STM

AN EXCLUSIVE INTERVIEW WITH MR. MURAT İKİNCİ - GENERAL MANAGER OF STM

DEFENCE TURKEY

VOLUME 14 ISSUE 95 YEAR 2019
ISSN 1306 5998

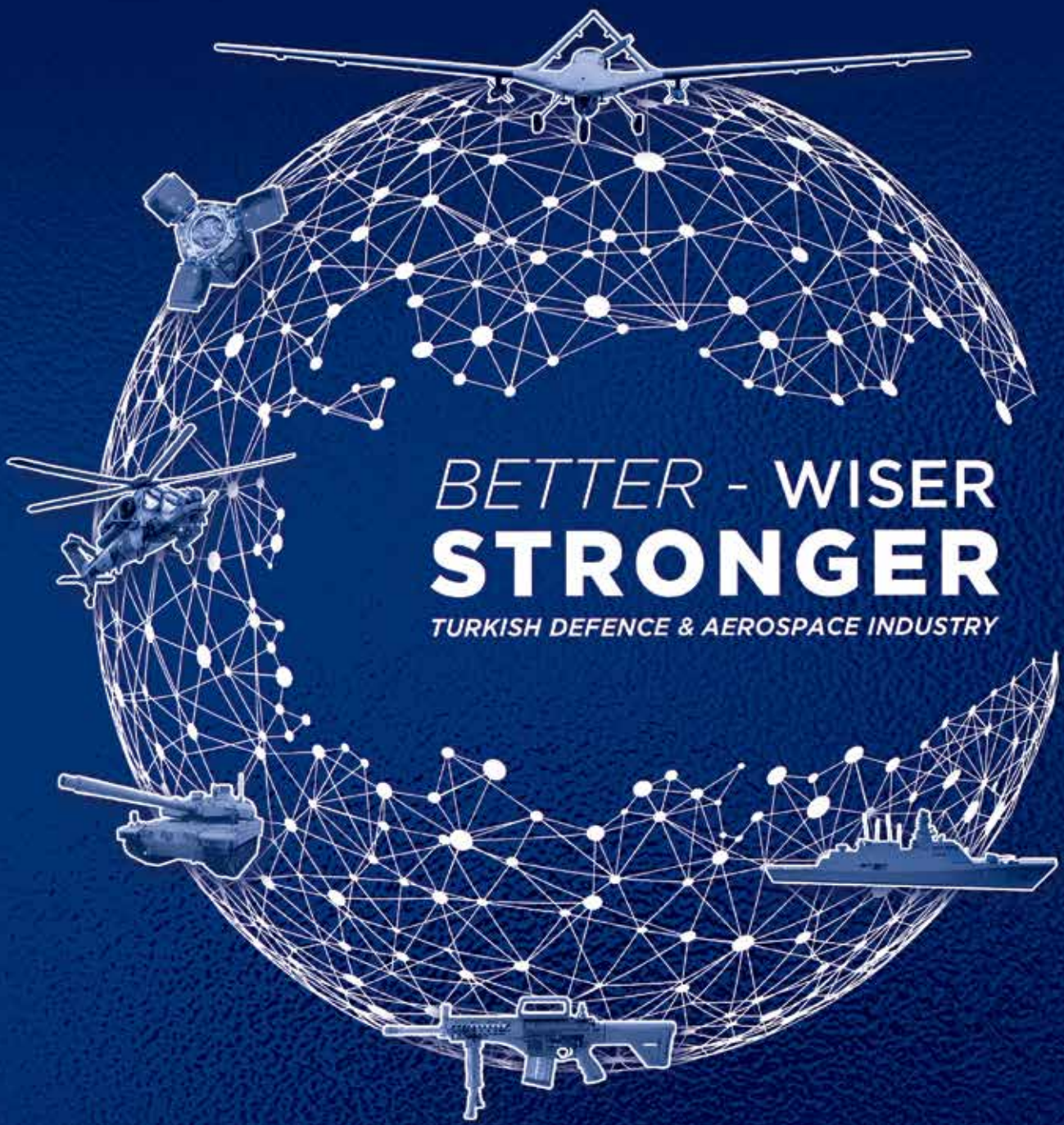
TAIS'S WIDE PRODUCT RANGE OFFERED TO GLOBAL MARKETS VIA AN INNOVATIVE AND COMPETITIVE STRUCTURE

TURKISH NAVY'S CURRENT FLEET & THE ROLE OF TURKISH NAVAL INDUSTRIAL CAPABILITIES

A BRIEF LOOK AT CURRENT SURFACE AND SUBMARINE PLATFORMS OF THE HELLENIC NAVY

AN EXCLUSIVE ANALYSIS: NAVAL BALANCE OF POWER IN THE EASTERN MEDITERRANEAN

NAVAL SPECIAL ISSUE



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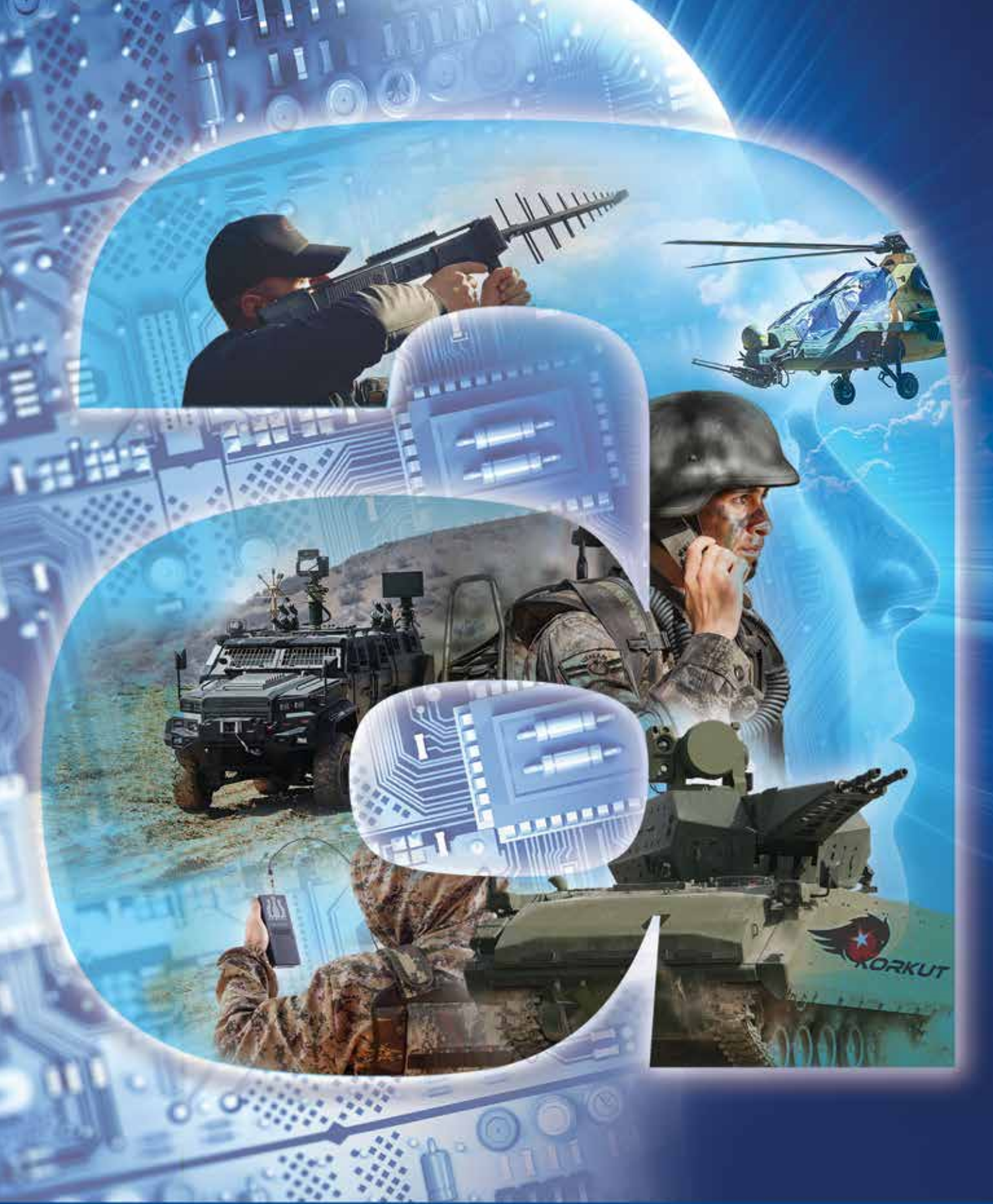

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ASELSAN is a Turkish Armed Forces Foundation company.

DEFENCE TURKEY

VOLUME: 14 • ISSUE: 95 • YEAR: 2019

ISSN 1306 5998

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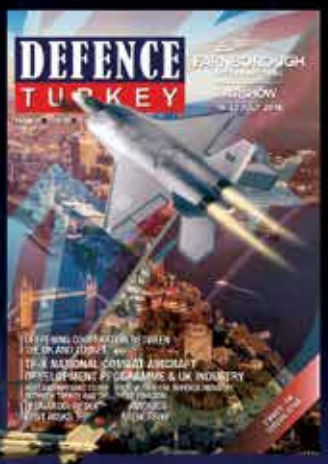

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Growing Power of the Region with Platform and System Capabilities Turkish Naval Forces

Ayşe AKALIN EVERS
Publisher & Editor in Chief

In the 8th Naval Systems Seminar held in October 2017, in light of the data shared by the SSB Naval Platforms Department, the total size of projects carried out under the responsibility of the Naval Platforms Department exceeded US$12 Billion, and the size of the Global Warship Market was expected to reach US$838 Billion by 2032. In this direction, an emphasis was made that strengthening the position of the Presidency of Defence Industries and the Turkish Armed Forces in the global warship ship market is one of the significant goals of the SSB. It cannot be denied that our country has made tremendous progress, especially in the development of systems and subsystems of the naval platforms in the last two years. We can say that the ADA Class MİLGEM Corvette program has already been established as an essential success story in the development of the Turkish Naval Platforms Sector with the delivery of the last ship, TCG F-514 "Kınalıada", which was launched in 2004, to the Turkish Naval Forces on September 29, 2019. The MİLGEM platform, which has shown the competence of the Turkish Defence Industry by waving our flag in international waters since 2011, was chosen by the Pakistan Navy shortly after its commissioning and has proven once again how competitive and competent our industry is in the export market. The construction activities of the Istanbul class frigate, which was launched as the 5th ship and the continuation of the MİLGEM project, are still underway, and the first ship is planned to be commissioned in 2023. The Multipurpose Amphibious Assault Ship (LHD) TCG Anadolu, which can be used within the framework of Natural Disaster Relief missions when necessary in times of peace and will provide an exceptional capability to the Turkish Naval Forces, has passed a critical threshold in its production. The first ship of this project, which was launched in the first quarter of 2019, is planned to be delivered in 2022 following the completion of ongoing equipping activities. In addition to the success of the indigenously developed warships, the pride of Turkey, the other nationally developed Support Ship, Patrol Ship, and Amphibious Assault Ship projects also continue at full throttle. Turkey has passed a significant threshold in this field with its capable shipyards competing against the world's largest shipyards and its globally recognized main and sub-contractors who produce world-class systems and subsystems. In particular, the investments in the system, subsystem, and indigenous products have started to reduce foreign dependence, especially in these fields, and significantly increased the operational capability of the Turkish Naval Forces. Waving our flag proudly over international waters as a force multiplier and ensuring the sovereign rights of the country especially during the ongoing natural gas exploration and drilling activities, where tension increases every day, the Turkish Naval Forces has further increased its strength with the indigenous solutions provided by the Turkish Defence Industry.

In our special issue of Naval Platforms and Systems; you can find articles on the Turkish Navy's Current Fleet and the Role of Turkish Naval Industrial Capabilities; Gas Conflict in the Eastern Mediterranean & the Role of Turkish Naval Forces in Protecting Turkey's Sovereignty Rights and A Brief Look at Current Surface and Submarine Platforms of The Hellenic Navy. Also, we would like to convey our special thanks to STM General Manager Mr. Murat İKİNCİ; TAIS General Manager Mr. Doğan BEŞCAN and Defence Analyst Mr. Arda MEVLÜTOĞLU once again for their valuable contributions.

