkish Aerospace (TUSAŞ) during the TEKNOFEST Istanbul Aviation, Space and Technology Festival, Turkey's largest technology festival held on September 17-22, 2019, at Ataturk Airport.

**Defence Turkey: As a start, could you please evaluate the TEKNOFEST Festival and TUSAS' participation in the event, which was held for the first-time last year and attracted more than 500,000 visitors?**

**Temel KOTİL:** TEKNOFEST's brand value is increasing every year. It is Turkey's largest Technology, Aviation and Space Festival. Within the scope of the festival, many award-winning competitions were held, and the awards were presented to the winners by Recep Tayyip ERDOĞAN, President of the Republic of Turkey. We, as Turkish Aerospace, received the best Patent Award in the field of patents.

**Defence Turkey: For which product was this award received?**

**Temel KOTİL:** We have developed a computer/ software system for aircraft avionics. It can now be used in military projects, and later for commercial projects. We are here with many products; our National Combat Aircraft, GÖKBEY and Heavy Class Attack Helicopter and our Unmanned Aerial Vehicles ANKA and AKSUNGUR. For the time being, the firing tests of AKSUNGUR UAV have been conducted and we will deliver it to our Forces by the end of year with its wide range of weapon integration options.

**Defence Turkey: How many AKSUNGUR MALE UAV prototypes are currently in-flight tests?**

**Temel KOTİL:** There are two prototypes. The production activities for the third one is currently ongoing. At the moment we are performing live firing tests with these two flyable prototypes. We integrate them and conduct laser-guided or GPS-guided firing tests. With each passing day, we are proceeding from mock-up to the prototype stage and then to production stage.

**Defence Turkey: During TEKNOFEST, you showcase many of your products. What is the status of these national products in the export market? As far as we know, negotiations for the ATAK Helicopter were occurring with Pakistan.**

**Temel KOTİL:** Negotiations with Pakistan still continue. Turkey now produces its own engines. The Turkish Defense Industry improves it with every passing day. Therefore, we will be able to see that the national products in the portfolio of Turkish Aerospace are sold everywhere, very soon.

**Defence Turkey: What about the National Combat Aircraft? It was unveiled at the Paris Air Show and now it is displayed at TEKNOFEST. What is the status of the activities? Is the schedule you declared in Paris still valid?**

**Temel KOTİL:** Yes, it is still the same. It will be rolled out in 2023 and the maiden flight will be performed in 2025. Ground tests will take two years and then we'll see it in the sky in 2025. We'll

deliver it in 2029, there's no change in the schedule.

**Defence Turkey: How many prototypes will there be? Previously, a total of 7 prototypes were declared, 6 for flight and 1 for ground, but in Paris the figure was also mentioned to be 5?**

**Temel KOTİL:** An increase in the number of prototypes is not that critical. For example, we increased the number of prototypes of GÖKBEY in order to deliver it at an earlier time. The important thing is to take it aloft.

**Defence Turkey: Another issue in national aircraft development efforts is the availability of qualified human resources. After all, there is human labor behind this type of program. It is not always easy to find qualified individuals because Aviation is indeed the highest level of science.**

**Temel KOTİL:** We don't have any difficulties in finding new graduates. We employ 1,000 engineers per year, and we prefer those with at least a 3.0 GPA. We're employing Turkey's qualified individuals and we are aware of it. So far, I have employed 2,500 engineers. The new graduates cannot directly start to work in production and the problem starts here. There is no problem in Turkey in finding staff; you can find them from every discipline, from electronics to aircraft, but these people don't have experience with "on-the-job training". The first 1,000 people we employed are about to complete their second year, and after five years they will be experienced engineers. So, the answer to your question is that Turkey acquires human resources from new graduates, but we have an experienced staff shortage since we have to complete and deliver the products in the meantime. For example, AKSUNGUR was completed in a very short time. Why? Because the center body was built on ANKA, and we will not sell it as more expensive than ANKA. It's easy to put something on it when you've done it before. Turkish Aerospace has spent many years on the ATAK helicopter. The Heavy Class Attack Helicopter is being developed very fast, as it was with GÖKBEY. Turkish Aerospace has a core staff, but it needs time to scale it. We are acquiring people from abroad who have experience in the development and manufacture of a Combat Aircraft, in other words supersonic aircraft, because there is no other way.

**Defence Turkey: A handshake was made with the British company BAE Systems for providing technical support under the National Combat Aircraft Project, wasn't it?**

**Temel KOTİL:** Don't take this as technical support, money talks here, there's a market. When you pay enough salary, you can employ the most qualified and experienced experts. For instance, there was a person from Florida, U.S. who was supporting us in GÖKBEY, an elderly person, but a master in helicopters, coming to us as a consultant. We sat down and had a chat. I said, "Thank you very much, you have come and are helping us at your seasoned age, and he said, "I thank you for hiring me at this age". What I mean here, they all have a market. We can bring people to Turkey that have in-depth knowhow, and especially those retired with expertise. There is no "impossible" in technology, but we need to be as bold as brass and daring, and we have shown this courage.

**Defence Turkey: There was also an issue in the press in recent weeks about AKSUNGUR's jet-engine powered brother. What would you like to share with us on this project?**

**Temel KOTİL:** Yes, we're trying to achieve supersonic flight right now. Now, our first goal in unmanned systems is to achieve supersonic speed. Instead of going supersonic with the National Combat Aircraft, we will go supersonic primarily with an unmanned system in a year. Activities for subsonic still continue, but we will achieve supersonic speed. We will produce HÜRJET to pave the way for the National Combat Aircraft. HÜRJET is also supersonic and will be able to reach Mach 1.4. It will make its maiden flight in 2022.

**Defence Turkey: There was an agreement about that, on the engine for HÜRJET at the Paris Air Show, is that right?**

**Temel KOTİL:** That's right, those activities are in progress. We are currently aiming to complete the subsystem procurement of HÜRJET. When the subsystem, the engine, etc., is completed, it means most of the work is almost done, and then the production stage will start. HÜRJET will make a surprise!

**Defence Turkey: A preliminary protocol was made for HÜRJET with the Turkish Air Force Command. During the ADEX Fair, it was stated that the Azerbaijan Air & Air Defense Force Command was showing close interest in both HÜRKUŞ and HÜRJET.**

**Temel KOTİL:** We started our marketing efforts for our indigenous products around the globe even when they were at the beginning of their design & development phase, but it takes time to achieve real sales. Our first customer is always Turkey, and this is actually a rule. Our primary focus is to produce these products better than their competitors in terms of procurement cost and performance, then the rest comes.

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

**Temel KOTİL:** As our President of the Republic of Turkey said, Turkey is self-sufficient in this regard. We hire new graduates and maybe we wait for three years, but we achieve in raising them to produce aircraft. We establish large laboratories in this field in Turkey, wind tunnels and facilities for lightning tests. We manage to solve challenges regarding both physical infrastructure and human infrastructure. After 10 years, Turkey will become a major player in the "aerospace" field and will be one of three or four countries excelling in this field

# Otokar Armored Vehicle Hull Main Welding Line and Full Penetration Welding Technique

by İbrahim SÜNNETÇİ


On April 24, 2019, Otokar, one of the leading land systems manufacturers in Turkey, opened the doors of its factory in Arifiye, Sakarya, to members of the press, including Defence Turkey Magazine. Otokar facilities are established on a total area of 560,000 m2, 144,000 m2 of which is a closed area.

One of the sections we visited in the factory was the Armored Vehicle Hull Main Welding Line. The hull welding operations of ARMA 8x8 Wheeled Armored Combat Vehicles, which are being produced at an intense pace for export, and COBRA II and COBRA I Tactical Wheeled Armored Vehicles, which are produced for four different users, were being carried out on the welding line.

In fact, according to Otokar officials, steel armor plates/sheets used in the production of armored vehicles supplied from abroad are welded by robots here, and parts of the vehicles which cannot be welded by robotic arms are performed manually by certified welding operators in a separate station. Two different welding methods are applied in the Armored Vehicle Hull Main Welding Line, which are Corner Welding with an Arc Welder and Full Penetration Butt Welding.

COBRA-II

Full penetration armor welding is also used in the production of ALTAY MBT pre-prototypes and prototypes, and it is the preferred welding process for welding thick, high-strength armor steel plates. This welding process is a multi-pass welding method, and a ceramic base is used to protect the weld pool. The welding process is carried out by robots, and Otokar production engineers developed the robot programs used in the system. According to our knowledge, the Full Penetration Welding technique significantly improves the blast protection of the armored vehicle. It is stated that the armored vehicle hulls produced with the Full Penetration Welding technique have a much higher resistance against various types of Mines and IEDs than the vehicles produced with the standard welding technique. However, with the Full Penetration Welding technique, the hull welding process takes 2.5 times longer than the standard welding technique, so the vehicles stay longer in the production line/factory, and therefore, more labor is spent. This process has increased the production costs of armored vehicles produced with this technique. According to Otokar officials, despite this cost increase, Otokar is one of the few companies that prefer the Full Penetration Welding technique to produce more protected vehicles.


During our visit, there were ARMA 8x8 Armored Combat Vehicles in the Full Penetration Welding Line. In the Armored Vehicle Hull Main Welding Line, 3 robots were allocated for 8x8 production, each performing different operations. Thanks to this welding robot infrastructure, Otokar can produce the vehicle hulls at a very high speed. According to the information we have obtained, it takes approximately 1 month for each 8x8 vehicle to be produced from scratch and become ready for delivery.

The vehicles are rotated in ergonomic and horizontal positions with the help of a positioner to allow the robot arms to weld the hard-to-reach parts in the hulls of the armored vehicles. Thus, the desired penetration in the welds can be easily achieved. All the welding lines are inspected with X-Ray and then sent to the user with zero error.

Otokar's tactical wheeled armored vehicles use high-strength steel plates with different mechanical and chemical properties in different parts of the hull.

# White Hackers Compete for the 'Capture The Flag'

**November 1, 2019. Under the leadership of the Presidency of Defense Industries (SSB) and organized by STM, the CTF (Capture The Flag) competition was held for the 5th time this year with broad participation, and STM's new product "Bugshield" was introduced and is expected to make a difference in cyber security. During the event, a signing ceremony was held between STM and Sakarya University for the "National Testbed Center" project initiated under the auspices of the SSB.**

by Cem AKALIN

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CTF, one of the initiatives of STM to create awareness in the field of cyber security and to raise qualified human resources, again witnessed fierce competition of white-hat hackers in its 5th year.

In the event organized with the participation of Prof. İsmail DEMİR - President of the SSB, the contestants competed to find deliberately created system gaps on issues such as cryptology, reverse engineering, web and mobile applications in the cyber environment specifically prepared for the CTF event. Professionals, students and technology enthusiasts showed great interest in the event and it was presented by Serdar KUZULOĞLU, well-known in the IT sector.

Prof. İsmail DEMİR, President of the SSB: "Turkey's defense industry has been progressing significantly with projects realized in recent years. The domestic and national products we have developed during this fruitful journey are of great importance for the security of our country. The technology era we live in makes the measures we will take even more critical with the emergence of new battle environments. The efforts to ensure the protection of our state, institutions and citizens in the digital environment constitute an important part of national security. The Turkey Cyber Security Cluster that we established has been performing activities with the aim to improve our technological capacity and build our own infrastructure by providing sectoral cooperation. I think CTF contributes to our efforts in this field and that the impact it creates is valuable for our country."


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*SSB President- Prof. İsmail DEMİR*

STM General Manager Murat İKİNCİ underlined that CTF plays an important role in guiding young people and professionals who are aiming to build a career in cyber security. "As STM, we carefully and methodically handle cyber security, which is one of the most important areas we focused on. The integrative and proactive approach we adopt reveals itself in our products and services as well as our initiatives that feed the ecosystem. In this sense, we are pleased to have reached more than 400 teams and nearly 1,500 competitors in our 5th year of CTF, which is an important initiative in the field of cyber security in order to train qualified human resources needed by our country. With Bugshield, our mass-based vulnerability detection platform, that we introduced today, we have added a new solution to STM's integrative solutions in cyber security. As STM, we will continue to make efforts steadfastly to develop innovative technologies for our country."

The competition that started with the online preselection of 197 teams and 710 contestants from 86 universities around Turkey ended today with an offline final competition with 50 teams. In the offline CTF final with 191 contestants, the winning team was awarded with a cash prize worth TL 25,000, the second team TL 20,000 and the third team TL 15,000.

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# STM's Critical Solution for Vulnerability Detection: "Bugshield"

Handling cyber security products with an integrated approach, STM has introduced its latest product Bugshield. The product detects exploitable cyber security vulnerabilities and creates instant reporting with its continuous penetration test methodology and offers a critical solution for the protection of corporate resources which enables security teams to take quick action before cyber attackers do.

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STM Deputy General Manager Ömer KORKUT stated that by bringing together expert cyber security researchers and institutions with a "hacker" point view, Bugshield enables the detection of vulnerabilities in systems. "Through Bugshield, we provide a proactive service to protect organizations from current cyber threats and increase security levels. With a web-based system, Bugshield provides a platform for a continuous test of the inventory that organizations require to be tested by various, reliable and competent researchers. These researchers that can be referred to as 'ethical hackers' consist of cyber security experts, who have become members of the system by being subjected to a series of interviews and security criteria. When the researchers report the vulnerability they have detected in the system, the STM experts are involved and the findings go through a predefined approval process. Immediately informing the institutions on the confirmed vulnerabilities gives significant opportunity to the institutions in order to detect the security gaps before the attackers and to close exposure gaps as soon as possible."