Enjoy this issue… ■


TÜRK DENİZ KUVVETLERİ
1081

by İbrahim SÜNNETÇİ

Turkish Navy's Current Fleet and the Role of Turkish Naval Industrial Capabilities

As a result of the Presidency of Defence Industries' (SSB) national and domestic defence equipment policies, which puts the major emphasis on indigenous manufacturing and development, since early 2000 Turkey has been investing heavily into local defence sector capabilities. In the field of naval platforms, the main aim is to be able to carry out the design and system integration of all types of surface and sub-surface naval vessels at local shipyards (military and private sector) using indigenous capabilities. As a result of these efforts, carried out under the supervision and management of the SSB, the procurement authority under the Turkish MoND, the Turkish Naval Shipbuilding Industry has achieved considerable success and is now ready to compete in the international markets with its indigenous solutions such as the MilGem (ADA Class) Corvette, TUZLA Class New Type Patrol Boat, 151 Class high-speed Landing Craft Tank (LCT), BAYRAKTAR Class Landing Ship Tank (LST), MRTP Series Fast Intervention Boats, MOSHIP and the RATSHIP

Thanks to the contributions of local companies such as Aselsan, AYESAŞ, Havelsan, İŞBİR, MİLSOFT, Meteksan Defence, TÜBİTAK SAGE, TÜBİTAK BİLGEM, TÜBİTAK MAM, Roketsan, MKEK, KBST, STM and Yaltes, which complement the increasing capabilities of the Turkish Naval Shipbuilding Industry, the Turkish Naval Forces (TNF) is developing into a remarkably powerful and increasingly self-sufficient force. As a result of heavy investment and the reliance on local capabilities coupled with the successful cooperation and interaction between the TNF and the Turkish Defence Industry on naval platform projects, the local content ratio reached 70% in 2017.

It should be noted that as part of the restructuring efforts that were launched following the bloody coup attempt, with an amendment that was made on the 1st Article of Law regarding the Ministry of National Defence (MoND) that military factories and shipyards were removed from the structure related to Military Departments and General Staff organization and were affiliated under the MoND with the State of Emergency Decree Law No. 669 issued on 31 July 2016. In this context Naval Shipyards of the Turkish Naval Forces Command (TNFC) such as Istanbul Naval Shipyard, Gölcük Naval Shipyard and İzmir Naval Shipyard, are affiliated under the MoND General Directorate of Shipyards (TGM, established on 25 July 2016 and its General Manager was appointed on 4 January 2017) in 2017. Following the completion of organizational efforts in late 2017, the MoND General Directorate of Shipyards came into operation in January 2018 together with all of its sub-departments. In order to glean benefits from the capabilities of military factories and shipyards, with the State of Emergency Decree Law No. 696, issued on 24 December 2017, Military Factory and Shipyard Management Incorporated Company (ASFAT A.Ş) was established. ASFAT A.Ş was established with the law to contribute to the capabilities of the 27 Military Factories and 3 Military Shipyards within the Turkish MoND and to serve the national defence industry with national facilities. ASFAT is authorized to use a workforce of approximately 20,000 people employed at 30 (27 Military Factories and 3 Military Shipyards) integrated defence industry facilities.


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According to the plans of the Turkish MoND General Directorate of Shipyards (TGM) during the period spanning 2017-2034 a total of 88 naval vessels in various types and including submarines would be constructed in Turkey to meet the requirements of the TNF and Coast Guard. 13 of them would be constructed at Naval Shipyards (2 x ADA Class [3rd and 4th Corvettes], 1 x İ Class Frigate, 1 x TF-2000 ADW Destroyer, 1 x TF-100 Frigate, 6 x Type 214TN REİS Class AIP Submarines and 2 x National Submarines [MilDen]) and 75 of them would be constructed at Private Shipyards (including 3 x İ Class Frigates, 3 TF-2000 Air Defence Warfare Destroyers, 3 TF-100 Frigates, 10 x Turkish Type FPBs, 2 x LHDs, 1 x Spy (SIGINT/ELINT) Ship, 7 x LCTs, 4 x LCACs and 8 x New Generation Mine Hunting Vessels and 6 Mine Counter Measures Vessels. All of these projects are being carried out under the management of the SSB.

In all, as of 1 October 2019 TNF numbers around 150 vessels of various sizes, with a total displacement of over 200,000t, including 22 patrol/intervention boats, 11 mine warfare vessels, 31 auxiliaries and 26 landing craft. TNF's current surface vessel strength consists of 16 frigates (plus four 'İ' Class under construction), 10 corvettes and 19 Harpoon SSM-armed fast patrol boats (FPBs), with a tender out for a further 10 to be produced locally. There are 12 submarines in service, with a further six 'REİS' Class Type 214TN under construction at Gölcük Naval Shipyard. Naval aviation assets comprise 35 naval helicopters (24 S-70B Seahawks and 11 AB212s for anti-submarine and anti-surface warfare (ASW/ASuW), two C-72 (ATR72/600) utility aircraft, six P-235 (CN235-100M) maritime patrol aircraft (MPAs), with a further six ATR72/600 MPAs to enter service in 2020-2021 under the MELTEM-III Program, according to the TNFC's official website. There is also one ANKA Block-B medium-altitude long-endurance (MALE) Unmanned Aerial Vehicle System with three aircraft, equipped with CMX-15D forward-looking infrared (FLIR) and Aselsan's SARPER synthetic aperture radar (SAR/GMTI/ISAR) and a BAYRAKTAR TB2-S SİHA/Armed UAV System with five aircraft in the service of the TNF. The contract for the procurement of four ANKA Block-B and eight ANKA-S UAVs (including armed versions) to be equipped with CMX-15D FLIR and SARPER SAR/GMTI/ISAR payloads have already been signed with TUSAŞ and deliveries will start in 2020. The TNF main surface fleet consists 8 GABYA Class (ex FFG-7 OHP Class), 4 MEKO 200 Track I (YAVUZ Class) and 4 Track IIA and Track IIB (BARBAROS Class) Frigates along with 6 BURAK Class (ex A69 Aviso Class Corvettes) and 4 ADA Class Corvettes and 19 Fast Patrol Boats (4 DOĞAN Class, 4 RÜZGAR Class, 2 YILDIZ Class, 3 KILIÇ-I and 6 KILIÇ-II Class). Contracts for the Test and Training Vessel (TVEG), İSTANBUL/İSTİF Class Frigates, TCG Anadolu (L-400) Multipurpose Amphibious Assault Ship (LHD), Fleet Replenishment Ship (DİMDEG) and two Logistic Support Ships have already been signed and construction efforts have been launched. Meanwhile the contract for the TF-2000 Air Defence Warfare (ADW) Destroyer Program is expected to be awarded during the early 2020s. In addition

to these heavy surface combatants the Turkish Naval Forces Command (TNFC) is also receiving 2 New SAT Boats (deliveries are scheduled to be completed in late 2019) and 8 Fast Patrol Boats (deliveries started in February 2019 and as of 2 October 6 boats have already entered the service of the TNF) from Yonca-Onuk Shipyard under the contracts awarded by the SSB on 6 October 2017. As of 2 October 2019, the TNF's submarine fleet consists of 4 AY Class, 4 PREVEZE Class and 4 GÜR Class Submarines. The deliveries of Type 214TN REİS Class Submarines will be completed during 2022-2027.

The 3,640-ton **GABYA Class Frigates** have been modernized locally from May 2007 to August 2012 at Gölcük Naval Shipyard with the integration of indigenously developed GENESIS Combat Management System (CMS), which has greatly enhanced their capabilities compared to the original design (with the GENESIS GABYA Class that can track over 1,000 tactical surface and air targets simultaneously, while in the original configuration only 64 targets can be tracked simultaneously). The GABYA Class Frigates are also equipped with the ASIST landing platform system so that they can accommodate two S-70B SeaHawk ASW/ASuW Naval Helicopters. In order to meet the Anti Air Warfare capability of the TNF, during 2012-2014 four of the GABYA Class Frigates (TCG Gediz, TCG Gökova, TCG Göksu and TCG Giresun) have been upgraded with an 8-cell Mk-41 VLS, located forward of Mk-13 Mod 4 launcher (for RIM-66E5 SM-1 Block VIA missiles) and SMART-S Mk2 3D radar that replaced the AN/SPS-49(V)4 radar. Thanks to the Mk-41 VLS' quad-pack feature the modernized GABYA Class Frigates and have the 32 RIM-162B Block I Evolved Sea Sparrow Missiles (ESSMs) in addition to 36 SM-1 Block VIA missiles. Moreover, their Mk-92 STIR Mod 2 Fire Control System was upgraded to the Mod 12 level. The existing Phalanx Mk-15 Block 0 (Mod 1) CIWSs on board GABYA Class Frigates will be upgraded soon to Block 1B Baseline 2 configuration level. According to current plans four of the GABYA Class Frigates that did not receive Mk-41 VLS and SMART-S the Mk2 radar upgrade will be replaced with TF-2000 ADW Destroyers starting from 2027 and the remaining four frigates upgraded with Mk-41 VLS and SMART-S Mk2 radar will be replaced with TF-100 Frigates after the 2030s.

GABYA and BARBAROS Class Frigates

The BARBAROS Class Frigates (Track IIA and Track IIB) were also upgraded locally during the 2012-2015 time frame with the replacement of the old AWS-9/Type 996 surveillance radars that were criticized for their low MTBF figures, with the SMART-S Mk2 and the obsolete 8-cell Mk-29 SeaSparrow launcher with 8-cell Mk-41 VLS for 32 ESSMs on TCG Barbaros (F-244), TCG OruçReis (F-245), while the existing 16-cell Mk-41 VLSs on TCG SalihReis (F-246) and TCG KemalReis (F-247) were upgraded to Baseline VII configuration. Thanks to the Baseline VII upgrade the number of RIM-162B Blok I ESSMs on Track IIB Frigates were increased to 64 (but, due to total weight, capacity and stability issues the frigates usually are armed with a mix of 40 ESSM [32] and SeaSparrow [8] missiles). The Thales SMART-S Mk2 3D radars already installed or to be installed on TNF vessels and have been manufactured under license since 2009 at Aselsan facilities in Ankara. Aselsan also provides T/R modules (over 200 modules have been exported) to Thales for 3D SMART-S Mk2 radars. On April 3, 2018 an Aselsan-Havelsan Business Partnership was signed in an agreement with the Presidency of Defence Industries (SSB, as of 10 July 2018 the name of Undersecretariat for Defence Industries [SSM] was changed to the SSB) for the Mid-Life Upgrade (MLU) of the BARBAROS Class Frigates in service of the TNF. The contract became effective on 9 August 2018 (T_0 started) and the System Requirements Features meeting was held on the 5th and 6th of February 2019. The TNF currently operates four BARBAROS Class Multipurpose Frigates that entered the service during 1997-2000; TCG Barbaros, TCG OrucReis, TCG SalihReis and TCG KemalReis. Two of them were constructed by the Blohm + Voss Shipyard in Hamburg, Germany, and the remaining two were constructed at the Gölcük Naval Shipyard in Turkey with technical support and material packages provided by the Blohm + Voss Shipyard. Under the contract the MLU upgrade of the first frigate would be completed in November 2022 and deliveries are scheduled to be completed by 2024. Under the contract, the existing Combat Management System (CMS, STACOS Mod 3/TACTICOS with 12 operator consoles) will be replaced by a national network enabled CMS namely 'ADVENT', and some of the existing weapons/sensors will be replaced with new ones on a one-to-one basis. In this context, the AWS-06 Dolphin radar is expected to be replaced with Aselsan's MAR-D AESA radar, Sea Guard CIWS with three Sea Zenith four-barrelled 25mm gun mounts are expected to be replaced with one Phalanx Mk-15 Block 1B Baseline 2 and two of Aselsan's 25mm STOP stabilized gun systems (at the aft section at starboard and port), the existing AN/SQS-56 hull mounted sonar will be replaced with a new generation Mid-Frequency Band (1kHz-10kHz) active/passive FERSAH (indigenously developed by Aselsan and Armelsan) Sonar System, existing AN/SLQ-25 Nixie Torpedo Decoy/Defence System will be replaced with Aselsan's HIZIR Torpedo Defence System, Aselsan's ARES-2NC Radar ESM and AREAS-

YAVUZ Class Frigate TCG Fatih (F-242)

2NC Naval Electronic Attack (EA) Systems will replace the existing Cutlas-1B ESM, and Scorpion-B EA Systems and an indigenous 127mm (5/54) Gun Fire Control System will be integrated on the vessels. The BARBAROS Class Frigates will also be integrated with Aselsan's Lazer Warning System, PIRI-KATS IRST System and a dual-band Fire Control Radar (AKR-D Block-B1/B2, X and Ka-Band radar with 120km range) for the ESSM. The BARBAROS Class Frigate MLU Contract also includes an option for the integration of Armelsan's ARAS-2023 Diver Detection Sonar System on four vessels. The MLU is designed to extend the BARBAROS Class Frigates' operational life until 2040s when they are planned to be replaced by TF-100 Frigates.

The YAVUZ Class Frigates are receiving very limited upgrades which are mainly focused on the replacement of the existing Racal Cutlas-B1 Radar ESM System with Aselsan's ARES-2NC Radar ESM System and the replacement of the existing decoy launcher with the Aselsan Decoy Launcher ASELDAS under the MEHS-Yavuz (National Electronic Warfare Suit for YAVUZ Class) Program. In 2018, Aselsan secured a contract to deliver an undisclosed number of AREAS-2NC EA Systems to replace the existing Scorpion-B EA System. It is not yet clear whether the contract covers both YAVUZ and BARBAROS Class Frigates or if it just covers the BARBAROS Class. According to Aselsan, the prototype AREAS-2NC EA System (on board YAVUZ Class TCG Fatih Frigate) and which is integrated with ARES-2NC ESM, was tested successfully during the NATO NEMO - Naval Electromagnetic Operations held in Antalya, Turkey during 30 October – 4 November 2017. The AREAS-2NC EA System features an RF solid state amplifier and a mechanically directed stabilized dish antenna structure. The first MEHS was integrated on the TCG Fatih Frigate and the Sea Acceptance Tests were completed in December 2017. Integration efforts on the remaining three frigates were completed in 2018.