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*STM Deputy General Manager- Ömer KORKUT*

Following STM Deputy General Manager Ömer KORKUT's speech, STM Cyber Security Specialist Şeref Can ÖZKAYA made a presentation to participants about the features of the product and the services they offer.

## Proactive Solution in Cyber Security: Bugshield Platform

The Bugshield platform, the latest cyber security product that STM provides in an integrated approach is a critical solution for the protection of corporate resources and enables the taking of quick action upon the detection of exploitable cyber security vulnerabilities through continuous penetration testing methodology and instant reporting services.

## Detection of Vulnerabilities through the "Hacker" Point of View

By bringing together expert and competent cyber security researchers and institutions, Bugshield enables the detection of vulnerabilities in the systems with a "hacker" point view. It operates as a web platform with three different interfaces connected to a central system, including customer, analyst and researcher profiles. Organizations using Bugshield are able to request vulnerability checks in their inventory lists according to the conditions set as per their policies. STM sends this request to the platform and initiates the penetration test process to be carried out by member researchers.

## Instant Reporting, Quick Action

The vulnerabilities detected are recorded in the Bugshield system by the researchers and the findings are subjected to a two-stage approval process by STM experts. Confirmed vulnerabilities are delivered to the customer in instant notifications via e-mail and SMS, regardless of their importance. By this way, the vulnerability is detected before the attackers and the time between detection and remedy is shortened. Organizations are able to generate reports on vulnerability analysis results in a variety of formats and by applying the requested filtering.

## Reliable and Competent Team

The researchers in the STM Bugshield system that are also referred to as "ethical hackers" consist of cyber

security experts, who are included in the platform as a result of technical interviews and assessments according to their competency profiles. A confidentiality agreement is also signed with the researchers. Upon request, the institutions are able to view the profile information of the researchers, vulnerabilities they have detected, effort they have made and the confidentiality agreements they have signed on the platform. Researchers work based on a reward system and their scores are recorded on their cards as they detect vulnerabilities. STM experts, on the other hand, undertake the verification and reporting tasks within the platform.

## Critical Information Systems under Protection

The STM Bugshield platform can be used by all public and private sector organizations having web or mobile applications. It offers a significant cyber security solution, especially for organizations with potentially critical information systems across the world. The continuous penetration test service provides superior advantages for ministries with sub-websites and large commercial enterprises compared to the conventional penetration test conducted periodically.

Bugshield will serve within the Cyber Fusion Center (SFM) established in Ankara by STM providing reliable and high quality cyber security solutions for critical infrastructures of all institutions both in Turkey and in the international arena.

# National Testbed Center to be Established in Cooperation with STM and Sakarya University

During the CTF event, which is organized by STM on an annual basis, a cooperation agreement was signed between and Sakarya University for the establishment of the National Testbed Center for Critical Infrastructures Based on Industrial Control Systems, to be carried out within 12 months. With the agreement, the signing ceremony, of which was attended by STM General Manager Murat İKİNCİ and Sakarya University Rector Prof. Fatih SAVAŞAN, is an important investment and it will be realized within the model of industry-university cooperation for the indigenization of the control systems of critical infrastructures such as energy and water and to ensure their security.

*Fatih SAVAŞAN and Murat İKİNCİ*

STM General Manager Murat İKİNCİ delivered a speech at the ceremony and said, "We invest in raising human resources; I believe qualified and talented human resources are needed especially in the field of cyber security. We place great importance to cooperation with our universities to increase the number of qualified human resources not only for our institution but also for other institutions. With the agreement we will sign here today, we will provide a very important infrastructure to Sakarya University. Thanks to this infrastructure, we think that more talented specialists will graduate from universities."

Sakarya University Rector Prof. Fatih SAVAŞAN: "It is an honor for our university to be approved and supported by the Presidency of Defense Industries and STM for the establishment of a testbed in the field of Energy and Water. We believe that Sakarya University will serve the development priorities of our country in the fields of bio-medical and cyber security in addition to superior material and material coating. We are proud of the fact that this project will be realized at our university."

With the project initiated under the auspices of the Presidency of Defense Industries for the establishment of the National Testbed Center, the aim is for both the indigenization of control systems of critical infrastructures that are very crucial in the cyber security environment and to secure such systems through national facilities.

At the Testbed Center, initially plans are to be made for the modelling of energy and water management systems. With the modelling of academic studies in a real environment, the objective is to expand the know-how of the country and to increase the number of domestic and national production initiatives.

# SEMPROCONX19 Conference Held in Ankara

*Semiha YAŞAR - Founder of SEMPRO*

SemproConX19 was held on November 18-19, 2019 at Bilkent Hotel in Ankara. The focus of the conference was on achieving a successful product life cycle in the digital world. The conference hosted over 200 participants from 53 companies and was organized by Sempro Consulting and Engineering, which provides consultancy services and training to the all sector on the new generation product management method CM2 used by the world's leading defense and aerospace companies, including Turkey's leading defense and aerospace companies.

Participants in the 2-day conference had the opportunity to listen to experienced specialists from various companies such as IpX, Roketsan, ASML, Nurol Machinery, FNSS, TÜBİTAK-Sage, Taos Certification, Configit, TEI, CIMdata, Aselsan, Esen Sistem, Arçelik, Sub-Zero and Havelsan on their application processes in their organizations, as well as hear their success stories, lessons learned and forecasts. Speakers drew attention to the contribution of the CM2 method to product management, and the capabilities it provides in integrity, traceability and quality improvement in the management of products and processes. Also emphasized was the fact that that CM2 provides effective and practical solutions for the inevitable elements that digital transformation requires for success. Thanks to the features of the CM2 methodology it will be a guide for transformation necessary in an ever evolving dynamic and digital business environment.

Panelists shared their views and answered questions from participants in three separate panels organized under the topics of "The Importance of Configuration Management in Companies", "How Product Management of the Future Should Be" and the "Contribution of CM2 Methodology to Digital Transformation".

During the conference, companies in the booth area exhibited their products and solutions to participants with and held informative meetings.

In an eloquent speech, Semiha YAŞAR, the founder of SEMPRO, extended her thanks to all speakers and panelists who supported SemproConX19 and to all participants for their interest in the conference. YAŞAR: "As you all know, the world is constantly changing and transforming. Terms such as Industry 4.0 and Digital Transformation have started to be used widely. As in other parts of the world, many conferences, meetings and workshops on digitalization are also being held in our country and the best practices and to-do's on digital transformation are discussed on a sectoral basis. The exact key lies in the answers to the following questions 'For whom do we do it, what do we do and how do we do it'. If the processes are insufficient to meet the requirements and are not properly defined and used, achieving digital transformation is not possible. At this point, we believe that CM2 provides a solution and we consider it very critical for achieving success on the way to digital transformation."

Following the conference which was supported by Dassault Systemes, Upchain, Arge PLM, FNSS, Techvisor, Forte Arge, Havelsan, MSI and Defence Turkey Magazine, a 3-day CM2 and Product Lifecycle Management (PLM) training and a 1-day workshop were conducted.


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# ESBAŞ- Defense and Aviation Industry National and Domestic Industry Development Conference Held in İzmir

Under the auspices of the Presidency of Defense Industries (SSB) and with the Aerospace Cluster Association (HUKD), the Aegean Free Zone Development and Operating Co. (ESBAŞ), which has hosted nearly 50 national and international conferences, organized the "Industrial Growth in National Defense and Aerospace via International Cooperation" conference on October 10-11, 2019 at the ESBAŞ Technology Center Conference Hall.

İzmir Deputy Governor Barış DEMİRTAŞ, ESBAŞ Chairman of the Board Faruk GÜLER, Vice President of the Presidency of Defense Industries Serdar DEMİREL, Gaziemir District Governor Ahmet Süheyl ÜÇER, Gaziemir Mayor Halil ARDA, President of Aerospace Cluster Association Osman OKYAY and numerous guests were present at the opening speeches of the conference.

Emphasizing at his opening speech that ESBAŞ has achieved many firsts so far, Faruk GÜLER, ESBAŞ Chairman of the Board said, "Under the auspices of the Presidency of Defense Industries, we organized two international Aviation and Offset Conferences in 2008 and 2010. In 2012, we hosted the Global Industrial Cooperation Conference, which was decided to be held in İzmir by taking full marks from the international organization committee established in this field. The establishment of the first Aerospace Cluster Association in Turkey was led by us. Ege University Aviation Higher Vocational School is located in Gaziemir and our graduates have been performing important tasks in the Aviation and Aircraft Industry for years."

Touching also upon international cooperation, GÜLER said, "The aim of this conference is to set a landscape for international cooperation of companies performing activities in the defense and aerospace industry. I hope that the participants establish fruitful collaborations and that we will see achievement of our goal."

Underlining the importance of making a difference in the defense industry, Vice President of the Presidency of Defense Industries Serdar DEMİREL said, "Owning the same weapon or similar weapons with the whole world increases predictability, therefore we have to produce extraordinary weapons. The defense and aerospace industry has grown by 60% in the last 10 years, but we need to increase it at least fourfold. Compared to European countries, we are at the level of 1 in 5; therefore we should increase our exports 4 times. Turkey's defense industry realized $ 2 billion in exports last year; $ 900 million was realized in the aviation/aerospace sector. This year it continues to increase. We achieved $ 2 billion in the first 9 months. If we continue this way,

we will have achieved an export of $ 2.5 billion with an increase of 38%. From a general point of view, Turkey's export increased by 10% during the last 6 years, but the export in our defense and aviation/aerospace industry increased by 60%. This is really impressive but we have to go further. In our 11th Development Plan, our 2023 target for defense and aviation/aerospace exports is $ 10 billion. We need to increase it four times. We need to think more innovatively and challenge our intellect by coming together. We are amongst the first 15 countries in the world in export. There are leagues in these 15 countries. We passed the amateur league, but we're in the third league. U.S. is the leader. Our exports are one-tenth of the U.S. The U.S., China and Russia, these are very different countries. We can look at the example of European countries. We have ¼ of the amount of the exports of European countries. We should increase our exports by 4 times.

Turkish aviation and defense industry companies, especially Turkish Armed Forces Foundation companies that are the backbone of domestic industry, foreign aviation companies, local authorities, rule-makers, SMEs, associations, local and foreign clusters came together at the conference under the themes of "How Domestic Industry Develops with International Cooperation?, Defense Industry Security and Export Control, International Cooperation and Practices in R&D and Design, Importance of Export for the Sustainability of Defense, Foreign Direct Investment in Defense and Aviation Industry, Industrial Competence Assessment and Support Program / Industrial Participation and the Role of Clusters in the Development of Domestic and National Aviation Industry."

*Görkem KİRİŞ and Osman OKYAY*

# Defense and Aerospace Industry Export Target for 2023: US$ 10.2 Billion

In the afternoon session of the first day of the Conference, Murat CERAN, Presidency of Defense Industries, Head of International Cooperation Department made a presentation on 2019 export performance, export targets, international cooperation activities, current status analysis, priority products and country approaches.

According to the updated data, Turkish Defense Industry Exports reached US$ 1.912 billion during the 10 month period between January 1 and October 8, 2019 and increased by 37.7% compared to the same period in the previous year. Turkish Defense Industry exports were recorded as having reached US$ 1.855 billion in the previous year.

In the presentation, it was also shared with participants that the Defense and Aerospace Industry export target for 2023 was revised as US$ 10.2 billion.

# Technology Sponsor of the Izmir Aerospace Conference: Vestel Defense Industry

With a wide range of products ranging from UAVs to hydrogen and fuel cell solutions and developing various technologies in this field, Vestel Defense Industry attended the Izmir Aerospace Conference as the Technology Sponsor. 5 different sessions were held at the event and Öner TEKİN, General Manager and Board Member of Vestel Defense Industry and AYESAŞ moderated the second of these sessions titled "Importance of Exports for the Sustainability of the Defense Industry".

# 5th Istanbul Security Conference Held - "New World Architecture of Economy and Security"

**Organized by the Turkish-Asian Center for Strategic Studies (TASAM) National Defense and Security Institute (MSGE) regularly every year since 2014, the 5th Istanbul Security Conference (IGK) with the main theme of "New World Architecture of Economy and Security" was held on November 7-8, 2019 at CVK Park Bosphorus Hotel, Istanbul. Various topics were discussed relating to the age of Micro Nationalism and the mounting Global Security challenges both old and new that are facing the world today.**


Along with the Istanbul Security Conference 2019, other forums were held as co-events, such as the 3rd Turkey - Gulf Defense and Security Forum with the main theme of "Gulf Architecture of Power and Economic Security" in cooperation with the Qatar Strategic Studies Center (QSCC), the 2nd Turkey - Africa Defense Security and Space Forum with the main theme of "African Architecture of Security and Turkey", and the 1st Space Ecosystem and Security Workshop with the theme of "New Economy and Security Architecture of Space."

The opening speech of the two-day event was given by Süleyman ŞENSOY, Chairman of TASAM, with the theme "New Conventional, New Economy and Security." The event hosted many military officials, senior bureaucrats and academicians specializing in their fields. Sub-themes were discussed in various panels, such as the "Ecosystem and Law of the New Power and Property, International Law Security, New UN and Security Architecture, Economic Security Governance, Global Governance of Military and Economic Competition, Transformation of Security Organizations."

Süleyman ŞENSOY, Chairman of TASAM gave the opening speech of the 5th Istanbul Security Conference with the theme of examining and understanding the economy and security architecture of the new era in the 'Multipolar World Order' which has not yet been understood and implemented in all its aspects. He pointed out that the first of the issues they faced while trying to understand the ecosystem vision was the new geopolitical model and the impact it has on competition. ŞENSOY: "The area up to Canada, including North Africa, appears to have become the new geopolitical center, but it is too early to make a final judgment. Within this new geopolitical area, there is fierce competition between the new and old powers, and there is also significant sharing competition in the regions outside this geopolitical area. Therefore, we need to challenge our brains to discover and anticipate the instabilities or possible instabilities in the regions outside the Geopolitical Center and contribute to an international regulation."

ŞENSOY reminded the audience that there has been a global resources crisis (Global Financial Crisis) since 2008 all over the world, especially starting from the Western world, as a result of pushing out the resources that could be produced in loan-debt relation. ŞENSOY also said that a land and sea rivalry has started with the domination of China, that the conventional balance has changed especially with the Declaration of Arms announced by Russia in March of last year (the introduction of 6 new asymmetric weapon systems) and that the U.S. Naval Forces would become a target in all open seas if the newly developed Russian weapons have the alleged capabilities. ŞENSOY: "Therefore, it is obvious that this land-naval forces war and rivalry will shape the upcoming period. What the competition stands for from a national and global perspective is very important because it is not possible to implement a standard, uniform strategy for any country. There are significant differences even within security

alliances, therefore each country needs to develop a competition perspective by properly analyzing its weaknesses and strengths. What I mean by competition is that destructive competition and the resource problem at this very point that the world has reached, I believe it is very difficult to eliminate. I think that competition in nature and the genetics of countries and people should be directed to different areas. One of the most important alternatives is space. Fierce competition has started, but it is now in a position to balance the competition in the world. Within this framework, each country has to define its own Strategic Inventory and take action accordingly. In other words, they need to redefine what they have in their strategic inventories; conventional power, soft power, hard power, smart power..."

Stating that he considers that it is not necessary to seek enemies internally and externally in today's world, ŞENSOY underlined that if we are seeking enemies or friends, we have to look at our own institutional infrastructure, because the power of this institutional infrastructure is able to determine everything. Noting that the institutional infrastructure and the capacity to implement regulation amendments rapidly are very crucial, ŞENSOY said, "Because of the swift pace of technology and rapidly changing virtual landscape, we are falling behind in ensuring the transformation of our institutional infrastructures in parallel with this rapid flow. This is the case even for the most developed countries." Stating that land is precious in the era of Empires, now machines have become more valuable with the Industrial Revolution and that great Nation States have emerged, ŞENSOY added, "The Information Age we are in today is an international system that promotes micro-nationalism. Since there are no big crashes and splits today, this may sound like a distant possibility, but we may receive very critical data on this in the next 10 years. Therefore, this era, the 21st century, is the age of Micro Nationalism, and it does not consist of only ethnic origins.

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*Süleyman ŞENSOY - Chairman of TASAM*


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Even people united around crypto coins can be included in micro-nationalism. So, I would like to underline that any difference can be organized, any difference can be perceived as micro nationalism. Therefore, within a knowledge-based economic and security model, security areas, sectors and the Economy Center should be managed accordingly. This is also one of the important mental thresholds ahead of countries. To achieve this, there must be a correct correlation between political targets, economic policy and sectoral targets. Unfortunately, this is something that cannot be achieved easily, so it is a process that leads to millions of repetitions. In this sense, I would also like to say again that this is the key formula for success in this arena ..."

In order to be successful in the competition of the new era, ŞENSOY emphasized that the primary regulation should be established with critical thought and should be merit based and thus ensuring the emergence of the power of institutional infrastructure. He noted that at this point of impasse the world has reached in civilization, the international system established after the Second World War (the conditions at that time were very ideal compared to these days) should be reinterpreted on the basis of power and justice, and he said, "Otherwise it is not easy for anyone to talk about a manageable country profile in a manageable world."

ŞENSOY: "I would like to repeat that the transformation of all economy-based industries is the most fundamental issue for safeguarding the security of the future. Nowadays the concept of power and ownership of power is changing in order to understand the international system that is constantly being shaped. In other words, everything that is conventional, large armies, large crowds, large civil servant sites, masses of experts, defense industry capacities or the institutions that support them and produce for them are changing rapidly. We are in a period when the conventional one changes rapidly. In this era where information, solely, is of value and even overrides

currencies, I think that we should consider our understanding of the 'new conventional' to be in the same boat, because if we face the future by simply relying on the existing infrastructure, I'm afraid we will come face to face with really painful issues. Therefore, the concept of power and ownership of power needs to be reexamined both on the basis of individuals and families, societies and the states. We are entering a period in which the market value of our conventional savings and accumulations can rapidly melt. This could be real estate wealth or vehicles for individuals, and armies for states. Therefore, I think that we should focus on what the economic equivalent of the new conventional is and how it should be transformed. The global new economic model is a model that is principally based on information and economizes information. For example, there are several companies in the world, the values of which exceed US$ 1 trillion. These are all information technology companies, no mining companies, no oil companies have such market values, so there are some clues as to how the economy transforms. For example, a taxi application has a market value of US$ 92 billion, or a hotel reservation application has a market value of US$ 32 billion. But when we look at the holding companies that have tens of thousands of factories and employ tens of thousands of people, we see that their values are like US$ 5-6 billion dollars. Industry 4.0, Society 5.0 and artificial intelligence are now very popular concepts, but as the popularity increases, its content becomes hollow. Artificial intelligence in particular is changing the center of security and the economy.

When we see that very outdated formulas are imposed especially upon developing countries, underdeveloped countries and least developed countries in terms of what and how the new economy and security ecosystem should be, we validate that this new economic security model has not been fully comprehended. Therefore, we need to come together and discuss how the new economic security model will be shaped all over the world. Hybrid power is one of the most discussed topics especially in military fields. Another issue is the risk of failure in success, for example the point where the European Union (EU) has come due to shortsightedness has resulted in the unsustainability of the standards that it raised to an extreme, and therefore it is necessary to adjust the extent of success. Being very successful may also bring a lot of mistakes, which is a very sophisticated issue, so I think that we need to work hard on the risk of failure in success while producing systems, establishing infrastructure, and

*Brigadier General Rashed Hamad Al-NAIMI, Commander of the Qatar Armed Forces*

setting targets. We said something about five years ago that reads, 'what we are doing over the next decade will determine where we will be for the rest of the century' and I think this is still valid. Very crucial changes are expected both within the current period and in the forthcoming years, especially the changes in technology and the developments that affect human lives validate some promising data but at the same time give some critical signals of chaos about the sustainability of international order. In this sense, there are serious instabilities in many countries around our own country. We wish friendly and allied Iraq soon to become stable. Again, many countries have similar potential. No one is exempt from this, neither Turkey nor the U.S. Therefore, how they are managed will be decisive for the future. We can say that countries manage to build a successful perspective for this century with a total institutional infrastructure transformation. Our aim here is to make an effort to provide clear information as a contribution to our national institutions in Turkey, friendly and allied countries and to the world..."

Speaking at the ISC 2019, Brigadier General Rashed Hamad Al-NAIMI, Commander of the Qatar Armed Forces Strategic Studies Center underlined that the Istanbul Security Conference (ISC) has become one of the most important security conferences specialized in defense affairs in the Middle East. Brig. Gen. Rashed Hamad Al-NAIMI delivered the following speech:

"This year's edition of the Istanbul Security Conference and the Turkey-Gulf Defense and Security Forum comes under accelerated shifts in the balance of international and regional powers. The superpowers are grappling and competing to fill the strategic vacuum that has been created by the withdrawals of other superpowers from many regions throughout the world. International Order is coming under pressure from the rise of many powers, Superpowers and Regional Powers, in which we are witnessing

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a rearrangement in the structure of the global system with all its factors, institutional, legal, economic, military and others. Also, at the regional level, there is a constant movement and change in the map of alliances and new forms of security, since the Gulf Crisis in 2017 and the ongoing unjust siege imposed on the State of Qatar, many strategic, security and economic equations have changed. The coming period will change many related concepts and equations. Many new notions will be imposed, under the introduction of some of the projects under consideration, both regarding the protection of waterways in the Gulf and the Arabian Sea, or regarding the formation of a new regional security umbrella includes all countries from the both sides of the Arabian Gulf. The security situation in the Gulf remains uncertain, due to the persistence of some unresolved disputes, including the Gulf Crisis, the Yemen War, sanctions and escalation against Iran. Where will these conflicts lead us? Especially after we have seen their in-depth ramifications in some of the most stable Gulf countries.

The renewable Defense and Security challenges have introduced a 4th military operational domain, which is Space, in addition to the other main domains of Land, Sea, and Air. Unmanned Vehicles and the Cyber


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Warfare have introduced a very challenging and complicated domain to defend against, and the Turkey-Gulf Defense and Security Forum will discuss this newly introduced military domain. The Forum will also discuss the evolution of strategic military tactics and military doctrine due to the technological advancement and ramifications on the military. The continuous collaboration between Qatar Armed Forces Strategic Studies Center and TASAM is the extension of the strong and strategic partnership between the State of Qatar and the Republic of Turkey. The events proved that the two countries stand in the same trench in the face of challenges that threaten regional security and stability. Over time, the facts unfold, and events prove the solidity of this strategic alliance and the validity of its view in many regional crises.

The Qatari-Turkish relationship is a renewed historical relationship, based on brotherhood and solidarity, and a common progressive vision, we share ups and downs, good times and bad ones. We walk together in a common road that our present and future have become dependent on. The people of Qatar will never forget the Exceptional Turkish stand and support during the Gulf Crisis. The stability of Turkey, politically and economically, is pivotal to the whole region, and therefore, Qatar is firmly standing with the Republic of Turkey, politically and economically, during all the economically stress it is facing. This is the constant role of our Good Qatar Governance and Leadership."

At the beginning of his address Rear Admiral Mirza Foad Amin BAIG, Representative of the Minister of Defense of Pakistan, stressed that he was fully in agreement with the noble concept of TASAM's Chairman Süleyman ŞENSOY about the challenges of information age and added, "I think there are few less fortunate countries that still have to face the challenges of the industrial age, and information age."

Noting that since the existing World Order is transforming from bipolarity to multipolarity and micro nationalism, from World Trade to Trade Wars, and from traditional power struggles to more complex hybrid challenges, the state is not necessarily the main actor, Rear Admiral BAIG said, "With security and stability as the fundamentals to peace and development, today's world is faced with mounting Global Security challenges both old and new." Rear Admiral BAIG stressed that some lingering conventional issues like Kashmir Continues to challenge Global Security with nuclear confrontation and said, "Global security is encountering non-conventional challenges and widespread terrorism at the hands of non-state actors, cybercrime, and massive migration caused by economic disparity and civil wars."

Rear Admiral BAIG went on to speak of socio-cultural imbalances and economic rivalries in various parts of the world all of which threaten National Security, social stability and economic

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*Rear Admiral Mirza Foad Amin BAIG, Representative of the Minister of Defense of Pakistan*

development around the world. Rear Admiral BAIG: "Within the globalized framework of the economically and politically integrated world, the dynamics of security have changed manifold. Cohesive efforts and enhanced cooperation between states from Regional and Global players as well addressing core issues of socio-economic discontent and stability are esssential. Pakistan highly appreciates the positive role being played by Turkey and other friendly countries to bring stability and order in a world, which is not yet based on the ideals of social justice. The question of diversity in an increasingly interconnected world has also been prominent. With a much faster transfer of populations than ever, spurred by economic interests as well as by instincts of conflicts imposed on these countries by external players and destruction on their part of the world. In this context, we need to realize the Dilemma of a huge segment of the Afghan population, our brotherly country living in refugee camps in Pakistan as well as Iran for the last four decades. The continued security conundrum of Afghanistan hampers the efforts to create a requisite pool factor enabling the safe and honorable return of these refugees to their home. Similarly, the displacement of the Palestinian population from their home marks a point at the very concept of universal Human Rights, social justice and egalitarianism. Ironically while at the same time the Rohingya refugee crisis is what's considered to be destabilizing for regional stability. India has blatantly deprived 1.9 million people of their citizenship rights, branding them illegal immigrants in India, their own country. In one way or another all such issues are as political as they are economic. The Refugees lost their economic roots in their own countries. The forced expulsion invariably adds to the complexity of a discrete resolution. Here I must mention Kashmir. India's revocation of article 370 and 35A of its Constitution has not only deprived the local population of their UN mandated political and economic rights but also put the security and stability of the nuclear neighborhood at risk. As the economic architecture within the global governance system has not kept up with the scale and complexity of the hybrid Information Age, the challenges have now come under stress due to the rapid Technological Advancements and the changing geo-strategic environment around the globe. Consequently, we are witnessing new regional Security and economic forums. They all have a crucial role in security and economic cooperation and development at a regional and global level as well. Trends with new systems of cooperation both in security and economy are shaping up. Just as was said, our next 5 years perhaps will decide the fate of our next 90 years. In the wake of the transition from Unipolar to Multipolar world, decent financial institutions and economic organizations are required. We believe that free trade agreements, information-sharing and through consulting and financing we can empower smaller economies to contribute their fair share to the world economy. This will offset the economy control of few over many..."