As a major example of the successful cooperation and interaction between the Turkish Navy and the Turkish Defence Industry, the MilGem (National Ship) Project represents a milestone in the development of Turkey's indigenous capability to design, build and integrate naval vessels. Under the MilGem Project four **ADA Class Corvettes** were constructed at the Istanbul Naval Shipyard. The first ship of ADA Class Corvettes, the TCG Heybeliada (F-511) was commissioned on 27 September 2011, and the second vessel the TCG Büyükada (F-512) was commissioned on 27 September 2013, and the third vessel, the TCG Burgazada (F-513) was commissioned on 4 November 2018 and the last vessel, the TCG Kınalıada (F-514) was commissioned on 29 September 2019. TCG Burgazada was launched in June 2016 and TCG Kınalıada was launched on 3 July 2017. Compared to the first two ships, the second and third corvettes are slightly updated and integrated with network enabled CMS 'ADVENT' (replacing the existing GENESIS CMS on board first two ships), Aselsan's HIZIR Torpedo Defence System (replacing the existing Ultra Electronics Sea Sentor Surface Ship Torpedo Defence System), SeaEye-AHTAPOT EO Reconnaissance and Surveillance System (replacing AselFLIR-300D) and AKR-D Block B-1/2 Fire Control Radar System (replacing STING EO). ADVENT CMS will be first integrated on the TCG Kınalıada Corvette and then the existing CMS onboard the TCG Burgazada and will be upgraded to the ADVENT level. The third vessel, the TCG Burgazada (F-513) and the fourth vessel, theTCG Kınalıada (F-514) are also stated to feature a more powerful main propulsion system (since the MTU diesel engines are same this power uprate can stem from deploying a more powerful gas turbine on the ships such as the LM2500+ versus the LM2500).

Beklentilerin ötesinde savunma.

Leonardo 127/64 LW Topu, gelişmiş sayısal altyapısı, yüksek atış hızı ve atışa hazır mühimmat kapasitesi ile Deniz Kuvvetlerine çok önemli operasyonel avantaj sağlamaktadır.

Ayrıca Leonardo 127/64 LW Topu, VULCANO Güdümlü Mühimmat ile de birleştiğinde, standart menzilden 3 kat daha uzak mesafeden nokta atışı doğruluğu sağlamakta ve tali hasarları asgariye indirmektedir.

Leonardo, büyük usta ve mucidin yaratıcılık ve merakından esinlenerek yarının teknolojisini tasarlamaktadır.

Vulcano 76mm GLR

Vulcano 127mm GLR

Vulcano 155mm GLR

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The TCG Burgazada (F-513) and the TCG Kınalıada (F-514) also feature RAM Block-II missiles compared to RAM Block-IA/HAS missiles deployed on the first two ADA Class Corvettes. The TCG Kınalıada is the first ship in the TNF inventory fitted with indigenous ATMACA Block I (with an active RF seeker) Anti-Ship Guided Missiles with land attack capability. Roketsan's indigenous ATMACA Anti-Ship Guided Missile was displayed for the first time at the IDEF '19 Fair. Designed as a long-range weapon system to be used onboard modern naval platforms under any weather conditions, the ATMACA Anti-Ship Guided Missile, with high-precision strike capability, can be used against both surface and coastal targets. The missile has a range of over 220 km and utilizes GPS (Global Positioning System) and INS (Inertial Navigation System) guidance. Equipped with an Aselsan built Active Radar Seeker, the ATMACA missile has sea-skimming capability and uses Barometric and Radar altimeters to navigate towards its target. On the 25th of September 2019 via its official twitter page, the SSB disclosed that a new live firing test with the ATMACA (without a live warhead) missile was recently conducted successfully. According to a short video shared by the SSB on its official twitter account, during the terminal phase, the ATMACA missile performed sea-skimming capability and flew at an altitude of 0.93 m just before hitting the fixed floating surface target.

The MilGem concept enabled domestic production and development of critical technological systems such as; GENESIS (the version on the TCG BAYRAKTAR LST runs on around 3.9 million lines of code of software and can track a tactical surface of over 2,500 as well as air targets, simultaneously) and ADVENT CMS (the version to be deployed on the TCG Anadolu LHD will run around up to 6 million lines of code), the YAKAMOS hull mounted medium frequency active/passive sonar family, 76mm gun fire control system, LPI radar, 12.7mm STAMP stabilized gun system, degaussing system, IR signature management system and laser warning system. While the TCG Heybeliada was constructed with a 65% local content rate, this figure has been increased to 70% in terms of the value of the materials used in the construction and outfitting of the vessels and to 80% on an item basis on the following vessels. The ADA Class Corvettes have a mono-hull, displacement-type hull form. Their overall length is 99.5 meters, maximum beam is 14.4m, displacement is 2,300 tons (2,450 tons with a full load) and their range at an economic speed is around 3,500 nautical miles. The ADA Class Corvettes accommodate a 10-ton helicopter (S-70B SeaHawk) with platform, hangar and extensive service and handling equipment. With their 32MW Main Propulsion System (in CODAG configuration), consists of a one gas turbine (LM2500) and two diesel engines (MTU 16V595TE90), the ADA Class Corvettes can reach 31 knots.

A Shot from ATMACA Anti-Ship Guided Missile's Live Firing Test Conducted at Sinop Test Range

The **I Class Frigate** Program was launched to construct four frigates, the extended and enhanced version of ADA Class Corvettes which are to replace the aging YAVUZ Class Frigates in the mid-2020s. Istanbul Naval Shipyard is responsible for the construction of the prototype ship. Construction of the first ship of the class, the TCG Istanbul (F-515), was officially launched on January 19, 2017 at Istanbul Naval Shipyard with a steel cutting ceremony. The TCG Istanbul Frigate was scheduled to be operational in 2021, but this deadline has been extended to the second half of 2023 due to delays in assigning a Main Contractor company to carry out subsystems, materials and services procurement and to manage the Project. The other three sister ships (the TCG Izmir, TCG İzmit and the TCG Içel), which were planned to be constructed in private shipyards, were scheduled to follow in the years 2022, 2023 and 2024, but again at least a one-year extension is expected in these time schedules. For the series construction of sister ships, a tender was launched and Dearsan and TAIS were shortlisted in late 2016. But since then, we must assume that either no selection has been made between these two bidders or that the result has not yet been publicized up to this point. The contractual negotiations with STM, assigned by the SSB as the Main Contractor Company for the I Class Frigate Program were completed in late 2018 and the contract was signed in early 2019 and became effective on 27 September 2019. According to President ERDOĞAN's second 100-Day Action Plan, which was disclosed on 13 December 2018, the contract for the first I Class Frigate should be signed during the first quarter of 2019. The I Class Frigates will have

I-Class Frigate Model

around a 50% increased fuel capacity and a cruising range capability that is comparable to ADA Class Corvettes. In line with the changing and developing requirements of the TNFC, the I Class Frigates will be equipped with a 16-cell Mk-41 VLS (behind the 76mm Super Rapid main gun on the bow) for a total of 64 ESSM Block I and Block II missiles, 16 Harpoon Block II and indigenously developed ATMACA Block I and Block II surface to surface/land attack missiles, Aselsan's FERSAH hull mounted medium frequency active/passive sonar system, AKREP (AKR-D Block B-1/2) Fire Control Radar, SeaEye-AHTAPOT EO Reconnaissance and Surveillance System, PIRI-KATS IRST System, KULAÇ Echo Sounder System (depth measurement equipment), MILPARS Electromagnetic Log System, Underwater Telephone, ALPER LPI Radar, a pair of 25mm STOP stabilized gun systems, HIZIR Torpedo Defence System, ARES-2N Radar ESM and the new generation AREAS-2N Radar EA System with

ARES-2N EDT ESM Console

AESA antenna array, as well as with Havelsan's GENSIS ADVENT CMS. Can be integrated with a wide variety of sensors and weapons.

The ADVENT is a powerful and scalable C4I System that provides planning, tactical picture compilation, decision-making and weapons control to meet current and emergent threats. The SSB has assigned Roketsan for the procurement of Mk-41 VLSs from the US and awarded a contract on 14 February 2018 for the procurement of 4 Mk-41 Vertical Launch Systems for the I Class Frigates. The contract became effective on 15 March 2018 and Interface Working Group Meetings were held in June 2018 and January 2019. The I Class Frigates will have a mono-hull, displacement-type hull form. Their overall length is 113.2 meters, maximum beam is 14.42m,

The Computer Generated Image of TCG Ufuk A-591 Test and Training Vessel (TVEG)

draft is 4.05m, and displacement is 2,966 tons. The I Class Frigates will be able to achieve over 29 knots and will have a range of 6,570nm at an economic speed (14 knots) powered by two MTU 20V 4000 M93L diesel engines (driving two shafts) and a LM2500 gas turbine (in CODAG configuration).

TAIS (Turkish Associated International Shipyards) is executing the construction of the TCG Ufuk (A-591) **Test and Training Vessel (TVEG)** for the Turkish Naval Forces Command (TNFC) under a contract signed between STM (Main Contractor) and the SSB which was awarded on 30 December 2016. The TVEG has a similar hull (having a mono-hull, displacement-type hull form) and superstructure design with the ADA Class Corvettes however it is equipped with a different type of Main Propulsion System (MPS). Contrary to CODAG configuration (two 595 Series MTU 16V595TE90 diesel engines and a LM2500 gas turbine generator) used in the ADA Class, the TVEG has a CODAD propulsion system (with only two MTU 20V 4000 M93L diesel engines, which also were selected for the I Class frigates). İŞBİR on the other hand, also delivered the power group of four generators each with a 750kW power capacity and were installed within an acoustic capsule for the TVEG. The TCG Ufuk TVEG will also have a different sensor and electronic equipment layout than the ADA Class Corvettes. The ADA Class Corvettes are equipped with a hangar and a helicopter deck with a single landing spot to accommodate one S-70B SeaHawk ASW/ASuW helicopter. However, on the TVEG even the helicopter deck has been retained and the hangar will be modified to accommodate unspecified electronic equipment and an undisclosed number of operator consoles. To act as "Turkey's Eyes and Ears in the Sea" the TCG Ufuk TVEG was launched on 9 February 2019 at Tuzla Shipyard with the participation of President Recep Tayyip ERDOĞAN, Minister of National Defence Hulusi AKAR, Minister of Industry and Technology Mustafa VARANK and President of Defence Industries Prof. İsmail DEMİR. Following the completion of ongoing fitting and testing phases that will last 40-months, the TCG Ufuk will be delivered to the TNFC on 31 July 2020. At his address during launching ceremony President Recep Tayyip ERDOĞAN underlined that the TCG Ufuk is the 5th MILGEM vessel after the TCG Kınalıada Corvette. ERDOĞAN stated that with a maximum speed of 18 knots and a 10-ton helicopter platform, the 'Ufuk' Corvette is Turkey's first intelligence ship developed and built with national resources and capabilities. ERDOĞAN said: "Today, with the 'Ufuk' Corvette, we acquire this capability that only a few countries have in the world." The TCG Ufuk (A-591), with its command control, electronic systems, test, and training system equipment to be provided by Aselsan, is intended to be used in signal and electronic intelligence missions (SIGINT/ELINT) in addition to the Test and Training Vessel requirements of the TNFC. The vessel will have a length of 99.5 meters, a beam of 14.4 meters, a maximum speed of 18 knots and endurance of 45 days.

To replace four of the GABYA Class Frigates that did not receive Mk-41 VLS and SMART-S Mk2 radar upgrades the TNFC initiated a project called TF-2000 to construct a total of seven destroyers fitted with enhanced anti-air weapon and sensor systems. The main aim of this project is to acquire fleet area air defence capability. Designed by the TNFC Design Project Office the **TF-2000 Air Defence Warfare (ADW) Destroyer** will have an overall length of 166m, a displacement of 7,000 tons, an overall beam of 21.5m and draught of 4.96m. To be powered by two diesel engines (driving two shafts) and two gas turbines (in CODOG configuration) the TF-2000 ADW Destroyers will be able to achieve over 28 knots. Under the TF-2000 ADW Destroyer Program construction of the first ship of the class, will take place at Istanbul Naval Shipyard while the remaining three sister ships are planned to be constructed at private shipyards. According to the TNFC, the first ship of TF-2000 ADW Destroyers is scheduled to be commissioned in 2027. The main sensor of the TF-2000 ADW Destroyers called

A Scaled Model of the TF-2000 Air Defence Warfare (ADW) Destroyer

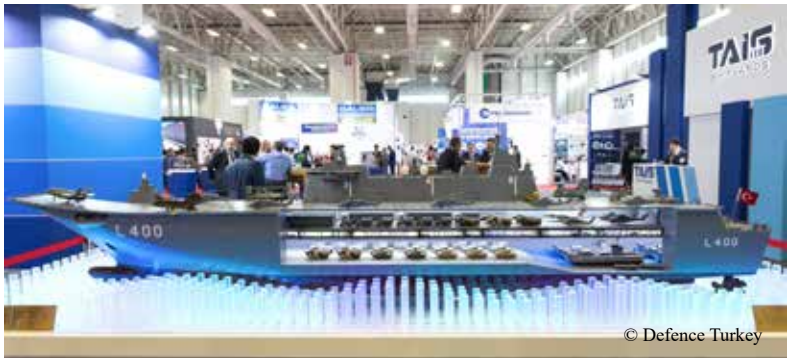
CAFRAD, of which a prototype has been under development since 2013. Under Phase-I of the **Multifunctional Phased Array Radar (ÇAFRAD)** Program a US$79 Million (TL200 Million) contract was signed between the SSB and Main Contractor Aselsan on 1 August 2013. Phase-I covers the design, development manufacture and testing of the CAFRAD Radar System Technology Demonstrator Prototype. The CAFRAD Suite comprises three separate new generation radars (CFR, AYR and UMR) based on the most advanced Gallium Nitride (GaN) Active Electronically Scanned Array (AESA) sensor technology with multiple digitally formed beams, fully solid state Transmit/Receive (T/R) modules and digital signal processing, up to 12 fixed-panel radar antennas (it depends the configuration of UMR, which has both a single face rotating antenna and a four fixed-panel configuration) and a non-rotating AESA type IFF antenna subsystem. The ÇFR (multifunctional radar) and AYR (illumination radar) are in X-Band configuration, whereas the long-range (450km+) search radar UMR operates in S-Band. The TF-2000 ADW Destroyer scaled model (stated to have a 90% similarity with the final configuration) displayed at the TNFC stand during IDEF '19 Fair features a fixed-panel version of the UMR and it was located around the bridge. A scaled model of the ÇAFRAD System to be utilized in TF-2020 Anti-Air Warfare Destroyers was also displayed during IDEF '19 at Aselsan's stand. Each fixed panel of the ÇFR and AYR consists of around 5,000 Transmit/Receive (T/R) modules. The four fixed-panel X-Band ÇFR antennas are located over the mast of the integrated antenna in the ÇAFRAD System over the TF-2000 model and a total of 8 antennas were located around the bridge. The relatively smaller of these antennas at the top section are AYR antennas, while the bigger ones at the bottom are long-range S-Band UMR antennas. In line with the information we received, the ÇAFRAD System to be integrated on the TF-2000 ADW Destroyers will be in the similar structure with the configuration displayed on the TF-2000 scaled model. Activities to assess the utilization of a scaled version of ÇAFRAD on I Class Frigates such as the EL/M-2248 MF-STAR AESA radar utilized on Israel's SAAR-5 and SAAR-6 corvettes continue. Design, development, manufacture and qualification of Technology Demonstration Prototype of ÇAFRAD, composed of a single-face, fixed-panel and scaled (what is implied with scaling is related with the number of internal modules contained rather the size of the antenna) versions of Multi-Functional Radar (ÇFR-1) and Illuminating Radar (AYR-1) along with the IFF System with a non-rotating AESA type IFF antenna subsystem was completed in September 2017. The Factory Acceptance Tests (FATs) of the ÇAFRAD prototype on the Technology Demonstration Prototype (TGP) Tower were carried out during the first quarter of 2018 and then the ÇAFRAD TGP Tower was integrated on the flight deck of a GABYA Class Frigate (TCG Göksu), with RIM-162B Block I ESSM capability.

Integration efforts including ÇAFRAD's integration to the ESSM System and GENESIS CMS on board the ship was completed in November 2018. The TCG Göksu (F-497) Frigate first sailed with its CAFRAD TGP tower on 24 November in the Gulf of Izmit and in the Marmara Sea and on December 3 transiting the Bosphorus towards the Black Sea for testing purposes. Live firing tests with the RIM-162B Block I ESSM integrated ÇAFRAD TGP on board the TCG Göksu Frigate were carried out on 11 December 2018 in the Black Sea. During the tests the CFR-1 radar successfully detected TUSAŞ's ŞİMŞEK High Speed Target Drone, simulating an air target, and it was destroyed by a RIM-162B Block I ESSM guided by an AYR-1 radar. Even if the size of the CFR-1 and AYR-1radar panels used in the tests appeared to be the same size as the radar panels to be manufactured as part of the Mass Production Phase, the number of T/R modules inside them were less than required. Following the completion of the ÇAFRAD Program Phase-I, the contract for Phase-II is expected to be signed in 2019. Phase-II of the CAFRAD Program will cover the development of multi-face antenna versions of CFR and the AYR and the development of UMR (to be based on the S-Band Early Warning Radar System [EIRS] of the Turkish Air Force) and their integration to the ÇAFRAD Suite. According to the SSB's official website under contract, Phase-II deliveries will start in 2023. The TF-2000 ADW Destroyers will also feature a number of indigenous sensor systems such as ADVENT CMS, new version of HIZIR Torpedo Defence System with a Towed Array containing both low frequency active (DUFAS, Low Frequency Active Sonar to replace the Towed Decoy) and passive sonar arrays/transducers and the YAKAMOS-L low frequency hull mounted active/passive sonar, and weapon systems such as 35mm GÖKDENİZ CIWS, HİSAR-A short, HİSAR-Nokta medium and SİPER (formerly known as HİSAR-U) long-range air defence missiles. The TF-2000 ADW Destroyers are also expected to be fitted with the naval variant of the Enhanced Long-Range Area Air and Missile Defence System (GUMS/UMBFSS, with BMD capability and EuroSam has been selected as the technical support provider) missile systems to be fired from national VLSs.

Under the Multipurpose Amphibious Assault Ship (LHD) Project Contract signed on 1 June 2015 between the SSB and Sedef Shipbuilding Inc. (Sedef Shipyard), the Keel Laying Ceremony of the **TCG Anadolu (L-400) LHD** was held on 30 April 2016 at Sedef Shipyard in Tuzla, Istanbul. Under the contract the project activities (T_0) started as of 18 September 2015. The provisional acceptance of the TCG Anadolu LHD is planned to take place in the T_0+67th month (April 2021) and following the 12-month warranty period, the final acceptance of the TCG Anadolu LHD is scheduled to be completed in the T_0+79th month (April 2022). The TCG Anadolu LHD is planned to be constructed with a 68% domestic contribution rate. The main Contract for the Multipurpose Amphibious Assault Ship Project includes the procurement of one LHD, four Landing Craft Mechanized (LCM, the Navantia design four LCM-1E will be constructed at Sedef Shipyard), two Landing Craft Vehicle Personnel (LCVP), two Rigid-hulled Inflatable Boats (RHIB), and one Commander Boat for guidance purposes. The total cost of the project is expected to be at the €1,250 Billion level. The design, construction, system integration, performance and timely delivery of the TCG Anadolu LHD are under the responsibility of Sedef Shipyard. Although no special training was required for the construction of the ship, a group from Sedef Shipyard was sent to the Spanish Navantia Shipyard and Sedef Shipyard engineers worked together with Navantia engineers during the design work. Within the scope of the project, a Navantia Office was established at Sedef Shipyard and a special secure (encrypted, no outside access to information) information exchange line was installed. On 30 April 2019 while it was in dry dock a fire broke out in a rope stacking room of the TCG Anadolu LHD. Though no injuries or fatalities were reported in the incident, according to our sources deformation occurred in the under-ramp and deck sections of the ship due to high heat. The Harbour Acceptance Tests (HAT) for the TCG Anadolu LHD are scheduled to start in 2019. The TCG Anadolu LHD is designed to operate even in sea state 6 conditions and even the design of the elevators on the ship has been updated and tested according to this requirement. At the request of the TNFC, unlike the other sister ships in service, the Central Steel Fender, (two rows of parallel steel curtains) will not be located in the well deck of the TCG Anadolu LHD.

The ship will consist of 114

TCG Anadolu L-400 LHD



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TCG Anadolu Big Scale model was displayed at TAIS Stand, at IDEF '19

blocks, each weighing at least 200 tons. 11,900 tons of steel plates will be used in the construction of the ship and 1,000 tons of these plates will be made of ballistic steel. While ballistic steel will be procured from abroad as it is not produced in Turkey, 10,900 tons of steel plates will be supplied from Erdemir Demir Çelik AŞ from Turkey. 4,500 ballast pipes, 454 vertical hatches and 650 panel doors are used in the construction of the ship. There are more than 1,000 enclosed spaces, 11 decks and 9 elevators on board the vessel. The Navantia product Integrated Platform Management System (EPKİS/IPMS) onboard the vessel will have 30,000 control and monitoring points. (EPKIS/IPMS used in HMAS Canberra and HMAS Adelaide LHD Ships has 64,000 control and monitoring points while Juan Carlos-I LHD has 50,000 control and monitoring points). Approximately 1,000-1,200 personnel from Sedef Shipyard including 400 engineers work in the construction of the ship. However, with the outsourced workers, an average of 1,400-1,500 people in total work in the construction of the ship in 2 shifts every day. If necessary, the working pace can be planned in three shifts. The TCG Anadolu will be equipped with a CODAD (with five MAN 16V32/40 Diesel Engines) type Electric Drive/Propulsion System, unlike other sister ships featuring Electrical Drive/Propulsion System in CODAG configuration (with two MAN 16V32/40 Diesel Engines and one LM2500 Gas Turbine). The Electric Drive/Propulsion System of the vessel with 40,000kW power generation capacity will incorporate two Siemens product eSiPOD propellers each with an 11MW capacity and 360-degree rotation capability and two bow propellers each with a 1,500kW capacity. The TCG Anadolu LHD is a single-hull steel ship, based on a Navantia Shipyard design platform with combat systems integrated by Aselsan-Havelsan Business Partnership. The TCG Anadolu is based on the Navantia Atlas LHD 26,000 design like the Juan Carlos-I (L-61) in the service of the Spanish Navy and the Canberra Class LHDs, HMAS Canberra (L-02) and HMAS Adelaide (L-01) in the service of the Royal Australian Navy. The vessel is planned to be constructed at 230.8m with a full displacement of 27,436 tons. The TCG Anadolu will feature a 202m long flight deck with 6 landing spots on it and is expected to have a maximum waterline length of 207.2m, a beam of 32m, maximum speed of 20.5 knots (at full load displacement), an economical speed of 16 knots and a maximum range of 7,000nm + 2,000nm at economical speed. The LHD will have a total height of 58m with a design draft (the distance from the bottom of the keel to the waterline) of 7.07m, the floodable well deck will have a draft of 10.20m and the flight deck of the vessel will have a depth of 27.5m with a total height of 20m from the waterline. The TCG Anadolu LHD will be integrated with a pair of Armelsan's ARAS-2023 Diver Detection Sonar Systems.

The DİMDEG Project was launched in order to meet the Turkish Naval Forces Command's new generation Fleet Replenishment Ship requirement, and to satisfy the fuel and water transport and supply the needs of surface units in the open seas around the world. On 10 July 2018 Sefine Shipyard secured a contract from the Presidency of Defence Industries (SSB) to construct a **Fleet Replenishment Ship (DİMDEG)** for the Turkish Navy. According to the contract schedule the DİMDEG will be delivered to the TNF in 58 months following the effective date of the contract. The DİMDEG is planned to enter Turkish Naval Forces service in 2024. The Project comprises two phases: Preliminary Design and Detailed Design & Construction. The ship's preliminary design has been carried out by the Turkish Naval Forces Command's Design Project Office (DPO) located at Istanbul Naval Shipyard, while some activities/tests required for the design phase have been performed by STM under a contract awarded by the SSB on 1 October 2012. For the Detailed Design & Construction Phase a tender was launched and in May 2016 and the SSB received proposals from Sedef Shipyard and Sefine Shipyard. During DIEC's 31 January 2018 meeting Sefine Shipyard was selected under the DİMDEG Project and the SSB was given a green light to start contractual negotiations with the company. On 25 January 2019 Sefine Shipyard signed a contract with the Aselsan-Havelsan Business Partnership for the procurement and integration of combat systems (KKMSES, including Havelsan's

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A Scaled Model of Fleet Replenishment Ship (DİMDEG)

ADVENT CMS and Ship Data Distribution System, Ship Information System and Message Operating System, Aselsan's MAR-D radar, 25mm STOP system, KIRLANGIÇ EO/IR Reconnaissance & Surveillance System, SatCom system, and GÖKDENİZ or Phalanx Mk-15 Block 1B Baseline 2 CIWS) for the DİMDEG. The DİMDEG will have an overall length of 194.8 meters, a height of 7.2 meters, displacement of 22,000 tons and a beam of 24.4 meters. The DİMDEG Fleet Replenishment Ship will be powered by two gas turbines and two diesel engines and will have maximum speed of 24 knots, endurance of 40 days (minimum) and a maximum range of 4,500nm. According to an SSB statement that was issued on 13 July 2018, many Turkish companies including Aselsan, Havelsan and Turkish Loyd will take part in the DİMDEG Project and the ship will be integrated with the ADVENT Combat management System. "The Industrial Participation and Offset (IP/O) commitment in the DİMDEG Project will be realized with a rate over 77%" the Presidency said in a statement.