Ayşegül BAYBARS, Minister of the Interior of the Turkish Republic of Northern Cyprus, was one of the keynote speakers of ISC 2019 and touched upon the latest status in the Eastern Mediterranean and said that they are working to realize the policies toward the development of cooperation as the Turkish Cypriot side for regional and global peace in the context of security architecture. BAYBARS: "As you all know, Cyprus is a small island in terms of its geographical location, but it is extremely strategic and important. Considering the theme of the conference this year, I would like to express, as the Minister of Interior of the Turkish Republic of Northern Cyprus (TRNC), that the recent developments and changing balance in the Eastern Mediterranean have made Cyprus even more effective and visible within the strategic equation. Stating that the hydro-carbon resources discovered in the Eastern Mediterranean have added a new parameter to the region in terms of defense, security and economic balances and led to the re-dealing of cards in the region. The bipolar world after the cold world was replaced by cyclical relations and alliances, Minister BAYBARS said, "In this new parameter, as Northern Cyprus and Turkey, we persistently have defended and continue to defend that these resources belong to two nations living on the island, namely the Turkish Cypriot people and the Greek Cypriot people. This position we have adopted is not only discursive but also operational, it is an extremely important position"

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# STM Gets Ready for MİLDEN and Takes the First Step for the Development of Ecosystem!


**As it may be recalled, STM Savunma Teknoloji Mühendislik ve Ticaret A.Ş., which has signed leading naval platform projects, had initiated the Submarine Design and Technologies Competition in October 2018 to generate indigenous projects related to submarines at universities and to support talent development in Turkey. The award ceremony of the competition was realized on November 11, 2019 at the Naval Museum in Beşiktaş, Istanbul with the participation of Northern Sea Area Naval Commander Rear Admiral Tayyar ERTEM, SSB Naval Platforms Department Head Alper KÖSE and STM General Manager Murat İKİNCİ.**

The Submarine Design and Technologies Competition was organized under the Postgraduate and Undergraduate categories. Initially, the applications were received and then workshops were held over the last year and the applications were evaluated by the jury (STM Naval Projects Director Rear Admiral (Ret'd) Savaş ONUR). The Design and Technologies Competition plays an important role for the future of the ecosystem in Turkey with the valuable inventive ideas developed by students from different disciplines for submarine platforms that are of strategic importance and the innovative new technologies that arise out of the creative process.


*Arif ALCAR - STM Submarine Design Manager*

In the Undergraduate Category of the competition, the thesis titled "Floating Antenna Design for Submarines and Underwater Vehicles" of Mustafa KUTLU, Aykut ALKAN and İbrahim SAVRUKOĞLU (Istanbul Technical University) under the supervision of Prof. Kadir KIRKKÖPRU placed first. The thesis titled "Online Body Diagnosis and Mine Diagnosis with Unmanned Underwater Vehicle" of Merve BERİK (Bülent Ecevit University) under the supervision of Seda Karadeniz KARTAL came in second place and the thesis on "Computational Analysis of Scale Effects in the Calculation of Submarine Resistance with Fluid Dynamics" of Hasan ÖZTÜRK (Yıldız Technical University) under the supervision of Dr. Yasemin Arıkan ÖZDEN placed third.

In the Postgraduate Category, the thesis titled "Hydrodynamic Analysis of an Underwater Glider" of Mehmet Ozan ŞERİFOĞLU (Istanbul Technical University) under the supervision of Asst. Prof. Bilge TUTAK ranked first, the thesis titled "Computational and Experimental Analysis of Trace-Compatible Submarine Propeller Design" of Sinan BURUNSUZ (Istanbul Technical University) under the supervision of Prof. İsmail Hakkı HELVACIOĞLU ranked second and the thesis titled "Underwater Electro-Optic Intercom System Design" of Kaan ALPER (Bahçeşehir University) under the supervision of Prof. Sarper ÖZHARAR ranked third.

In order to become a major player in the maritime sector worldwide, STM has also been recently concentrating its efforts on underwater platforms with the strength it has been gaining from the success in the MİLGEM Project.

Being a leading organization in the construction and modernization of submarine projects in Turkey, STM has been investing and improving skills in this field for over 10 years with the experience and knowhow of more than a quarter century.


*Murat İkinci - General Manager of STM*

Delivering a short speech at the ceremony, Arif ALCAR, STM Submarine Design Manager informed participants on the Design and Technologies Competition that was held for the first time this year.

Answering the question on the reason for selecting the Naval Museum as the venue of the ceremony at the beginning of his speech, he shared that the Beşiktaş Naval Museum incorporated the history of the Turkish Naval Forces and that it was located at the area where Nuri DEMİRAĞ Aircraft Design Office – Turkey's first aircraft engine design office was built, and he added, "I think organizing the ceremony at this place is really meaningful for a design and technology competition". Reminding the audience that Turkey is still making efforts to design and build its own submarine, ALCAR said, as STM, they think that national power and resources need to be mobilized for designing and building submarines and in the meanwhile all relevant institutions should act according to a plan.

Stating that, as STM, they have been contributing, and intend to do so in the future, to submarine building, modernization and similar activities conducted in Turkey under the auspices of the Presidency of Defense Industries (SSB), the National Submarine (MİLDEN) Project being in the first place, ALCAR said that in the analysis they made themselves, one of the issues that they saw in common amongst the countries that built their own submarines was that intensive research, articles and publications had been initiated years before the start of the National Submarine Project in the universities of these countries. ALCAR: "As STM, the important factor to organize such a thesis competition is to trigger and activate the development potential in this field. We organized this competition in order to close the gap even a little, to draw attention to the submarine topic, and to ensure that our young people in various branches at universities focus on the submarine issue and create a submarine design force in the future. 23 approved Undergraduate and Postgraduate Theses from 10 universities took part in the competition. This number is more than one third of the theses published in our universities in the last 30 years. The number of theses done within nearly ten years have been accomplished just last year and we believe this number will climb to much higher levels in the future. On this occasion, we would like to express that the valuable students participating in our competition should have the rightful pride of breaking new ground. If theoretical background is not generated at universities, we believe Turkey, under no circumstances, will be able to own its fully indigenous and national technologies. We would also like to ask our esteemed faculty members to encourage participation in this competition, which we plan to organize continuously.

In order to progress in the submarine area, which is of critical importance in gaining strategic talent to Turkey, our state, industry and universities are putting forth efforts in coordination, and therefore, we look forward to your valuable


contribution in this regard. We fully believe that our precious young people, that we entrust our country to in the future, will fulfill their duties successfully".

Recalling that STM was established in 1991 with the aim of localizing the defense technologies needed in our country and creating critical engineering knowhow, STM General Manager Murat İKİNCİ noted that, as of today, STM employs nearly 700 engineers and incorporates considerable knowhow in the field of military marine technologies.

Stating that STM's current strong engineering structure is very significant toward developing national solutions that will required in the future, İKİNCİ summarized the main objective of the Submarine Design and Technologies Competition, which is the one and only in Turkey, as "to create our own power for building our National Submarine that we will need in the future." İKİNCİ: "We believe fully in this matter. One of the most important issues that we place importance upon is the fulfillment of our future needs by our own children through STM's engineering knowhow, which is also included in STM's founding purpose. In fact, we started cooperating with our universities in earlier years. We provided training especially in the field of marine technologies and tried to raise awareness at our universities. As of today, we believe that we have brought the cooperation between universities and industry to a certain point. With this and similar competitions, we aim to train our engineer candidates who will take over the flag for us in the future in the domains in which we have needs and requirements."

Following the speeches, awards were presented to the contestants and photos were taken.

# 2nd International Military Radar and Border Security Summit

The 2nd International Military Radar and Border Security Summit (MRBS) was held with the participation Minister of Interior Affairs Süleyman SOYLU and Minister of National Defense Hulusi AKAR in Ankara. At the opening of the summit, the Ministry of National Defense signed goodwill and strategic cooperation agreements with 29 domestic defense industry companies within the scope of localization and nationalization activities.


Under the auspices of the Ministry of Interior, the Ministry of National Defense, the Presidency of Defense Industries, and the support of the Turkish Cooperation and Coordination Agency (TIKA) and the Turkish Defense and Aerospace Manufacturers Association (SaSaD) the 2nd International Military Radar and Border Security Summit (MRBS) was held by the Independent Industrialists and Businessmen's Association (MÜSİAD) in Ankara at the Hilton Garden Inn, between 2-3 October 2019. The two-day summit focused on strengthening surveillance and detection strategies, protecting critical areas, the work of the Military Radar Technologies and Domestic Industry in this direction, the latest developments in border management and border security technologies, the use of UAVs in cross-border operations and border security, mobile border security systems, and effectively utilizing radars, avionics, and sonar systems against land, sea and air threats.

Organized to support the development of the domestic and national defense industry and to increase export potential, the 2nd International Military Radar and Border Security Summit was held with the participation of Minister of Interior Affairs Süleyman SOYLU, Minister of National Defense Hulusi AKAR, Turkish Chief of General Staff General Yaşar GÜLER, Commander of the Turkish Land Forces Ümit DÜNDAR, Commander of Turkish Naval Forces Admiral Adnan ÖZBAL, Commander of Turkish Air Forces General Hasan KÜÇÜKAKYÜZ, Vice President of Defense Industries Mustafa Murat ŞEKER, Governor of Ankara Vasip ŞAHİN, General President of MÜSİAD Abdurrahman KAAN, President of MÜSİAD Ankara Hasan Basri ACAR, and the MÜSİAD Ankara Defense Industry and Aviation Sector Chairman Fatih ALTUNBAŞ.

In his opening speech, MÜSİAD Ankara Defense Industry and Aviation Sector Chairman Fatih ALTUNBAŞ said: "With a stronger international identity, the summit will increase our exports and contribute to the economy of our country. In this regard, we will share the projects and capabilities developed in the field of military radar and border security and the experiences of users and manufacturers with you, our distinguished participants, with sessions and special presentations to be held for two days. The summit will also act as a medium where companies can share their products, technologies, and solutions with decision-makers. As MÜSİAD Ankara, we are closely following these developments about Radar and Border Security systems in our country. Being part of the solution by renewing every year and producing realistic and applicable global solutions makes us proud."

## President of MÜSİAD Ankara Hasan Basri ACAR: "IDEF should be held in Ankara."

President of MÜSİAD Ankara Hasan Basri ACAR underlined that the Summit was organized with the active participation of 54 domestic and national defense industry companies that played an essential role in the development and growth

of the Turkish defense industry. Emphasizing that a Defense Industry 'Free Zone' should be established in Ankara, ACAR pointed out that this would allow the defense industry companies to make export-oriented investments and to benefit from foreign trade opportunities. ACAR emphasized that the clustering of the defense industry in Ankara will contribute to the increase in production and employment, especially in terms of software and hardware. ACAR also said that it is important to organize defense industry fairs and summits in Ankara and suggested that IDEF, the defense industry's most comprehensive event , should be held in Ankara.

## General President of MÜSİAD Abdurrahman KAAN: "Turkey needs a strong defense industry for strong defense diplomacy."

Taking the floor after President of MÜSİAD Ankara Hasan Basri ACAR, General President of MÜSİAD Abdurrahman KAAN, emphasized that the defense industry is one of the critical aspects of the diplomatic field and establishing national production and technology capability in the defense industry makes Turkey more potent in military diplomacy. Emphasizing that the domestic defense industry also supports numerous other sectors in terms of both technology and intermediate goods, KAAN pointed out that the defense industry is not only an upper sector branch but also a source of production and design knowledge.


## The Latest Solutions in Border Security were Presented

At the two-day summit, the latest developments in radar technologies, radar networks, command and control applications, anti-drone systems, airborne Synthetic Aperture Radar systems, and surveillance applications were discussed, and special panels were held on "Border Security Systems and Technologies," "Ground Surveillance Systems," "Mini/Micro UAV Detection & Anti-UAV Technologies," "Radar Systems for Aerial Platforms," "Solutions for Protecting Coastal Borders," "Radar Technology Trends" and "Complementary Applications for Border Security."

On the first day of the Summit, FNSS Business Development Manager Haldun OLGUN gave a presentation on the "Importance and Future of Land Vehicles in Border Security." Meteksan Defense Business Development Manager M. Tolga ÇELİK and Software Design Manager Ali ÖZZEYBEK gave presentations on "Recent Developments in Border and Perimeter Surveillance Radars" and "Cognitive Radar, Radar Networks and Artificial Intelligence in Radar" respectively and shared the solutions of the company with participants. On the second day of the summit, HAVELSAN Senior System Engineer Tolga SÖNMEZ gave a presentation on "Border Awareness System." and Nurol Makina Business Development & Bid Director Koray ÜRKMEN gave a presentation on the "Use of 4×4 Tactical Wheeled Vehicles in Border Security."

During the summit 1,074 participants from 22 countries had the opportunity to follow the latest developments in the defense industry from 41 speakers who are experts in their fields. Summit participants also received information about current projects first-hand during B2B meetings from leading sector companies, including Aselsan, Havelsan, Havelsan Technology Radar, Roketsan, STM, MKEK, FNSS.