Under a contract awarded by the SSB in April 2014, Aselsan completed the delivery of 13 **Ku-Band SatCom Terminals** to be integrated on FPBs in the TNF inventory. Acceptance of the first batch of Ku-Band terminals was completed in April 2017. Under the contract Aselsan will deliver over 30 Ku-Band SatCom terminals to the TNF for the integration on various naval platforms. Under the **KASUMSİS Project** contract awarded on 7 May 2015 Aselsan is also producing and integrating 9 X-Band AcroSat SatCom terminals for 3 KILIÇ-I and 6 KILIÇ-II Class FPBs. In accordance with the Program schedule FAT of the first batch of KASUMSİS X-Band SatCom terminals took place in late 2018 and integration efforts on KILIÇ-I and KILIÇ-II Class FPBs were launched in 2019. The KILIÇ-II Class TCG Meltem FPB is the first boat integrated with a KASUMSİS X-Band SatCom terminal. Aselsan's KASUMSİS X-Band SatCom terminal was tested successfully during the Deniz Kurdu 2019 Naval Exercise. To replace aging FPBs in the TNF inventory, the **Turkish Type Fast Patrol Boat (FPB) Program** was launched in 2013. Under the Program a total of 10 FPBs (4 firm and 6 optional) will be constructed at private shipyards to replace four DOĞAN, four RÜZGAR and two YILDIZ Class FPBs. The aim of the Program is to develop highly agile indigenous platforms, able to create a surprise effect thanks to their high speed and capability to conduct efficient surface combat through high strike power. Under the Program the SSB issued an RFI document to local shipyards on 25 July 2013. After receiving over 10 responses to the RFI document, a feasibility study was initiated, the result of which were already submitted to the TNFC, which is still working on the Turkish Type FPB Program's Technical Specifications. Each will be expected to cost around US$150 Million. The Turkish Type FPBs will have an indigenous design, and the SSB and the TNFC will own all the intellectual property rights, and will feature high speed, high strike power (8 RGM-84 Harpoon/ATMACA Block I SSMs, 1 x 76mm Super Rapid main gun, 1 x 21-cell Mk49 Mod 3 RAM launcher and 2 x 12,7mm STAMP systems) and 'stealth' (with reduced Radar Cross Section [RCS], Infrared [IR] Signature, Magnetic Signature and Acoustic Signature [Underwater Noise Level]). Turkish Type FPBs are required to be able to conduct operations in high sea state conditions. According to the information we obtained during IDEF '19 the requirements defined for the Turkish Type FPB Program were revised in 2018. In this context, for example, the speed requirement of the Turkish Type FPBs was reduced from 60 knots to45 knots. STM developed the FAC-55 design to meet the TNFC's requirement and Dearsan plans to offer the Norwegian Skjold Class FPB design. With a length of nearly 47.6m, beam of 13.5m and height of 15m, the Skjold Class FPBs have an air -shield catamaran hull design and features 8 Surface-to-Surface Missiles and the 76mm Super Rapid main gun with a range of around 12 km. The Skjold Class FPBs with a quite low RCS figure is capable of reaching a speed up to 60 knots in sea state 0 and 45 knots in sea state 3 with the help of the main propulsion system in CODAG configuration.

Turkish Naval Shipbuilding Industry companies are also active in the field of under surface warfare. Under a contract awarded on 30 March 2011, the system and equipment modernization of two **AY Class** (Type 209/1200) Diesel-Electric Submarines (TCG Doğanay [S-351] and TCG Dolunay [S-352]) in the service of the TNF were performed by STM in cooperation with Gölcük Naval Shipyard. Modernization efforts, launched in November 2012 at Gölcük Naval Shipyard, covered replacement of existing DR2000U ESM with ARES-2SC Radar ESM, surveillance (BS-19) and attack periscopes (ASC-18) with SERO-250S and SERO-250A periscope sets and aging INS with Raytheon's Inertial Navigation System. Following the completion of the modernization efforts the TCG Dolunay was re-delivered to the TNF on 9 April 2014 and the TCG Doğanay on 22 April 2015. Meanwhile under a US$1,78 Million contract awarded in 2016 Aselsan developed a national intercept sonar in a 9-month schedule named ASIST (Aselsan Intercept Sonar System) for three of four AY Class Submarines and carried out acceptance tests in June 2017. Following the integration efforts, the Harbor Acceptance Tests (HAT) and Sea Acceptance Tests (SAT) of the first ASIST sonar on-board the TCG Batiray (S-349) submarine was completed in December 2017. As of June 2018, three of the four Ay Class Submarines are operating with Aselsan's ASIST intercept sonar. The Submarine Intercept Passive Sonar (IPS) manufactured by Meteksan Defence was installed to one of the four AY Class submarines in the TNFC's service. The Meteksan

IPS equipped AY Class submarine took part in the Deniz Kurdu 2019 Naval Exercise. The Intercept Sonar System is located at the back part of the sail in AY Class Submarines, and in PREVEZE and GÜR Class Submarines it is located inside the hatch bulging out at the nose section. The acoustic detection sensors and low-noise front-end electronic units of the Intercept Passive Sonar and the Intercept Data Ranging Sonar that will be used aboard PREVEZE and GÜR Class Submarines are being designed and produced indigenously by Meteksan Defence. Meteksan Defence's MSH-01 hydrophones and their equivalents are retained as spare parts for the AY and PREVEZE Class Submarines' Cylindrical Hydrophone Arrays, Passive Ranging Sonars and Own Noise Measuring Systems.

Currently two different modernization projects composed of MÜREN CMS Implementation and Mid-Life Upgrade (MLU) Program are being conducted in parallel for PREVEZE Class Submarines. Initially the MÜREN CMS PREVEZE Class Implementation Project was launched, and this Project covers a total of four submarines. Under the **MÜREN Integrated Underwater Combat Management System (CMS) Program**, which is carried out in cooperation between the TNFC's Research Center Command (ARMERKOM) and TÜBİTAK BİLGEM, two (TCG Doğanay and TCG Dolunay) of four AY Class Submarines in the service of the TNF have been integrated with national Submarine CMS dubbed "MÜREN" under a contract signed in 2016 between TÜBİTAK BİLGEM and the TNFC. The contract for the AY Class covers the deliveries of 1 Ground Station System and 2 Submarine Systems. Within the scope of the Project conducted under the cooperation of the ARMERKOM of the TNFC, Gölcük Naval Shipyard and TÜBİTAK BİLGEM, modern heavyweight torpedo firing capability, target motion analyses (TMA) capability via sonar, periscope and ESM data, track management capability and an indigenous weapon control unit capability have been added to the AY Class Submarines. The Project was completed in 2.5 years and the activities under warranty are currently ongoing. MÜREN CMS is currently operational on the TCG Doğanay

MÜREN CMS Operator Consoles

(S-351) and the TCG Dolunay (S-352) Submarines. According to the information we received, 8 torpedoes were launched in 2018 as part of the test campaign. With these tests Turkey became the first country in the world that successfully fired a DM2A4 heavyweight torpedo from a Type 209/1200 Class Submarine. As Mk-48 Mod 6AT and AKYA Heavy Weight Torpedoes are not identified within the scope of this project, only DM2A4 SeeHecht Heavyweight Torpedoes could be launched by MÜREN CMS. With MÜREN CMS, AY Class Submarines can perform 4 different heavyweight torpedo engagement simultaneously. Under the second phase of the MÜREN CMS Program, for which the contract was signed in August 2017, the dry-end section of ISUS-83/2 CMS on-board one of four PREVEZE Class (Type 209/1400) Diesel-Electric Submarines in the TNFC's service will be modernized with MÜREN CMS and the modernization effort is scheduled to be completed by the end of 2023. In addition to DM2A4 SeeHecht, Mk-48 Mod 6AT and AKYA Heavyweight Torpedoes can be also launched by MÜREN CMS on board PREVEZE Class Submarines. The first torpedo firing test with a MÜREN CMS equipped PREVEZE Class Submarine is expected to take place in late 2020 or early 2021. Due to the lack of space on the submarine the Combat Information Center (CIC) the MÜREN CMS runs on only two interchangeable operator consoles. In case there is a breakdown in one of the consoles, the software could be transferred to another console. These consoles are manufactured by YALTES Under the Project, for the AY Class Submarines, YALTES designed and delivered a special console that needed to fit into a very limited area. Due to the success it achieved, another contract was signed in 2018 under the **MÜREN CMS PREVEZE Class Implementation Project**. As the sub-contractor of TÜBİTAK BİLGEM, YALTES will be developing and delivering the requested operator consoles, electronic cabinets, combat data/video networks and Local Launching Panels for the PREVEZE Class Submarines. The existing equipment currently on the CIC of PREVEZE Class Submarines will be emptied completely, the ISUS-83/2 CMS will be replaced with the MÜREN CMS. The contract for the PREVEZE Class covers the deliveries of 1 Ground Station System and 4 Submarine Systems. After the completion of modernization of the prototype PREVEZE Class Submarine, series modernization of the remaining three submarines will be carried by a local company. Under the MÜREN CMS PREVEZE Class Implementation Project on


A SERO 250 Periscope (right) installation is shown here at the CIC of one of the modernized AY Class Submarines

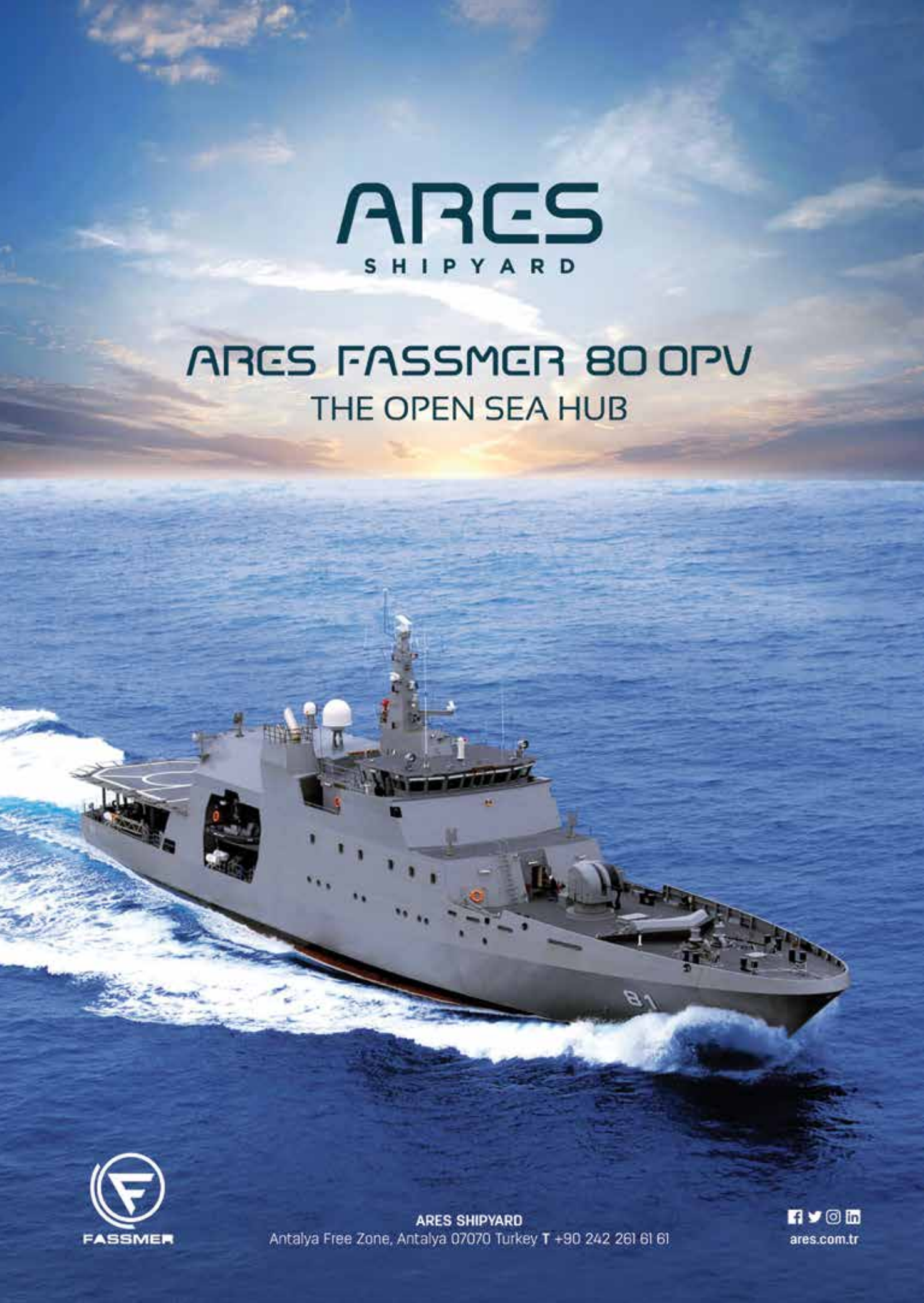
PREVEZE Class Submarines are equipped with ISUS-83/2 CMS

31 July 2018 a contract entitled "Sonar Subsystem Procurement for Integration into the MÜREN CMS aboard PREVEZE Class Submarines" was signed between TÜBİTAK BİLGEM and Meteksan Defence for the local development and manufacture of electronic and signal processing hardware and software of the sonar and underwater acoustic systems, which constitutes the important part of MÜREN CMS to be integrated on PREVEZE Class Submarines. MÜREN Submarine CMS for the GÜR Class Submarines will be designed and to be integrated on the platforms under a separate contract during the second half of the 2020s. In addition, Meteksan Defence has also indigenously developed the sensor elements of the Flank Array Sonars of existing submarines (PREVEZE and GÜR Class), and these sensors have reached the Sea Acceptance Test (SAT) phase. Once the qualification phase has been completed, they will become available for use as spare parts.