At the summit, the Ministry of National Defense (MSB) General Directorate of Military Factories and General Directorate of Military Shipyards signed goodwill and Strategic Cooperation Agreements with 29 local companies to reduce foreign dependence in the defense industry and to strengthen national and domestic production.

# Aselsan Launches Ukrainian Local Production Facility

Aselsan, an international technology company that continues its sustainable growth with the value it creates in the global market has brought a local production facility in Kiev, Ukraine into service.

Covering the needs of users by giving priority to local needs and conditions and aiming to increase the technological know-how of countries by exporting communication systems to more than 30 countries, Aselsan has been successfully performing the delivery of software based tactical radios to the Ukrainian Armed Forces since 2017.

In line with friendly and allied relations between Ukraine and Turkey, and according to the long-term needs of Ukraine, Aselsan radios will, from now on, be manufactured locally in Ukraine. This will pave the way for sustainable relations and future cooperation between the two countries.

Evaluating the opportunities to become permanent by establishing localization in every market it enters, Aselsan aims to expand its production capacity depending on the quality and quantity of the needs in Ukraine.


# Aselsan Retains its Position in the Istanbul Stock Exchange Sustainability Index

Aselsan has achieved significant success for the sixth time in the Sustainability Index, which was initiated by Borsa Istanbul in order for companies, that have adopted sustainability and corporate social responsibility principles and that have made a difference in these areas, to be noticed by the investors.

Within the scope of the Index, an independent research organization based in London, with which Borsa Istanbul cooperates, reviews and evaluates the sustainable activities of companies in major areas such as corporate governance, environmental awareness, social responsibility, ethical principles, human rights, employment practices, occupational health and safety and supply chain. In this way, a tool is created to facilitate investment in successful companies on sustainability, which has become increasingly important and the most essential investment criteria for some institutional investors, and various indicators are arranged for companies to improve themselves.

Aselsan, as one of the 15 companies in Turkey that succeeded in taking part in the index since its launch in 2014, has retained its position each year, and this year it again has taken part with the other 56 companies thanks to activities that it has conducted in the fields that meet the criteria of the index and Aselsan is continuously improving their efforts in this regard.

Aselsan is also the only defense industry company in Turkey that was involved voluntarily in the Carbon Disclosure Project (CDP), the world's most prestigious and most comprehensive environmental initiative. With its activities carried out during 2018 in the field of carbon emissions, Aselsan performed above the world and country average and raised its "B" score to "A-". With this score, Aselsan is one of the two companies that achieved the highest score in the CDP field in Turkey and takes justified pride in having received the same score with the world's leading defense industry leaders.

The Sustainability Report and the CDP Report are published annually in Turkish and English and can be found on the Company's website.

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# Turkish Aerospace Displays Its Aerial Products at Seoul

On October 16th, 2019, Turkish Aerospace participated in Seoul International Aerospace and Defense Exhibition for the first time, between 15-20 October 2019. On the occasion of the exhibition, Turkish Aerospace displayed its products for participants from the defense industry from all over the world. Turkish Aerospace, with its globally known products was a focus of interest especially with the ANKA Unmanned Aerial Vehicle, the T129 ATAK Multirole Combat Helicopter and the T625 GÖKBEY Multirole Helicopter.

President and CEO of Turkish Aerospace Prof. Temel Kotil (PhD) stated: "Turkish Aerospace which is well- known in the field of the defense industry in the world, will be exhibiting its product models for the first time in South Korea. Being present in South Korea will create an opportunity for trade of technology. I believe that it will be a productive trade exhibition where we will discuss business cooperation in the defense industry and it will be an important opportunity to strengthen cooperation with Korean aerospace industry authorities."

# Baykar Delivered Second Batch of TB2 UCAVs to Ukraine

Under the contract signed in January, a total of 6 Bayraktar TB2 UCAVs and 3 ground control stations were delivered to the Ukrainian Air Force

Baykar Defence delivered the second batch of Bayraktar TB2 Armed Tactical Unmanned Aerial Vehicles to Ukraine. In January 2019, Baykar Defense and Ukrspetsproekt, Ukraine's state-run armament agency, signed a US$69 Million contract for the procurement of 6 Bayraktar TB2 UCAVs, 3 ground control stations, MAM-L Smart Micro Munition, and related equipment to meet the needs of the Ukrainian Air Force. Following the completion of the test and training activities, the first batch of 3 Bayraktar TB2 UCAVs was delivered to Ukraine in March. During the ceremony held at the military base in the Khmelnytsky region with the participation of Ukrainian President Petro POROSHENKO, a live firing test was also carried out with a Bayraktar TB2 UCAV.

Within the scope of second-party deliveries, 3 TB2 UCAVs, training simulators, mission payloads, camera systems, and ground data terminals were delivered to the Ukrainian Air Force. During the acceptance tests performed at Starokostiantyniv Air Base, the Ukranian Air Force evaluated the performance of the aircraft and its components. The UCAVs will be operated by Ukranian Air Force personnel who have completed their training in Turkey.

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# STM Announces New Cyber Threat Status Report

## Raw Materials of Cyber Attacks: Personal Data

The Cyber Threat Report published quarterly by STM emphasized the risks posed to both states and the public due to the threat of personal data that is shared on the internet being maliciously processed.

In cyberspace, where information is commercialized and transformed into a threat risk, policies regarding the protection of personal data and data privacy are of great importance. The report noted that with every interaction on the internet, individuals are transforming into cyber tools that are used and manipulated for commercial or political purposes, while the stored information is processed like digital raw material through technologies such as data mining, artificial intelligence and machine learning. In this way, an infrastructure containing profiles of individuals and their tendencies is obtained. It was emphasized that according to the intention of those holding the data, there are serious threats, the target and scale of which vary, in political and social terms.

## Personal Data in Turkey Protected with Superior Measures

Issues on personal data protection and data privacy are evaluated within the scope of the Law on Protection of Personal Data, which is regarded as a protection and evaluation guide in Turkey. The circular on "Information and Communication Security Measures" prepared with the contributions of the Presidential Digital Transformation Office and published on July 6, 2019 by the Presidential decree, carries the measures taken in our country to a higher level. The Circular is an important guideline for the protection of highly critical information such as population, health, communication, genetic and biometric data. The guideline that describes the measures to be taken and the principles for implementation of these measures aims to minimize security risks and escalate the security of critical data to the top level.

## Acoustic Systems May Turn into Cyber Weapons!

STM's Cyber Threat Status Report warned against the vulnerabilities contained in smart devices that we use in our daily lives. The fact that the speakers used in devices such as computers, telephones, televisions and sound systems can emit frequencies beyond hearing range gives this feature the possibility to be used as a weapon. Research reveals that manipulated speakers may cause not only simple physical reactions in humans, such as browsing specific web pages, but also hearing loss or psychological discomfort depending on the volume of sound. It was mentioned that in order to prevent such acoustic attacks, both hardware and software related measures should be taken.

## Driver Systems in Vehicles also on Attackers' Radar

Autonomous systems that support users in their daily lives to increase security levels turn into a new attack area for attackers. The report pointed out that Advanced Driver Assistance Systems (ADAS), the key component of autonomous systems that aim to prevent accidents, can be deceived by machine learning. Tests on the Mobileye system that directs the driver with capabilities such as lane departure warning, collision avoidance and recognition of traffic signs indicate that attacks can be carried out to risk human life by deceiving the ADAS systems. Although it seems that risks can be mitigated, experts say that the systems are exposed to new attack vectors such as GPS deception, imitation of transceivers by radio frequencies and interference generation.

## Bluetooth Makes Credit Card Cloning Easier

Misuse of Bluetooth technologies makes credit card users extremely vulnerable to theft attacks. Referring to the security gaps in practice, the report mentioned a method of theft through hardware called a "skimmer" that is placed on devices where the credit cards are read. The Bluetooth connection of this malicious hardware, which allows the cloning of credit card information and passwords and which is extremely difficult to detect, facilitates the attack by providing remote access to the attacker. Investigations to prevent this vulnerability make the detection of it quite difficult, while the devices using Bluetooth make it easier to detect the attack.

## Cyber Threat at Home!

The security gaps of systems having Internet of Things (IoT) technology, which are becoming increasingly common today, make devices vulnerable to several attacks. The report emphasized the risks posed by the systems used in homes and referred to a study which reveals access vulnerability of 20 to 50 percent of 83 million IoT devices in 16 million households across the world. The security gaps encourage attackers towards cost-effective attacks such as seizing the local network at home with Distributed Denial-Of-Service (DDoS) methods. Experts underlined that more strict measures should be taken against vulnerabilities in IoT devices that are protected by weak passwords.

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# Zemana's Indigenous Solution Identifies "Deepfake" Threats which are Altering Perceptions and Distorting Reality

Asis Elektronik, continuing its growth by creating technological added value in different areas in line with the requirements of the era of digital transformation, and Zemana a Turkey-based international cyber security provider offering online solutions in the cyber security field (incorporated by Asis Elektronik) launced its groundbreaking Deepfake Scanner developed against "Deepfake", one of the newest and most dangerous threats faced in the constantly evolving cyber landscape. The company shared, for the first time, detailed information about Deepware Scanner, which enables real-time detection of fake videos generated by using artificial intelligence technologies and manipulating human images and voices.

Zemana's Deepware Scanner provides services all around the world with its security software developed by domestic and national resources and is the world's first online "Deepfake" detector. Detecting fake content generated by the intervention of human images and voices, Deepware Scanner provides a pioneering solution against "Deepfake", one of the latest and most dangerous threats facing cyber security in recent times.

"Deepfake", the credibility of which is increasing day by day through algorithms based on the deep learning ability of machines, allows cyber-attacks involving all kinds of malicious manipulations leading to political scandals, social provocation, fraud, slander and etc. Digital content manipulated by "Deepfake" methods that directly affect election results, the fates of countries and the lives of people, create serious threats; for example the videos are believed to be real and as a result the virtual creation is confused with reality. Zemana, with its new solution Deepware Scanner, prevents artificial intelligence from being misused.

## Deepware Scanner Targets the Global Market

Emphasizing that they have developed a critical solution for the security of countries and societies, Yağızhan ATMACA, Board Member Responsible for Technology said, "In the "Deepfake" examples that have come up so far, many different methods that exactly simulate people's gestures and mimics have been used, such as face swapping, body swapping and voice swapping. Deepware Scanner that we developed to provide an effective solution against "Deepfake" threat is software that instantly detects manipulated videos with its multi-layered mechanism. We are targeting the global market with Deepware


Scanner, which provides an important service in the field of cyber security. The danger is great and capable of undermining all of us. This new technology we developed will detect this manipulated danger immediately."

## Fake Videos to be Detected Instantly!

Enabling the detection of harmful content before any social or individual damage, Deepware Scanner immediately warns whether or not the content that is being played is fake when installed on a platform. Deepware Scanner has versions developed for social media networks, media organizations and government agencies which provides detection of fake audio and video files. These types of files are becoming increasingly difficult to distinguish from real ones without spreading and causing chaos. Deepware Scanner warns governments, social media platforms with its instant messaging application, and provides media platforms with the opportunity to detect deception in digital contents before any damage occurs and aims to prevent possible damage. Deepware Scanner can be integrated to any platform and runs in the background and is able to scan the file that is played on the platform.


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# The First Unique Production Grenade Launchers Delivered to TAF

Within the scope of the “MPT-76 Compatible Grenade Launcher Project”, the first batch of locally produced 500 AK40-GL under-barrel grenade launchers (UBGL) was delivered to the Turkish Armed Forces (TAF).

Under the tender opened by the Presidency of Defense Industries (SSB) to provide modern under-barrel grenade launchers to the Turkish security forces, the company Akdaş Arms which is located in Konya delivered the first batch of AK40-GL grenade launchers to the Turkish Land Forces Command.

As part of the "MPT-76 Compatible Grenade Launcher Procurement Project" of the Presidency of Defense Industries, Akdaş Arms will deliver a total of 8,000 locally produced AK40-GL units to the Turkish Security Forces. The AK40-GL grenade launcher can be mounted on both the MPT-67 and MPT-55 and has a patented sight, which allows rapid and precise aim. Following the successful completion of climate and field tests, the indigenous grenade launchers were delivered to the Turkish Land Forces Command and started to be used in the field along with MPT-76 infantry rifles.

The local firearms manufacturer company, Akdaş Arms, from Konya's Beyşehir district, participated in the tender opened by the Presidency of Defense Industries (SSB) to demonstrate its experience and capabilities in the defense industry and was awarded by the SSB to produce 8,000 in total. The AK40-GL UBGL was developed by the company with domestic capabilities and has successfully completed the extreme qualification tests which lasted approximately 3.5 months.

The AK40-GL can also be used individually with a stock attachment. The launcher can fire 40mm grenades, including less-lethal tear gas and stun cartridges and high explosive ammunition. The launcher has a unique ambidextrous design and can be used with both the right and left hand. It also features Picatinny rails for target illumination and aiming laser attachments. The AK40-GL launcher has some clear advantages over its competitors. It weighs only 1.5 kilograms, has a barrel life of 5,000 rounds, and an effective range of 400 meters.

The company will deliver another 2,500 grenade launchers to the Turkish Land Forces Command with the second batch.

# National Air-to-Air Missile BOZDOĞAN Successfully Fired

Turkey's indigenous BOZDOĞAN Within Visual Range (WVR) Air-to-Air Missile developed by TÜBİTAK-SAGE was successfully tested against a target aircraft. During the guided firing test, the missile was launched from the ground and intercepted the target aircraft. The Minister of Industry and Technology Mustafa VARANK announced the launch test via his social media account. In his message Minister VARANK said, “We continue to make history! Developed by TÜBİTAK-SAGE, the BOZDOĞAN Within Visual Range Air-to-Air Missile, which was previously announced by our President, successfully intercepted a target aircraft for the first time.”

Within the scope of the GÖKTUĞ (Beyond Visual) missile family project, two different missile systems are being developed by TÜBİTAK- SAGE. The short-range air-to-air missile

BOZDOĞAN (Merlin), which was successfully completed the first firing test, will replace the “AIM-9X Sidewinder” missiles in the future. The other missile GÖKDOĞAN (Peregrine) beyond visual range air-to-air missile is aimed to replace “AIM-120 AMRAAM” missiles.

Developed as part of the GÖKTUĞ Project, the BOZDOĞAN missile is expected to enter the inventory of the Turkish Armed Forces after the firing tests have been completed which are to be carried out in 2020. The GÖKTUĞ Project was initiated in 2013 to replace the missiles currently used by the Turkish Air Force with national systems.

# International Future Soldier Conference to be Held in Ankara, March 23rd and 24th, 2020


With the support of the Presidency of Defense Industries (SSB) 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 Defense Industry Cluster (TSSK).

In this context, the conference will act as a platform which promotes and provides optimum benefit and awareness for the sharing of information between parties and will gather the following participants;

- The officials of the countries that conduct studies on the "Future Soldier" concept
- Turkish and foreign state military delegations
- Global defense and technology company' executives working in this field
- Turkish defense industry executives
- Other distinguished guests from universities, organizations and institutions

The main theme of the conference, "The Warrior, Today and Tomorrow" has been determined within the framework of providing opportunities for cooperation and creating common synergies in the field of "Future Soldier Concept and Technologies". The 2-day conference will include the programs and policies of countries that carry out Future Soldier Modernization projects, panels on new technologies in this field and business to business (B2B) meetings between global and Turkish companies. You can get more information at www.ifscturkey.com

Within the scope of the planned conference program, panels, presentations, and discussions will be held in the following related technology fields: Combat Clothing, Individual Equipment & Balistic Protection; Weapons; Sensors, Non Lethal Weapons, Ammunition; Power Solutions; Soft Target Protection; Soldier Physical, Mental and Cognitive Performance; Robotics and Autonomous Systems; Medical; C4ISTAR Systems; Exoskeleton Technology; CBRN and Logistics Capability.

# ASELSAN and the Turkish MoD Signed a US$54.5 Million Contract

Turkey's defense industry company Aselsan and the Ministry of National Defense (MoND) have signed a US$54.5 million contract for the supply of the Denizgözü Octopus-S Electro-Optic Reconnaissance and Surveillance System to meet the reconnaissance and surveillance system requirements of the Turkish Naval Forces.

Aselsan announced the contract on the Public Disclosure Platform (KAP) and stated, "An agreement regarding the Denizgözü Ahtapot-S Electro-Optic Reconnaissance and Surveillance System for the needs of the Turkish Naval Forces has been signed between Aselsan and the Ministry of National Defense, valuing US$ 54,5 million.

# SAR Integrated ANKA UAV System for the Naval Forces Command

Three Anka Unmanned Combat Aerial Vehicles (UCAV), one of which was integrated with the SAR radar, were delivered to the Turkish Naval Forces Command. The Presidency of Defense Industries announced the news from its Twitter account and stated that the Synthetic Aperture Radar (SAR) equipped the ANKA UAV can detect and track targets in all weather conditions. Following this announcement, Turkish Aerospace also made a statement from its Twitter account informing that the number of ANKA UAVs has reached 22 with this delivery, which will carry out reconnaissance and surveillance missions in the Aegean and Mediterranean regions. The statement also revealed that the total flight time of the ANKA UAV system exceeds 30,000 hours.

# HİSAR-A Ready for Serial Production

Turkey's first domestic and national air defense system HİSAR-A has been reported to have successfully destroyed a high-speed target in the final system tests and has reached the serial production stage.

Developed by Aselsan and Roketsan against fixed and rotary-wing aircraft, cruise missiles, air-to-surface missiles and unmanned aerial vehicles (UAVs) to protect military bases, ports, and critical facilities; Turkey's first indigenous low-altitude air and anti-missile system, HİSAR-A, has successfully destroyed a high-speed target drone in the final system tests.

President of Defense Industries Prof. Dr. İsmail Demir announced the successful firing test from his social media account and stated that serial production of the HİSAR-A Low Altitude Air Defense Missile System, which was developed to meet the air defense needs of Turkey with domestic and national resources, will be started soon. Aselsan and Roketsan conducted the firing tests of the indigenously developed HİSAR-A project in Aksaray with the participation of representatives from the Presidency of Defense Industries and the Turkish Armed Forces.

During the firing test, the HİSAR-A system detected and tracked the high-speed target with its radar. After the command and control system initiated the engagement sequence, the missile was fired automatically by the fire control system at the most appropriate time. Guided by the Self-Propelled Autonomous Low Altitude Air Defense Missile System, the missile approached the target using its seeker at the terminal phase and destroyed the target by detonating its warhead. Thus, the effectiveness of the HİSAR-A Low Altitude Air Defense Missile System at maximum range and altitude was tested with the successful destruction of the high-speed target aircraft.

TÜBİTAK- Sage developed the high-explosive fragmentation warhead used in the firing test as part of the HİSAR Projects. The HİSAR-A and HİSAR-O systems have a modular design structure, which enables easier integration into different platforms, fire control systems, and command control (C2) infrastructures. The high explosive and fragmentation warhead of the HİSAR missiles has both impact and proximity fuses, enabling them to be effective against various types of air targets.

The HİSAR-A system performs the task of neutralizing hostile aerial threats at lower altitudes to provide air defense for mobile military units. With the HİSAR project, the SSB aims to obtain various new capabilities in addition to acquiring essential technologies in the field of air defense. Aselsan and Roketsan are working together with more than 100 local solution partners to get the indigenous HİSAR air defense system into the inventory and to meet the needs of the Turkish Armed Forces.

HİSAR-A (low altitude) is planned to be delivered to the Turkish Armed Forces in 2021 and HİSAR-O (mid-altitude) in 2022.

# TS1400 Engine Accessory Gear Box Subcontract Signed

The Subcontract for the TS1400 Turboshaft Engine Development Project Accessory Gear Box was signed between TEI - TUSAŞ Engine Industries Inc. and Alp Aviation, Turkey's leading companies in the field of aviation engines.

The design and manufacture of the Accessory Gear Box (AGB) planned to be used in the TS1400 Turboshaft Engine to power GÖKBEY, the first indigenous and the national helicopter of Turkey, will be performed by Alp Aviation. The signing ceremony was held in Eskişehir and the main contractor is TEI.

AGB will ensure the operation of the subsystems required by the engine to perform its functions. AGB, which has critical functions for the TS1400 Turboshaft Engine, will be developed for the first time with domestic facilities and will reduce foreign dependency.


*Prof. Mahmut.F.AKŞİT - President & CEO of TEI and Senay İDİL - General Manager of Alp Aviation*

# President of the SSB Prof. Ismail DEMIR:

## "By the End of 2020, We will have delivered the LHD to the Turkish Naval Forces."

President of Defense Industries Prof. Ismail DEMIR examined the construction activities of Turkey's largest amphibious assault ship, the TCG ANADOLU and said that they would deliver the ship to the Navy by the end of 2020.

The President Prof. DEMIR made the following statement about the examination: "We have conducted examinations in the area where the TCG ANADOLU, the biggest ship in our Navy, will be built. This ship will be the pride of Turkey. The work carried out for the ship, publicly known as the aircraft carrier, are being carried out accordingly and when we talked to the executives of the shipyard, we saw that necessary measures were and are being taken regarding the delivery of the ship for nearly a year earlier than planned. Hopefully, by the end of 2020, we will have delivered this ship to our Naval Forces. In our talks with the executives of the shipyard, we found that they were satisfied with the progress. We are also pleased with the progress. During the examination, we conducted on-site evaluations about the indigenization of various products and the use of domestic products and projects. We believe Turkey will have a voice in the world with such ships. We hope that we will make our mark in terms of both design and various materials and systems. Good luck with it."

### TCG ANADOLU

The construction of the TCG ANADOLU ship had started within the scope of the Multi-Purpose Amphibious Assault Ship (LHD) project initiated by the Presidency of Defense Industries. The construction activities of the TCG ANADOLU, which can transport a force of a minimum battalion size to the designated location with its own logistical support without the need of main base support, continue at the Sedef Shipyard in Tuzla, Istanbul.

TCG ANADOLU will carry four Landing Craft Mechanized, two Landing Craft Air Cushion, two Personnel Landing Craft as well as aircraft, helicopters and unmanned aerial vehicles. The 231 meter long and 32 meter wide ship will have a full load displacement of about 27,000 tons.

# The Sixth Fast Patrol Craft Delivered Naval Forces Command

## Within the scope of the Fast Patrol Craft Project initiated by the Presidency of Defense Industries, Yonca-Onuk Shipyard delivered the 6th MRTP-12 Fast Patrol Craft to the Turkish Naval Forces Command

Yonca-Onuk Shipyard delivered the sixth boat under the "Fast Patrol Craft Procurement Project" which was initiated the Presidency of Defense Industries (SSB) to ensure the security of the Turkish Naval Forces' critical facilities and Navy elements.

The MRTP-12 boats weigh 11 tons, have a length of 12.65 meters, a draft of 80 cm and can reach 47 knots. The ships are also armed with a 12.7 mm STAMP Remote Controlled Stabilized Weapon Station manufactured by ASELSAN.

Under the "Fast Patrol Craft Procurement Project" initiated by the Presidency of Defense Industries (SSM), in January 2016, Yonca-Onuk shipyard will produce eight boats from fiber-reinforced polymer (FRP) material with domestic resources and deliver them to the Turkish Naval Forces Command. The project aims for a 75% domestic production rate.

# Aselsan at its 44th Founding Year

Aselsan, the largest institution of the Turkish Defense Industry, visited Anıtkabir on its 44th anniversary.

Aselsan Chairman and CEO Prof. Haluk GÖRGÜN, together with the directors and employee representatives, observed a moment of silence at Anıtkabir.

Leaving a wreath on the mausoleum, Prof. Haluk GÖRGÜN signed the official Anıtkabir memorial book following the moment of silence.

# TEI – AYESAŞ Cooperation Agreement

TEI - TUSAS Engine Industries Inc., Turkey's leading company in the field of aviation engines signed a cooperation agreement with AYESAŞ, a leading supplier of critical systems in the defense and aerospace industry for the development of Digital Engine Control System (DECS).

President and CEO of TEI Prof. Mahmut Faruk AKŞİT and AYESAŞ General Manager Öner TEKİN, as well as senior executives, and officials from the Presidency of Defense Industries attended the signing ceremony held at TEI Headquarters in Eskişehir.

DECS, as a whole system, consists of the platform and interface, as well as the system that enables the efficient operation of the engine by sending commands to the actuators in line with the information received from the sensors and commands from the users, and involves the control and health functions of the engine. This system will reduce foreign dependency in the production of aviation engines, and it will be developed for the first time with national resources. DECS, the design, equipping and manufacturing of which will be developed by AYESAŞ, is a critical component of the Turboshaft Engine Development Project.

*Prof. Mahmut F. AKŞİT and Öner TEKİN*

# The SSB Organizes Technology Sharing Day

Technology Sharing Day organized by the Presidency of Defense Industries (SSB) was held on the topic of "Global Positioning System Autonomous Navigation and Locating" on 15th November.

At the event organized with the participation of the SSB, procurement authorities and companies, information was exchanged on various complementary acquisitions made regarding Global Positioning System Autonomous Navigation and Locating technologies within the scope of Development of Resource Management Algorithms in the Cognitive Radio Network and Test Simulator Project (KAYA) and the Multi-Dimensional Radio Communication Signal Analysis Platform Project (KAŞİF) that were initiated by the SSB. In the completion process of these projects the newly launched Global Positioning System Autonomous Navigation System Development Project (KERKES), Project on Autonomous Exploration, Guidance and Navigation with Collaborative Robots (ROBOTİM) and Artificial Intelligence Assisted Fire Control and Autonomous Driving Project for Land Vehicles (KARAGÖZ).

With this event, awareness was raised in the sector on this matter and R&D project outputs were shared with end-users and integrator companies.

# The First OMTAS Shot from a Moving Vehicle Accomplished as Part of the ATV Project

Within the scope of the ATV Project, the first target was successfully hit with an OMTAS missile fired from a moving vehicle. The qualification tests are expected to be completed by the end of this year, and delivery will begin by 2020. Under the project, a total of 260 vehicles will be delivered.

The first firing test with the Roketsan OMTAS missile from moving PARS and KAPLAN ATV vehicles developed by FNSS was carried out successfully, as part of the Anti-Tank Vehicle (ATV) project. The Presidency of Defense Industries (SSB) announced the firing test from its official social media account, stating, "Within the scope of the ATV Project, the first target was successfully hit with an OMTAS missile fired from a moving vehicle. The qualification tests are expected to be completed by the end of this year, and delivery will begin by 2020. Under the project, a total of 260 vehicles will be delivered."