On February 8, 2019, the Presidency of Defence Industries (SSB) and a joint venture formed by STM-Aselsan-Havelsan-ASFAT (including KBST as a subcontractor) signed a contract on the **Mid-Life Upgrade (MLU) of four PREVEZE Class (Type 209/1400) Diesel-Electric Submarines** commissioned between 1984-1999. Contract became effective (To started) on 17 July 2019. Following the completion of their MLU modernization efforts the PREVEZE Class Submarines will be re-delivered to the TNF in 2024, 2025, 2026 and 2027 respectively. Within the scope of the PREVEZE Class Submarine Mid-Life Upgrade (MLU) Program, acoustic sensors, which are the basic and most important sensor group of a submarine, will be replaced with more modern, more effective and indigenous sensors. In this context, by changing wet-end units of the Cylindrical Hydrophone Array, Passive Ranging Sonar, Flank Array Sonar (FAS), Intercept Sonar, Active Sonar and Own Noise Measurement Systems, the acoustic capabilities of our PREVEZE Class submarines will be improved. Acoustic Sensors of PREVEZE Class Submarines will be provided by Aselsan and Meteksan Defence. The indigenously developed AKYA heavyweight torpedo and ATMACA Block I guided anti-ship missiles are likely to be integrated on the PREVEZE Class Submarines under the MLU/MÜREN SYS modernization efforts. On 5 August 2019 HENSOLDT Optronics GmbH announced that it had received a contract from Savunma Teknolojileri Mühendislik (STM) under the PREVEZE Class MLU Project to upgrade existing search and attack periscopes onboard four PREVEZE Class Submarines. Under this contract, HENSOLDT Optronics will provide a total of four SERO 420 Attack Periscopes and four SERO 430 Search Periscopes to replace L3 KEO (formerly known as Kollmorgen)'s Model 76 Search and Attack Periscopes ordered in 1987 and integrated on the submarines during early 1990s. The MLU is designed to extend the operational life of the PREVEZE Class Submarines until the 2040s when they are planned to be replaced by MİLDENs.

According to the current schedule the PREVEZE Class Submarines will be replaced with National Submarine (MİLDEN) Submarines starting from the second half of 2030s. Featuring a teardrop shape two-deck hull design, "X" tailplane and shrouded screw (although the propulsion looks like a pumpjet at first glance, we assume that a more basic six or seven blade shrouded screw [Kort Nozzle] will be used) the MİLDEN is expected to have an overall length of between 70m to 80m and submerge displacement of between 2,500t – 3,000t. MİLDEN submarines will be powered by a hybrid propulsion system composing 6 PEM Fuel Cell Modules (able to generate 300kW+ power), Methanol Reformer System and Lithium-Ion Battery (LIB) sets. In this context in 2018 the SSB launched the Submarine Propulsion System Components Development Project and invited Aspilsan, Roketsan, TÜBİTAK MAM (as subcontractor) and Vestel Defence to submit their bids. Companies submitted their bids in September 2018 to the SSB and contractual negotiations related to their bids were carried out during the 2019 summer season. As per the SSB's Best and Final Offer (BAFO) request the bidders are currently (as of September 2019) preparing to submit their BAFOs to the SSB. Under the Submarine Propulsion System Components Development Project, the Main Contractor is expected to be selected before the end of 2019 and the contract is expected to be signed in January 2020. The pairing of LIBs and PEM Fuel Cell Modules supported by a Methanol Reformer System could result in a highly capable and versatile submarine that features extreme endurance, very quiet operation, fast acceleration and high dash speeds. But such a hybrid design would also come at greater cost and complexity.

The AY, PREVEZE and GÜR Class Submarines have been equipped with Aselsan's **Torpedo Countermeasure System (TCMS)** dubbed "**ZARGANA**" along with the **ZOKA Anti-Torpedo Acoustic Decoy Family** (comprising stationary jammers and target emulator decoys, the self-propelled version of target emulator decoy is under development) with with up-to-date signal processing capability under the DAKA (Acoustic Decoy System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Aselsan's ZARGANA Lancher was displayed at IDEF' 19

for Submarines) Project. Under the Project, valued at TL45 Million during 15 April 2008 – 1 October 2014 Aselsan manufactured a total of 4 ZARGANA TCMSs along with 280 ZOKA torpedo decoys for the AY Class submarines, and 8 ZARGANA TCMSs along with 360 ZOKA torpedo decoys for the PREVEZE and GÜR Class Submarines. In AY, PREVEZE and GÜR Class Submarines the ZOKA decoys (LAPİN, MERCAN, ÇİPURA and ÇAÇA in 10cm diameter and 50cm and 100cm length) are launched via inboard signal ejector tubes. Whereas the self-propelled LİPSÖZ (target emulator) and EŞKİNA (jammer) decoys are in a 12.5cm diameter and a 120cm length needed for the ZARGANA Submarine Decoy Launcher for launching from PREVEZE and GÜR Class Submarines. Under a contract valued at TL34 Million and awarded in January 2015 Aselsan developed a 6-tube ZARGANA Submarine Decoy Launcher to be fitted externally to the pressure hull for the PREVEZE and GÜR Class Submarines. This makes it relatively easy to install and reload because the pressure hull itself does not need to be pierced and then repaired. Thanks to its full integration into the submarine's CMS the ZARGANA Launcher shortens reaction time considerably compared to the signal ejector tube launching option. Each of the PREVEZE and GÜR Class Submarines will be integrated with a total of 4 ZARGANA Launchers (2 at port and 2 at the starboard side). The ZARGANA Launcher can be effectively used up to depths of 400m and since there is no release of gas into the water the submarine's stealthy acoustic performance is maintained during launcher/decoy deployment and helps it to escape. Under the Prototyping Phase Aselsan will integrate ZARGANA Submarine Decoy Launchers first on a PREVEZE and then on a GÜR Class Submarine that serve as the prototype platform and then the remaining PREVEZE and GÜR Class Submarines will be modernized under the Series Modernization Phase. According to Aselsan, ZARGANA Submarine Decoy Launchers will be first integrated on the TGC Anafartalar (3rd ship of PREVEZE Class) and then on the TCG Burakreis (3rd ship of GÜR Class). The company has already completed manufacture and the Factory Acceptance Tests (FATs) of ZARGANA Launchers to be integrated on the TCG Anafartalar and the TCG Burakreis. According to the Program schedule the integration efforts on the first prototype submarine (TCG Anafartalar) should have been started in March 2018 and integration on all of 8 submarines should be completed by the end of 2019. However, this schedule does not seem achievable. According to Aselsan's 2017 Almanac the FATs of prototype ZARGANA Submarine Decoy Launchers to be integrated on the first prototype submarine were completed successfully in November 2017. Meanwhile according to Aselsan's monthly bulletin's September 2018 issue, the FATs of the second set of ZARGANA Launchers to be integrated on the TCG Burakreis were completed successfully during 30 July – 1 August 2018. As of May 2019, prototype ZARGANA Submarine Decoy Launchers were successfully integrated on the TCG Anafartalar Submarine, the Harbor Acceptance Tests (HAT) and Sea Acceptance Tests (SAT) with the TCG Anafartalar Submarine are scheduled to be completed before the end of 2019.

Under the New Type Submarine Project (NTSP) valued at Euro2,060 Billion a total of six **REİS Class Type 214TN Submarines** will be constructed at Gölcük Naval Shipyard. Construction of the four submarines are currently ongoing. The construction of the first submarine, the TCG PiriReis, started in October 2015 (it is expected to be launched in December 2019), the second one (TCG HızırReis) started in 2016 and construction of the third submarine the TCG MuratReis was officially started on 25 February 2018 with a first welding ceremony. At a ceremony held on 4 November 2018, the 4th REİS Class submarine the TCG AydınReis (S-333)'s first welding was conducted by President ERDOĞAN. The 5th REİS Class Submarine the TCG SeydialiReis' first welding ceremony is expected to take place in December 2019. The REİS Class Type 214TN AIP submarines are scheduled to be commissioned between 2022 and 2027. The Type 214TN REİS Class submarines, to be the first AIP-equipped submarines operated by the TNF, will replace four AY Class (Type 209/1200) diesel/electric powered submarines. Featuring ISUS-90/72 CMS the single hull REİS Class Type 214TN Submarines originally were planned to have an overall length of 67.6m, height of 13.1m, an overall beam of 6.3m

Type 214TN AIP Submarine Model was displayed at IDEF' 19 on the TKMS Booth

and hull draught of 6.8m and would have a submerged displacement of 2,042 tons (surface displacement is 1,855 tons). However, later their dimensions and displacement were increased. The overall length of the Type 214TN AIP Submarines have been increased by 0.75m and is now stands at 68.35m (2.05m longer than CERBE Class), with the other key dimensions being a height of 13.1m (without periscope masts), beam of 6.3m and draught 6.8m. According to current technical features the REİS Class Submarines will have surface displacement of 1,856 tons and a submerged displacement of 2.042 tons. The REİS Class Submarines will be armed with Mk-48 Mod 6AT and DM2A4 heavy weight torpedoes as well as Harpoon Block I/II and IDAS missiles. The indigenously developed AKYA heavyweight torpedo and ATMACA Block I/II guided missiles are likely to be integrated on the platforms in coming years. At the beginning of the NTSP Program, the submarine class to be constructed was called "CERBE", but later in 2014 a revision was made in submarine dimensions to meet the TNF's requirements and to overcome technical problems witnessed at HDW design. Speaking at a National Submarine (MİLDEN) Workshop on 15 June 2017 the then Turkish Naval Forces Commander Admiral Bulent BOSTANOĞLU underlined that Turkish Naval Forces engineers have found five major design flaws in Type 214TN Submarines and developed solutions for them. The resulting submarine, longer and heavier than CERBE, was renamed the REİS Class.

Local companies are also developing indigenous weapon systems to meet the TNF's requirements in close cooperation with the ARMERKOM such as the AKYA heavyweight torpedo, ORKA lightweight torpedo, TORK hard-kill torpedo countermeasure system (anti-torpedo torpedo, first phase of sea trials with sonar array have been completed in early September 2018), ATMACA Block I (with active RF seeker) and Blok II (with dual seeker [active RF and IIR homing]) surface to surface & land attack missiles and GEZGİN cruise missile as well as bottom mines with fiberglass fuselages (under the MALAMAN Project awarded on December 1, 2011, KBST-MKEK-TÜBİTAK

AKYA Heavyweight Torpedo

SAGE developed the prototype and contract for the series production phase which was recently awarded) and the mobile naval mine (under the MAYTOR/WATOZZ Project awarded in 2016 to Albayrak Savunma) against submarines and surface targets. The SIDA (Armed Unmanned Naval Vehicle) being developed under the MAYTOR/WATOZZ Project features the shape of a stingray and is made of titanium and aluminium with a silicone-coated outer surface covered with signal absorbing paint. It has two cameras fitted into the eye sockets of the stingray and can cruise at a maximum speed of 5.5 knots for up to 12 hours. Featuring three integrated engines the SIDA underwater vehicle, a mobile naval mine, can be used for surveillance or assault missions. It can carry an undisclosed weight of explosives and is controlled by encrypted acoustic sound waves.

Conclusion

With credit to the greater participation of the Turkish Naval Shipbuilding Industry and local defence industry companies that complement the increasing capabilities of the Turkish Naval Shipbuilding Industry, as a result of strategies and policies supporting domestic industry that have been implemented by the SSB within the last 20 years, the increase of R&D activities for indigenous products and solutions thanks to the R&D support provided by the Government, the Turkish Naval Forces (TNF) have been able to induct several national systems and platforms during last decade. With the support of the domestic shipbuilding and defence industries the TNF is without a doubt developing into a remarkably powerful and increasingly self-sufficient regional military power and seeks to impose a naval superiority in the Mediterranean. The developing domestic shipbuilding and defence industry is now ready, experienced and eager to take a leading role in the TNF's future modernization efforts. Once the on-going procurement and modernization programs that based on domestic production of indigenous solutions are completed, the TNF will be robust and a worthy deterrent as it has never been before. As one of the most respected, powerful and capable navies in the Mediterranean and actively protecting Turkey's maritime rights and interests in the Turkish EEZ (Exclusive Economic Zone), TNF warships wave the Turkish flag with great pride on the worldwide seas from the Sea of Japan to the Baltic Sea, from the Persian Gulf to the Somali Basin, from Gibraltar to Panama, and from the North Atlantic to the Indian Ocean

Temiz Bir Gelecek için

Hidrojen ve Yakıt Pili Teknolojilerinde

15 Yılı Aşkın Tecrübeyle

Askeri ve Sivil Çözümler

VESTEL

Savunma Sanayi

TAIS's Wide Product Range Offered to Global Markets via an Innovative and Competitive Structure

In this interview TAIS General Manager Doğan BEŞCAN discusses the company's focus on provide new business opportunities for Turkey and the Turkish military shipbuilding sector by using the capabilities and joint forces of partners

Defence Turkey: TAIS (Turkish Associated International Shipyards) Consortium was formed three years ago by 5 private sector shipyards (Anadolu Shipyard, Istanbul Shipyard, Sedef Shipyard, Sefine Shipyard and Selah Shipyard) holding a production license as well as the necessary knowhow and experience in the defence industry. Could you please inform us on the founding purpose, the needs which led to this formation and the current organizational structure after Istanbul Shipyard and Selah Shipyard left the Consortium?

Doğan BEŞCAN: TAIS Shipbuilding and Technology Inc. was established in 2017 by 5 shareholders with equal shares. Anadolu Shipyard, Sedef Shipyard and Sefine Shipyard have been continuing with equal shares after the transfer of shares by two founding partners in June 2019.

Defence Turkey: Could you tell us about the number of personnel (workers, technicians) working at TAIS Shipbuilding and Technology Inc. and the current shipbuilding capabilities (outdoor and indoor area size, number and capacity of dry and semi-wet dry docks, number and capacity of cranes and annual steel processing capacity etc.)?

Doğan BEŞCAN: The total number of personnel within TAIS Shipbuilding and Technology Inc. is 8,000 including those working under the subcontractors and nearly 1,000 of which are engineers, technicians and retired naval officers.

Total production area of the shipyards: 415,659 m^2

3 Semi-Wet Dry Docks (285m x 47m- 40,000 TLC; 140m x 38,4m – 7,000 TLC; 105m x 28,5m – 4,000 TLC)

2 Dry Docks (310m x 50m; 240m x 42m x 9m)

Annual Steel processing Capacity: 200,000-250,000 tons.

Defence Turkey: Could you please inform us on the product range of TAIS Shipbuilding and Technology Inc., and military ship sales as well as any associated project activities?

Doğan BEŞCAN: TAIS offers nearly 50 types of military ships to its customers. Some of these ships were already sold primarily to our Naval Forces and allied countries.

© Defence Turkey

Defence Turkey: Could you explain your plans regarding the potential for a future capacity increase or additional capacity acquisition?

Doğan BEŞCAN: Our partners are the leading shipyards of our country in terms of manufacturing capacity and production capability. Our priority plan for the future is to achieve a wide range of products that can meet most of the military ship needs of any country.

Defence Turkey: As a private company established with the partnership of private sector shipyards having different product ranges and experiences, what would you like to say about the scope of activities of TAIS Shipbuilding and Technology Co., its targets in the domestic market and business model?

Doğan BEŞCAN: TAIS is a company established to develop business in foreign markets by using the facilities and capabilities of its partners. We attend fairs abroad related to military ships, make presentations to naval forces of various countries, prepare proposals and participate in tenders.

Defence Turkey: You have been following military shipbuilding projects in Azerbaijan, Turkic Republics and Azerbaijan and Turkic Republics. Could you inform our readers on your ongoing export activities and overseas targets as well as the ongoing projects and the contracts of which are expected to be signed in the near future?

Doğan BEŞCAN: We have projects expected to be finalized in the near future in total 6 countries such as Southeast Asia, North Africa, West Africa, and the Middle East. We are also closely following 12 countries.

Defence Turkey: Last May, you became the successful bidder with your local partner in the international tender for the construction of 5 45,000-ton Fleet Support Tankers for the Indian Naval Forces. What would you like to say about the experiences you encountered during the international tender process, the current status in the contract negotiations and the technical features of the Fleet Support Tanker that is planned to be delivered to the Navy in 9 years?

Doğan BEŞCAN: The ships, the contract negotiations of which are ongoing, will be 200 meters in length and capable of replenishing fuel, water and food at sea. They will be amongst the largest ones in their class in the world.

Defence Turkey: According to the the press, ADİK Shipyard, one of the founding partners of TAIS, will sign the contract of the tender as a pilot shipyard. Within the scope of the project, the total value is estimated to be US$ 2.3 Billion and is it scheduled to be completed in 9 years. A certain number of Turkish personnel are planned to be employed in India. What could you tell us about the targeted domestic participation rate (Turkey) in the project, task sharing between TAIS and the local partner Hindustan Shipyard Limited (HSL) and the volume of the export revenue that Turkey will gain?

Doğan BEŞCAN: We will be responsible for the design, main machinery, auxiliary machinery, power transmission equipment, supply of replenishment systems, preparation

of specifications and general engineering services. The project will be one of the most important defence industry projects of our country in terms of added value.

Defence Turkey: TAIS Shipbuilding and Technology Inc. is one of the two companies that submitted bids to the SSB within the scope of the I-Class Frigate Project of the Turkish Naval Forces Command. What is the latest status in the project? The construction of the first ship was started in January 2017 at the Istanbul Shipyard Command, while the responsibility for the construction of sister ships would be given to the private sector shipyard to be designated by the SSB. However, no news on the selection of the shipyard has been reported to the press so far.

Doğan BEŞCAN: We have not received any news yet.

Defence Turkey: A fire broke out last April in the TCG ANADOLU Multi-Purpose Amphibious Assault Ship (LHD), which is under construction at the SEDEF Shipyard and which is planned to be delivered within the last quarter of 2020. According to the information we have obtained, the fire broke out due to the ignition of ropes and insulation materials in the stowage under the ramp while welding. As a result of the fire which lasted for nearly 2 hours, no damage occurred on the capstans and beckets, but some deformations occurred due to high-temperature under the ramp and deck sections. Could you inform us about the activities carried out so far to eliminate the deformation/ damage after the fire and whether these activities will lead to a shift on the planned delivery date?

Doğan BEŞCAN: Minor damages were remedied in a short time. The construction of the ship continues according to the schedule.

Defence Turkey: Could you please tell us about the domestic military shipbuilding projects you are currently following as TAIS?

Doğan BEŞCAN: TAIS was established with the mission of following overseas projects. Our partners are following the domestic projects.

Defence Turkey: Governing projects to lead the shipbuilding business by the Government / SSB / MoND will further strengthen the private shipyards and the military shipbuilding sector. In this context, what are your expectations from the government as TAIS?

Prof. İsmail DEMİR - President of Turkish Defence Industries , Qatari Emiri Navy Major General Abdullah Hassan Al-Sulaiti met with TAIS executives during the DSEI' 19, London

Doğan BEŞCAN: The ability to build military ships emerges through years of effort and large team investments. The sustainability of this ability is possible only through the availability of continuous work by specially trained and competent teams. Failure of the continuity of projects may lead to the loss of such capabilities.

Defence Turkey: In the recent period, you founded a company called TAIS Engine Inc. to supply diesel engines to military ships. Could you please enlighten our readers about the activities you have conducted so far on the engine and the qualified manpower established?

Doğan BEŞCAN: The core team established within TAIS Engine Inc. performs the feasibility studies. The project that will start with medium speed large (6,000-10,000 Kw) diesel main engines will continue with smaller (1,000-2,000 Kw) diesel auxiliary and main engines.

Defence Turkey: What are the future goals of TAIS?

Doğan BEŞCAN: We plan to make TAIS an innovative and competitive structure that offers its wide product range to global markets. To this end, we are structuring and forming the necessary manpower.

Defence Turkey: Is there any additional message you would like to convey to our readers?

Doğan BEŞCAN: As TAIS, we are competing against very strong rivals in the most challenging markets of the world in order to provide new business opportunities for our country and the Turkish military shipbuilding sector by using the capabilities and joint forces of our partners. We aim to accomplish these achievements and we will succeed in this way being one of the best examples of the Turkish private sector's culture of doing business together

Ms. Ayşe AKALIN EVERS met with Ahmet ÇAKIR and Doğan BEŞCAN at DSEI' 19


GÖKTÜRK - 2
EO SATELLITE SYSTEM
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TURKISH FIGHTER
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AND LIGHT ATTACK AIRCRAFT
AKSUNGUR
HIGH PAYLOAD CAPACITY
UAV SYSTEM
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by Arda MEVLÜTOĞLU
Defence Analyst

Naval Balance of Power in the Eastern Mediterranean

Recent energy discoveries caused substantial changes in the geopolitics of the Eastern Mediterranean. This new situation in the region, also known as the Levant, has increased the competition between Turkey, Greece, Israel, Syria, Egypt, Lebanon and the Greek Cypriot Administration in Southern Cyprus (GCASC). Providing the security of both energy supply and the integration of newly discovered sources into national economies have been primary targets of these countries' national security agendas. The importance of navies in this new regional competition has been increased.

Turkey and Greece both being NATO allies as well as Egypt and Israel can be assessed as dominant naval powers of the region, to be followed by the GCASC and Lebanon with modestly equipped forces. The Syrian Civil War and its devastating effects on the Syrian armed forces as well as the whole country further complicates the security equation of the region.

Background

Throughout history the Eastern Mediterranean has always been a scene for regional wars, competition and conflict because of its geography, natural resources, demographic structure, and historic and religious importance. One of the major developments that shaped the Eastern Mediterranean's geostrategic importance was the opening of Suez Canal. This passage presented faster and cheaper transit between European, Asian and African markets, bypassing the route around the Cape of Good Hope. Today more than 220,000 ships use the Suez annually. This number represents around one third of world sea trade.

The latest addition to its importance has been new hydrocarbon resource discoveries since the early 2000's. According to research by the U.S. Geological Survey, the Levant region of the Eastern Mediterranean, which includes Syrian coasts holds a reserve of 1.7 billion barrels of oil and 3.5 trillion cubic meters of natural gas.

These resources have been subject to new debates and competition among the littoral states, mainly for securing their exploitation and entry into local as well as global markets. As a result, the region has become a "hot spot", with increasing tensions over definition and security of Economic Exclusion Zones (EEZ) and research parcels. The region is composed of 13 so-called research parcels which

were unilaterally announced by southern Cyprus. Parcels 1, 2 and 3 are located in the north; parcels 4,5,6,7,8,9 and 13 are in the middle whereas parcels 10, 11 and 12 are located in the south.

In addition to the new energy-geopolitics of the region, the implications of the Libyan Syria Civil War brought forward new challenges to littoral states. Increased activity of terrorist organization and non-state actors; flow of refugees mainly from Syria and Libya to Europe and the risk of the ignition of a regional conflict, brought forward new security challenges to littoral states.

These factors resulted in more emphasis on modernization and procurement programs for naval and C4ISR (Command, Control, Communications, Computers, Intelligence, Surveillance, Reconnaissance) systems. There is an increasing trend towards submarines, corvettes and offshore patrol vessels (OPV) as well as unmanned aircraft systems (UAS).