Within the scope of the ATV Project, the OMTAS missile was launched from the Anti-Tank Remote Controlled Turret (ARCT) integrated into the tracked KAPLAN ATV vehicle during the previous test and successfully hit a moving target on April 6, 2019.


# Meteksan Defence Exports Radar Altimeter to an Asian Country

Meteksan Defence has scored another export success. The company signed a new export contract with an undisclosed Asian country in September to provide radar altimeters for air platforms.

The Radar altimeters were developed and produced indigenously by Meteksan Defence under military standards, and are designed to accurately measure the altitudes of fast-moving or maneuvering aircraft, helicopters, UAVs, and guided missiles even at low altitudes. The Radar altimeters, which can operate in a wide frequency band, have low power output, Low Probability of Intercept (LPI) capability, and a power control mechanism that automatically adjusts according to the altitude.

The Radar altimeters, which are designed, developed, and produced with national resources in accordance with military standards, have successfully passed environmental conditions tests (MIL-STD-810F), Electromagnetic Interference / Electromagnetic Compatibility tests (MIL-STD-461E) and flight tests and have been qualified.

Meteksan Defence, one of the few companies with this technology in the world, introduced its radar altimeter product family in 2016 and achieved great success with its first export to a Far East country in 2017. With the contract signed in September this year, radar altimeters developed by Meteksan Defence have accomplished yet another export success for the second time.

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

# Aselsan Signed Strategic Cooperation Agreement with its Approved Suppliers

In order to minimize the burden of design, development and production, to make maximum use of the expertise of its suppliers due to the close cooperation starting from the design stage and to make the material/service procurement process faster and more reliable, Aselsan signed strategic cooperation agreement with its approved suppliers having the required technological infrastructure and expertise, and that tend to develop themselves with the support to be provided and to establish long-term cooperation.

In a ceremony organized at the Productivity and Technology Fair held between October 31 and November 3 with the theme of Technologies for the Future, the protocols signed with the participation of Aselsan Chairman and CEO Prof. Haluk GÖRGÜN were presented to business partners.

By signing strategic cooperation agreements with 13 approved suppliers as a result of the evaluations that were conducted, Aselsan expanded the number of its strategic partners in this field to 36.

Aselsan aims to increase the number of its strategic partners each year to contribute to design and production processes by closely following technological developments.

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## Certificate of Appreciation to Suppliers Contributing to Nationalization and Indigenization

Aselsan made a strong impression with its products and cooperation demonstrated with its business partners at the Productivity and Technology Fair. Continuing its support toward national and domestic product development processes, Aselsan presented examples of the technologies it has developed. By minimizing foreign dependency with production through domestic and national opportunities, the impact of secret/concealed embargoes will be significantly reduced. Aselsan presented its indigenized products at the fair showcasing their diligence and fervent resolution to eliminate the risk of foreign dependency in these areas.

At the Efficiency and Technology Fair, nationalization/ indigenization brochures prepared by Aselsan were presented and the products the nationalization/ indigenization processes of which been completed were announced together with their business partners. Aselsan Chairman and CEO Prof. Haluk GÖRGÜN presented certificates of appreciation to eight companies, including SDT, for their contribution to the nationalization/ indigenization of ten different products.


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*Haluk GÖRGÜN -Aselsan Chairman & CEO with Mehmet DORA - Chairman of SDT*

# 4th International Cyber Warfare and Security Conference Held in Ankara

The 4th International Cyber Warfare and Security Conference was organized by the Turkey Cyber Security Cluster, under the auspices of the Presidency of Defense Industries, at Congresium Ankara on November 20-21, 2019.

President of Defense Industries Prof. İsmail DEMİR made the opening speech of the 2-day conference which was held with the participation of nearly 2,000 cyber security experts from 40 countries.

Underlining the necessity of global cooperation against cyber-attacks, Prof. DEMİR said, "We are exerting efforts to raise awareness. Our goal is to create human resources and software. We all know that important institutions are under threat. We develop technologies to protect the safety of nations as well as our own nation. We cooperate with civil organizations and other countries. I strongly recommend that you to take maximum advantage of this conference, an event where members of our clusters present and promote their products."


*Prof.İsmail DEMİR- President of Defense Industries*

After delivering the opening speech, Prof. İsmail DEMİR visited the booths and received information about the products and services of the companies.

Local and foreign Cyber Security experts exchanged their knowhow and experience at the conference on issues such as Cyber Wars in the Digital Age, Cyber Security in Weapon Systems, and the Roadmap on Cyber Security Technologies, and overall 40 Cyber Security Cluster members exhibited their products and services.

Ali Taha KOÇ, Head of Digital Transformation Office at the Presidency of the Republic of Turkey attended the second day of the conference and in his speech, he placed an emphasis on new generation technologies that could change the course of cyber warfare and the precautions to be taken in this regard.

Under the main theme of this year, "How to become a global player in Cyber Security?", the conference also hosted 4 panels moderated by the Deputy Minister of Industry and Trade Mehmet Fatih KACIR, Vice President of the SSB Celal Sami TÜFEKÇİ, the Deputy Head of the Digital Transformation Office Yavuz Emir BEYRİBEY and METU Northern Cyprus Campus Rector Nazife BAYKAL. Panels on "Cyber Security in the Digital Age", "Ways of Accessing the Global Market", "International Cooperation" and "Women in the Cyber Security Sector" received a great deal of interest from the participants.

During the conference, cooperation agreements were signed between the Presidency of Defense Industries and Pakistan Air Force University and Cyber Security Malaysia.

# SONGAR Impresses with Direct Hits

ASISGUARD is an ambitious player in the defense sector with the success of the SONGAR and it continues to impress with new and improved capabilities. It will be the first armed national drone system developed and produced indigenously and will soon enter the inventory the TAF Inventory. SONGAR neutralizes targets with remarkable shooting accuracy.

Turkey's first national Armed Drone System SONGAR successfully passed its first test during shooting performed on November 13, 2019 with its considerably improved electronic sight and ballistic calculation module. It is scheduled to enter the inventory of the TAF on December 25, 2019.

Designed and developed indigenously by ASISGUARD, the


ASISGUARD develops systems, subsystems, hardware and software in areas such as military land vehicles electronics, autonomous micro, mini and medium range UAVs, electro-optics, border security and artificial intelligence. The company continues to improve its impressive product SONGAR which is the first national armed drone system. SONGAR was improved by integrating a grenade launcher after the successful capability demonstrated by the automatic machine gun and has achieved an important cornerstone on its roadmap.

"Electronic Sight and Ballistic Calculation Module" processes data obtained from embedded sensors such as laser distance meters and cameras with external environmental factors such as wind speed.

Ayhan SUNAR: "Shooting tests will continue to an altitude of 450 meters"

Stating that the Electronic Sight and Ballistic Calculation Module acts as the "Shooting Control Computer" of the SONGAR Armed Drone System, ASISGUARD

General Manager Ayhan SUNAR said, "We are improving the shooting accuracy and efficiency of SONGAR with capabilities and hardware such as ballistic calculation and sight. In the first stage, the electronic sight and ballistic calculation module was tested at altitudes of 60, 100 and 150 meters. We will gradually increase the altitude in December and continue our efforts up to 450 meters. SONGAR, which is also integrated with a grenade launcher after the automatic machine gun, are successfully shooting targets detected by the Striking Micro Drone System. We are still exerting efforts on adding new capabilities to our system."

"Until December 25, 2019, the scheduled inventory entry date, we will continue to improve the SONGAR Armed Drone System. We achieved 3.2 MOA (Minute of Arc) shooting accuracy during the test held on November 13, 2019. SUNAR added "In December, we will complete the target destruction work with a single-place Control Station with SWARM flight and simultaneous shooting."

*Ayhan SUNAR - ASISGUARD General Manager*

# Safran and MTU Aero Engines Achieve a Major Step Forward for the Engine of the Next Generation Fighter

The FCAS (Future Combat Air System) program takes a major step ahead: Safran Aircraft Engines and MTU Aero Engines settled the details concerning their eye-level partnership to develop the engine of the next-generation European fighter aircraft NGF.

© Airbus

This industrial agreement relies on the principles of the Letter Of Intent (LOI) signed between the two companies in February 2019, which specifies that Safran will take the lead in engine design and integration, and MTU Aero Engines will take the lead in engine services.

In the framework of the contractual scheme defined by France and Germany, Safran Aircraft Engines will be the prime contractor and MTU Aero Engines the main partner for the first phase of Research and Technology (Phase 1A).

The two partners also agreed on the foundation of a 50/50 joint venture that will be incorporated by the end of 2021 to manage the development, the production and the after-sales support activities of the new engine that will power the next-generation fighter aircraft (NGF).

"This agreement is a major step forward, which reflects Safran Aircraft Engines and MTU Aero Engines' willingness to ensure a strong and effective management of the program relying on a balanced partnership and clear accountabilities," stated Olivier Andriès, CEO of Safran Aircraft Engines, and Michael Schreyögg, Chief Program Officer of MTU Aero Engines. "Safran and MTU are committed to supply the Forces with an innovative engine architecture which will be a key asset of their operational performances."

# Airbus Helicopters Delivers First NH90 Sea Lion to the German Armed Forces

Airbus Helicopters has delivered the first NH90 Sea Lion naval multi-role helicopter to the Federal Office of Bundeswehr Equipment, Information Technology and In-Service Support (BAAINBw), with a further two to be delivered by the end of the year.

In total, 18 Sea Lions have been ordered for the German Navy, with deliveries expected to be completed in 2022. The selection of the Sea Lion as the successor to the Sea King was made in March 2013 and the corresponding contract was signed in June 2015.

"I am proud of our teams who worked hard to meet the ambitious delivery schedule of our customer, whose continuous support has also been key in making it happen," said Wolfgang Schoder, CEO of Airbus Helicopters Deutschland. "During the summer, we successfully completed demonstration flights involving the German Navy and BAAINBw to verify the Sea Lion capabilities for search and rescue as well as special forces missions. I am confident that these helicopters will bring next-generation capabilities to the German Navy, and I'm committed to ensure the best level of support for the Sea Lion fleet."

When deployed, NH90 Sea Lions will take on a wide range of roles including search and rescue (SAR), maritime reconnaissance, special forces as well as personnel and material transportation missions. In addition to its land-based use, the Sea Lion will also operate on Type 702 (Berlin class) combat support ships.

Thanks to its multi-role capability and growth capability, the Sea Lion will not only replace the German Navy's Sea King Mk41 fleet but significantly enhance its operational capabilities. The fly-by-wire flight controls of the NH90 Sea Lion reduce the crew's workload thanks to its high precision and ease of use, which particularly come to the fore in over-water hovering, even in poor weather conditions.

The German Navy has also recently opted for the naval version of the NH90 to succeed its 22 Sea Lynx Mk 88A on-board helicopters that have been in service since 1981.

Five nations are already using the NH90 in its naval NFH (NATO Frigate Helicopter) version and have completed more than 50,000 flying hours in SAR, humanitarian and military missions, with the 90 helicopters that have been delivered so far. The 399 helicopters that make up the worldwide NH90 fleet have already completed over 230,000 flying hours. This first Sea Lion is also the 400th NH90 helicopter to be delivered.

# Denmark and Germany Receive the Latest versions of the Leopard 2

On 29th October, Krauss-Maffei Wegmann (KMW) handed the latest versions of the Leopard 2 over to Denmark and Germany. Frank Haun, Chairman of the Board of KMW, presented the symbolic keys of the first two vehicle systems to the Ambassador of the Kingdom of Denmark, Friis Arne Petersen, and the Parliamentary State Secretary of the Federal Ministry of Defense, Dr. Peter Tauber.

Both nations are receiving comparable variants of the Leopard 2 A7 main battel tank. Protection, mobility, firepower and commandability were significantly increased. The main features include an even higher protection level, high-performance power supply, new NBC and air conditioning systems as well as the integration of C4 I systems in order to meet the requirements of modern, networked operation. The modernization of the driveline and a further optimization of the weapon stabilization during travel bolster the vehicles' agility and combat performance.

The Danish army will receive a total of 44 Leopard 2 A7 vehicles by 2022. The German Federal Armed Forces will acquire 104 Leopard 2 A7V vehicles by 2023.

# French Navy Received First Two "Standard 6" ATL2s

On 29th October, this summer, Lann-Bihoué French naval air station received the first two ATL2 maritime patrol aircraft upgraded by Dassault Aviation.

Last week, Florence Parly, Minister of the Armed Forces, flew on one of these aircraft.

These two events demonstrate the progress made on the upgrade program which is designed to modernize the ATL2 combat system to standard 6.

The contract for the upgraded (standard 6) ATL2 combat system was awarded by the defense procurement agency DGA on October 4, 2013. The program covers a fleet of 18 aircraft. Dassault Aviation will deliver a further five upgraded ATL2s in the period 2020-2023. In parallel, the SIAé aeronautical maintenance center will upgrade 11 aircraft.

Standard 6 includes: new radar: Thales Search Master with active antenna, new Thales acoustic subsystem to gather and process signals from the latest-generation air-dropped sonobuoys for submarine detection, new navigation console designed by Dassault Aviation, new consoles for the tactical display subsystem, developed by SIAé.

The upgrade work is performed by Dassault Aviation and Thales (co-contractors), in association with Naval Group and in cooperation with SIAé. Architect of the combat system, Dassault Aviation is as well responsible for development of the core system including LOTI1 software designed by Naval Group. Dassault Aviation is also in charge of overall integration of all subsystems.

All the specifications for this program were established using the PLM Systèmes tool as part of a Dassault Aviation-Thales-Naval Group-SIAé collaborative work platform installed at St-Cloud in the Dassault Aviation design office.

The standard 6 upgrade will improve the ATL2s' capability to support the Strategic Ocean Force, to deal with modern threats (future nuclear or conventional submarines, naval forces at sea, etc.) and to support air-land missions, until 2030.

France is one of the very few countries producing high-technology maritime patrol aircraft combining detection (optronics, radar, acoustics) with a variety of weapons (anti-ship missiles, torpedoes, laser-guided weapons).

"This expertise as an architect of maritime patrol solutions, both for the platform and for systems integration, is the result of experience dating back to the late 1950s and the launch of the ATL1 program, the predecessor of the ATL2. Dassault Aviation has extended this experience, from the 1970s onwards, with the maritime surveillance Falcons, the latest version of which is the Falcon 2000 MRA-based Albatros program. As we have shown once again with the standard 6, this maritime patrol/maritime surveillance expertise builds largely on the trust and the excellent working relations between our company, the DGA and the French Navy, to which I express my sincere gratitude. We will leverage this know-how to prepare together maritime patrol solutions beyond 2030", declared Eric Trappier, Chairman and CEO of Dassault Aviation.

# Rheinmetall StrikeShield APS Selected for Substantial Testing by U.S. Army


The U.S. Army has awarded a contract valued at 11 Million USD (roughly 10 Million EUR) to the team of Rheinmetall Protection Systems and Unified Business Technologies (UBT) for significant testing of the StrikeShield Active Protection System (APS) to begin in October 2020 at Redstone Test Center in Huntsville, Alabama.

The Army's recently formed Vehicle Protective Systems (VPS) Program Office will evaluate StrikeShield as part of a larger effort to characterize APS performance against a wide variety of anti-armor threats. This significant contract award represents the first funded APS testing the Army will undertake of the StrikeShield System. It provides a pathway to potential utilization of the system on vehicles in the current Army vehicle fleet as well as vehicles fielded in the future.

The StrikeShield APS is a distributed, real time system, which was developed to protect the carrying platform against anti-tank rockets and missiles. It therefore can operate in the immediate vicinity of the vehicle to be protected. Additionally in StrikeShield the technical requirements of large calibre Kinetic Energy (KE) defeat are addressed, which is a unique combination of threats to protect against and reason for the promising overall outlook.

The Army will carry out extensive live fire testing of the StrikeShield System that will take place over a period of several months. The objective of the Army tests will be to gather performance data that can inform future selection of APS technologies best suited for any particular platform. The Army expects the test results will inform APS pursuits for both its fielded vehicle fleets and new vehicle programs like Armored Multi-Purpose Vehicle (AMPV), Mobile Protected Firepower (MPF) and the Optionally-Manned Fighting Vehicle (OMFV).

Rheinmetall and UBT have teamed for U.S. active protection programs since 2015. The companies are optimistic that this new Army testing program will lead to further vehicle integration opportunities on U.S. military vehicles and both firms are extremely pleased that the Army has selected StrikeShield for this important program.

"We are excited to enter into a new phase of

partnership with the Army that will enable the Army to carry out extensive tests of the StrikeShield APS System," said Stefan HAASE, Rheinmetall Active Protection GmbH Managing Director on the Hybrid Protection Module. "We are confident the system will perform very well in the testing and that possibilities for fielding the technology on Army vehicle systems will arise."

"The StrikeShield System is a world class, mature APS system that will deliver tremendous capability for the U.S. Army," said UBT CEO Michelle D'SOUZA. "UBT and Rheinmetall are proud to be teamed together as a partner to the Army in addressing the high priority requirement for APS technology."

## Hybrid Protection Module

Rheinmetall has also developed a modular hybrid configuration of its StrikeShield APS that combines the company's active and passive protection technologies in a single integrated design. This new configuration was on display at AUSA 2019. The hybrid approach draws on Rheinmetall's unique expertise as a provider of both APS and armor protection, and the company's proven track record as a leading vehicle supplier and system integrator. The System's hybrid and modular design is well suited for integration


on both tracked and wheeled vehicles.

The Hybrid Protection Module allows for an integrated approach: passive protection components simultaneously serve as interface and shield for the components of the active protection system (ADS-Gen.3 Active Vehicle Protection System/ AVPS). Conversely, the StrikeShield APS components comprise ballistic functions and characteristics. The specially harmonized bulkhead design features two layers. The first one, the external protection layer, protects the ADS-Gen.3 AVPS components against shell fragments, small arms fire and other sources of mechanical stress. The StrikeShield countermeasures (ADS-Gen.3 AVPS countermeasure components) are embedded in the first protection plate from the outside. The deflector of the countermeasure serves simultaneously as part of the first layer of passive protection. The sensors of the System (a mix of optronics and radar sensors) are contained in the space in between.

In standalone mode, the complete module already offers additional ballistic protection that significantly enhances the basic integrity of the vehicle hull. The integrated ADS-Gen.3 is effective against rocket-propelled grenades and anti-tank guided missiles (ATGMs). It is designed to intercept and destroy ATGMs from ranges as short as 10 meters (33ft) by using a directed explosive detector. The incoming ATGM is detected by a mix of optronics and radar sensors. Operating at 20GHz to 30GHz wavebands the radar sensor can detect incoming ATGMS at ranges of 30m (98ft), but thanks to its very low output power of around 1 watt the radar sensor can not be detected by enemy's ESM sensors at ranges greater than 350 to 400m. According to Rheinmetall the ADS-Gen.3 can cope with multiple attacks thanks to its capability to defeat 4 incoming missiles/ rounds within 0,5m2 area with a timing difference of 100 milliseconds between the missiles/ rounds

The prime advantage of this new possibility for StrikeShield APS integration into tactical vehicles is its compact size: the Hybrid Protection Module is less than 150 mm in height. Moreover, it is relatively simple to install and can be mounted onto existing vehicles. The Module thus offers an easy-to-implement way of adding active protection technology to a platform. The new modules can replace existing add-on passive protection elements either completely or in part. Furthermore, the modules can be mounted to vehicles in preparation for a specific mission.

The Rheinmetall and UBT team will engage the U.S. Army VPS team regarding the potential of the future hybrid module approach on U.S. vehicles as part of its funded testing.

# HENSOLDT's Passive Radar in NATO Measurement Campaign

## Excellent detection performance without detectable emissions


On 29 October 2019 – The passive radar "TwInvis" of sensor solution provider HENSOLDT showed outstanding detection performance during a measurement campaign of the NATO Science and Technology Organization under the leadership of the Polish armed forces.

For this purpose, a passive radar sensor cluster with two sensors was installed on the Polish Baltic coast. During the measurement campaign, a system integrated in a container was used alongside a system variant integrated in a van. TwInvis reliably detected a large number of targets in the air and at sea, ranging from light aircraft and combat aircraft to ballistic and ground-to-air missiles. The achieved ranges over the Baltic Sea coast were up to 300km. The live data from the TwInvis cluster were fed into the Polish MilRad network and analysed and evaluated in a nearby Polish CRC.

A passive radar acts purely as a receiver, i.e. it does not transmit itself, and locates aircraft by evaluating the signals reflected at the target from existing external transmitters. The TwInvis is creating a comprehensive air situation picture, which is generated from the simultaneous evaluation of a large number of frequency ranges. TwInvis is able to simultaneously evaluate up to 16 FM transmitters (analogue radio) and 5 frequencies with several contributing transmitters from DAB and DAB+ (digital radio) as well as DVB-T and DVB-T2 (digital terrestrial television) due to its highly developed digital receiver technology and special algorithms.

In civil applications, passive radar enables low-cost control of air traffic without additional emissions and without using scarce transmission frequencies. In military applications, the system enables covert surveillance of large areas using networked receivers and offers the advantage that the "passive radar" cannot be located by the enemy and is very difficult to be jammed.

# South Korea to Integrate MBDA's Meteor Missile Onto KF-X Fighter Aircraft

MBDA has been awarded a contract from Korea Aerospace Industries (KAI) for the integration of the Meteor beyond visual range air-to-air missile onto the KF-X future Korean fighter aircraft.

The contract includes integration support to KAI, transfer of know-how and manufacture of test equipment for the KF-X integration and trials campaign.

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 manoeuvring targets even at extreme ranges.

Éric Béranger, CEO of MBDA, said: "We're very pleased to mark this next and important step in our partnership with KAI and the Korean Defence Acquisition Program Administration. South Korea is a strategic market for MBDA, and we're proud that Meteor will be providing KF-X with the world's most potent air-to-air capability."

# Bangladesh Orders Leonardo's

## High-Tech Air Surveillance Radar

The Bangladesh Air Force (BAF) has ordered Leonardo's KRONOS LAND radar to provide air surveillance, allowing operators to detect and track targets in tactical environments. Leonardo has announced the contract at BIDEC (Bahrain International Defence Exhibition and Conference) tri-service exhibition, which is taking place at Manama (Baharain) from 28 to 30 October.

Leonardo will also supply communications equipment, twelve months of technical support services, spare parts and a comprehensive training programme for Bangladeshi Air Force personnel with modules in Italy and Bangladesh. As a complete package, this contract will enable the BAF to develop a long-term maintenance capability and preserve the functionality of the system.

Completely designed and developed by Leonardo, the KRONOS LAND is a multi-functional, multi-mission 3D radar for air surveillance and defence, based on latest-generation Full Active-Electronically-Scanned-Array (AESA, also known as E-scan) technology. Leonardo has sold more than 40 KRONOS family systems worldwide.

The contract to supply KRONOS LAND to the Bangladesh Air Force bolsters Leonardo's presence in Bangladesh. It follows the earlier provision of the RAT31 surveillance system to the BAF for early warning and air defence.


© Leonardo

# Multimillion-Euro Contract:

## International Customer Orders Air Defense systems from Rheinmetall


© Rheinmetall

Rheinmetall has won an order from an international customer for state-of-the-art air defenSe systems. The contract, which is now official, is worth a total of around €210 million. Delivery is to be complete by 2022.

Among other items, the order encompasses Skymaster command and control systems, X-TAR 3D radars, Oerlikon Revolver Gun MK3-automatic cannon as well as an ammunition package that includes airburst-capable AHEAD rounds. Spare parts, technical documentation and service support round out the order.

As the world's leading supplier of comprehensive ground-based air defense solutions, Rheinmetall combines all relevant sensors, effectors, platforms and C4I assets in overarching, scalable networks. This results in highly effective, modularly configurable ground-based air defense systems that assure maximum operational flexibility throughout the military mission spectrum.

# Lockheed Martin's PAC-3 Interceptor Test Proves Reliability

Two Lockheed Martin PAC-3 Cost Reduction Initiative (CRI) interceptors successfully intercepted two tactical ballistic missile targets today in a test at White Sands Missile Range, New Mexico. The PAC-3 CRI intercepts threats in support of the U.S. Army's Field Surveillance Program (FSP) ensuring the reliability and readiness of fielded PAC-3 missiles. The test also marked the twelfth and thirteenth successful PAC-3 CRI FSP intercepts in seven years.

The U.S. Army-led missile defense flight test demonstrated the unique Hit-to-Kill capability of the PAC-3 family of missiles which defends against threats through body-to-body contact. The test also reconfirmed PAC-3 CRI's ability to detect, track and intercept incoming missiles while meeting fielded reliability requirements. The test was observed by representatives from the U.S. Army and current and potential Foreign Military Sales PAC-3 customers.

"PAC-3 continues its long history of reliability and readiness in the field and remains the only combat proven Hit-to-Kill interceptor in the world," said Jay Pitman, vice president of PAC-3 programs at Lockheed Martin Missiles and Fire Control. "Today's global security environment demands reliable solutions. We expect PAC-3 interceptors to continue serving as an essential element in integrated, layered defense systems."

The PAC-3 CRI and MSE are high-velocity interceptors that defend against incoming threats, including tactical ballistic missiles, cruise missiles and aircraft. Fourteen nations have procured the PAC-3 missile defense interceptor: the U.S., Germany, Kuwait, Japan, Qatar, Republic of Korea, Kingdom of Saudi Arabia, Taiwan, the Netherlands, United Arab Emirates, Romania, Poland, Sweden and Bahrain.

# Establishment of ESEN Saudi in-line with the 2030 vision of the Kingdom of Saudi Arabia


INTRA Defense Technologies and ESEN established ESEN Saudi as a Joint Venture in KSA. The new venture will develop high tech solutions and implement the proven capabilities of both companies including transfer of technology and production in the fields of defense, aerospace and security.

ESEN Saudi will be the contractor for the engineering and production of INTRA Defense Technologies unmanned aerial systems' ground control units including different configurations of land and naval based ASEF Hybrid VTOL Unmanned Aerial System.

INTRA Defense Technologies is a private Saudi defense technology company focusing on Unmanned Aerial Systems.

ESEN is a privately-owned company providing high technology products and services in aerospace, defense and security areas.

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