Naval Modernization Programs of Littoral States

The below table shows the current combatant ship fleets of the Eastern Mediterranean navies:

	LPD / LHD	Frigate	Corvette	OPV / Patrol Boat	Submarine
GCASC	-	-	-	1 x Sa'ar 62 1 x Alasia 4 x FPB	
Israel	-	- (+3 x Sa'ar 6)	3 x Sa'ar 5	8 x Sa'ar 4.5 25 x Dvora / Super Dvora	3 x Dolphin I 2 x Dolphin II (+1)
Lebanon	-	-	-	~5 x PC	-
Egypt	2 x Mistral LHD	1 x FREMM 4 x FFG-7 2 x FF-1052 2 x Jianghu II	1 x GOWIND (+3) 1 x Po Hang 2 x Descubierta	4 x Ambassador Mk3 6 x Ramadan 5 x Tiger ~20 PG / PCG	4 x Type 209/1400+ 4 x Tip 033 (?)
Syria	-	-	1 x Petya (?)	~15 Osa I / II (?) ~5 Tir (?)	-
Turkey	- (+1 x Anadolu LHD)	4 x MEKO 200TN I 4 x MEKO 200TN II 4 x Gabya (FFG-7) 4 x Gabya + (FFG-7) (+1 İstanbul)	4 x Ada 6 x A69	9 x Kılıç I / II 2 x Yıldız 8 x Doğan 16 x Tuzla	4 x Type 209/1200 4 x Type 209/1400 4 x Type 209/1400+ (+6 Tip 214TN)
Greece	-	4 x MEKO 200HN 3 x Standard 6 x Standard MLM	5 x Roussen (+2)	4 x Combattante III 5 x Combattante IIIb 3 x Combattante IIb ~10 x PC	3 x Type 209/1100 3 x Type 209/1200 1 x Type 209/1200AIP 4 x Tip 214HN

Israel

Israel's Navy, which has the lowest share of the budget in the armed forces, has implemented a gradual modernization program with the effect of energy discoveries in the Eastern Mediterranean, the situation in the Gaza Strip and the Arab Spring process. Within this scope, electronic warfare and weapon systems of the existing surface platforms have been modernized and UAS and submarine platforms have been procured. Especially with the addition of new submarines, Israel aims to acquire long range precision strike and power projection capabilities; representing a leap for a small size brown water navy.

The Israeli Navy has three main bases, which are in Ashdod, Eilat and Haifa. The main combatant ships are three Saar 5 class corvettes and eight Saar 4.5 class assault boats. In addition, there are around 30 assault boats and patrol boats. The main strategic element of the navy is the German Type 800 Dolphin class diesel electric submarines. In addition, advanced Dolphin II class submarines, which were ordered in 2006, have recently entered service. These boats are equipped with air independent propulsion (AIP) which enables them to stay submerged for much longer periods.

The Saar 5 class has a Phalanx close in weapon system (CIWS), Barak 8 air defence and Harpoon anti-ship missiles. The ship also has 324mm torpedoes for underwater targets. Tests with the C-Dome, the ship-based model of the Iron Dome missile defence system, were completed in 2017. The ELM-2258 Advanced Lightweight Phased Array (ALPHA) radar system of the Saar 5 is capable of 3D scanning up to 120km range. The ship is equipped with Elisra NS-9003/9005 electronic intelligence systems and a hull mounted sonar. The hangar of the ship is suitable for the deployment of the AS565 Panther 5-ton class anti-submarine warfare (ASW) helicopter.

The main surface element of the Israeli navy is the Saar 5 class corvettes purchased from the USA. Designed by the Israeli navy and built by Huntington Ingalls Industries (HII), the ships have a displacement of 1,275tons and a length of 85m. The three ships that were commissioned between 1994 and 1995 were named Eilat, Lahav and Hanit, respectively. The Saar 5, which has between 65 and 75 crews, are corvettes in terms of tonnage, size and duty, but they are as well-equipped as a medium-sized frigate in terms of weaponry and electronic systems.

The newest surface ships of the Israeli Navy will be Saar 6, whose contract was signed with German ThyssenKrupp Marine Systems (TKMS) in 2015. Four of these ships, which will replace the Saar 5s and are a derivative of TKMS's MEKO 100 corvette design, will be commissioned. The steel cutting for the first ship was completed in February 2018 at the TKMS shipyard in Kiel. The construction of boats and superstructures of the ships will be done in Germany; weapons and electronic equipment will be integrated in Israel, Haifa Shipyard. The four ships are scheduled to enter service between 2020 and 2022. The Saar 6 class weighs about 2,000t according to open source information. The crews of the ships around 70 and they span 90m in length and a width of 13m.

The main weapon of the ships is the 76mm gun. Air defence is comprised of Barak 8 and C-Dome systems. The Saar 6 carries 16 anti-ship missiles and 324mm light torpedoes. In addition, two 30mm remote controlled guns will be used for self-defence. The hangar is suitable for 10-class SeaHawk ASW helicopters, eight of which were ordered in 2016. The main sensor of the ship is the ELM-2248 MF-STAR 3D radar system. There is no clear and reliable information in open sources about the other electronic warfare and target detection systems to be installed.

The order for Dolphin class submarines, which are designed by the German Howaldtswerke-Deutsche Werft (HDW), was given in the early 1990s. Half of the cost of the first of the three submarines, and the remaining two, were covered by the German government under the compensation of the Nazi genocide in World War II. The submarines Dolphin, Leviathan and Tekuma entered service between 1999 and 2000.

With a displacement of approximately 1,900t, the Dolphin class is 57m long and features a conventional diesel electric drive system. The submarines, which have 35 crews, have six 533mm and four 650mm diameter torpedo tubes. Of these tubes, the 650mm ones caused intense controversy. It was claimed that these tubes, which are wider than the standard torpedo diameter used by the submarines, were added to the submarines for firing the nuclear warheaded Popeye Turbo cruise missiles. It is widely accepted that Israel does not deny nor accept that it has nuclear weapons as a state policy. Therefore, it is possible that Dolphin submarines will be able to fire nuclear-headed cruise missiles. These 650mm tubes are also used for the infiltration and sabotage operations of marine commandos, which are used for the launching of underwater vehicles and laying of marine mines.

To reinforce the submarine fleet, a new procurement program and consequently negotiations with Germany were initiated in the early 2000s, resulted in with the contract being signed in 2005. The German government covers a third of the cost of the program.

Israeli Navy SAAR V Corvette during a SAR exercise

Known as Dolphin II, the most important feature of these submarines is that they have an AIP drive system. The AIP provides a large force multiplier effect for conventional (non-nuclear propelled) submarines, allowing it to be submerged for long periods of time without the need to surface for charging fuel cells.

The first submarine of the Dolphin II class, Tanin was launched in 2014 with the second boat, Rahav in 2016. The order for the third submarine was given in 2011. There is no reliable information available in open sources on the weapons and electronic systems of these submarines.

On the other hand, it was reported in 2017 that Germany and Israel reached an agreement to renew the first three Dolphins; with the German government reportedly covering about half of the cost of three new, so-called Dolphin III class submarines.

A particular focus of the Israeli Navy is the supply of UAS for intelligence, reconnaissance and surveillance. In this context, Heron Eitan, a longer-range derivative of the Heron UAV system produced by the IAI is being developed and Heron and Orbiter type UAVs are also in service. It is known that these UAS are equipped with sensor systems for marine surveillance and target acquisition. G550 CAEW airborne early warning (AEW&C) aircraft in the Israeli Air Force service also regularly support naval operations.

Egypt

Egypt's armed forces have been equipped mostly by US-made systems since the end of the 1970s, and the navy had a relatively lower share of the budget compared to other services. This has changed since 1997 and an ambitious modernization program was initiated.

The main combatants of the Egyptian Navy are four FFG-7 class frigates transferred from the United States in 1981. In addition to these ships, there are two older US-made FF-1052 Knox, two Chinese-made Jianghu I and two Spanish-made

Greek Navy S-70B Aegean Hawk Helicopter took of from Egyptian Navy Gowind 2500 Class Al Fateh (971)

Descubierta-class frigates. More than 50 assault boats, made by Russia (former USSR), the UK, China and France are also in service.

After the military coup in July 2013, Egypt has been carrying out a very intensive armament and modernization activity. Numerous major purchase agreements have been signed in the last five years, especially with France and Russia. The most remarkable of these was undoubtedly two Mistral-class docked landing ships (LHD) from Russia.

The two Mistral class ships originally ordered by Russia in 2011, were planned to be put into service under the names Vladivostok and Sevastopol in 2015. However, the contract was terminated in August 2015 due to the sanctions imposed on Russia after the Ukrainian crisis and the annexation of Crimea. Shortly thereafter, sales negotiations started with Egypt and ended in September, and in 2016 the ships entered service in the Egyptian Navy under the names of Anwar al-Sadat and Cemal Abdel Naser. Egypt is also negotiating the purchase of Kamov Ka-52K attack helicopters with Russia for use on these ships.

In 2014, with a contract of 1 billion Euros signed with the French military shipbuilding company, formerly named DCNS and the new name Naval Group. The contract covers four Gowind 2500 class corvettes. Equipped with the new generation MM40 Exocet Block 3, the first of the Gowind 2500s was built in France and the remaining three will be built at Alexandria Shipyard with technology transfer. El Fateh, the first ship in the scope of the project, numbered 971, was laid down in September 2015. Launched in September 2016, the ship went into service in September 2017.

The order for Gowind corvettes in 2014 was followed by an agreement for the purchase of a FREMM class frigate the following year. This package, which included the purchase of 24 Rafale fighter jets for the Air Force, was not an ordinary defence purchase, as the ship was a frigate named Normandie and was built for the French Navy. After the dismantling and modification of some weapons, communications and electronic warfare systems designed according to the needs of France, the ship entered service in the Egyptian Navy in June 2015 under the name Tahya Misr.

In addition to the Gowind class, Egypt acquired four Ambassador Mk3 class corvettes from the US. The first two of these vessels were put into service in 2013 and the remaining two in 2015.

Egypt's submarine capability for a long time was limited to four Type 033G Romeo-class diesel electric submarines that were purchased from China and modernized in the 1980s, but with extremely low war preparation levels. In order to renew this fleet, two Type 209/1400 class modern diesel electric submarines were ordered from Germany in 2011. This was followed by an additional order for two more submarines in 2014. The first submarine S41 was launched in December 2015 and launched in December 2016. The second submarine S42 was delivered last August. Egypt also ordered 20 UGM-86L Sub Harpoon submarine missile launch missiles for use in these submarines.

Greece

Since the late 1990s, Greece has implemented a comprehensive and ambitious modernization program for its armed forces, giving priority to the air and naval forces. In this context, large-scale procurement and improvement projects have been initiated, especially with Germany and France. However, the severe economic crisis that has affected the country since 2009 has had a devastating impact on the armed forces' preparation and modernization activities as well as on all the mechanisms of the state. The European Union sanctions and aid conditions have resulted in the dissolution or freezing of several procurement programs.

In the Greek Navy inventory, there are currently three Glavkos class Type 209/1100 models, all made in Germany; four type 209/1200 Poseidon class and four type 214 class Papanikolis class submarine. The surface fleet includes nine Dutch-made Kortenaers and four German-made MEKO 200HN class frigates and more than 40 assault boats and outpost boats of various types and tonnages. Naval aviation consists of 11 US-made Sikorsky S-70B Aegean Hawk helicopters and 8 Italian-made AB-212ASW helicopters. Greece recently ordered 7 MH-60R SeaHawk helicopters and an upgrade program for 4 P-3B Orion ASW aircraft is underway.

Within the scope of the modernization of the submarine fleet, two separate contracts were signed with the German HDW. The first of these projects, the Papanikolis program, covered new generation of Type 214 submarines with AIP. The second one, Neptune II, covered the upgrade of existing Type 209 submarines with AIP and modern command and control systems.

Papanikolis was launched in 2004, its commissioning was significantly delayed due to the refusal of the Greek side on the grounds that the technical requirements were not met. The Neptune II project was terminated after the completion of the modernization of the first submarine Okeanos.

Cyprus Greek Administration

The Greek Cypriot Administration of Southern Cyprus (GCASC) does not have an independent naval force. Within the Greek National Guard Army (CNG), there is a Naval Forces Command as a coast guard. The duties of the unit in question include the fight against terrorism and smuggling, the preservation of the coastline of the GCASC, search and rescue.

The current inventory of the CNG maritime unit consists of six different types and sizes of patrol boats. The biggest one is the French-made Patra-class Salamis boat with a displacement of 98 tons. The most modern boats are the Dilos-class Kyrenia boat, donated by the Greek Navy in 2000 and two Vittoria-class boats purchased from Italy in 2004. One Britten Norman BN-2B-21 is used for Maritime Defender aircraft, marine outpost and search and rescue operations. The marine unit has one base in Limassol, Mari and Zigi; There is also a search and rescue coordination center in Larnaca.

Following the hydrocarbon discoveries in the Eastern Mediterranean, an agreement was signed in December 2010 by Israeli Infrastructure Minister Uzi Landau and the Greek Cypriot Foreign Minister Markos Kyprianu to determine the borders of Israel and the Exclusive Economic Zone

(EEZ). The agreement covers the cooperation of the parties in the sharing and common use of the discovered resources.

Shortly after signing the agreement, Israel proposed a comprehensive modernization package to the Greek Cypriot Administration to strengthen the CNG naval unit. The proposal included the sale of a Shaldag-type patrol boat and a helicopter. Even though the implementation of this proposal has suffered due to the economic crisis of the GCASC, the administration has continued to seek alternatives to renew its maritime power. In 2013, negotiations were held with France for the supply of two Gowind class corvettes. Due to the high cost of these modern vessels, negotiations did not reach the stage of contract signing. The option of joint supply and operation of the Gowinds with Greece in need of a similar class of ships was also considered.

Syria

The Syrian Navy, which had already received the lowest share of budget for modernization by 2011, and most of its vessels had been discarded, was almost completely inactive due to the violent civil war that has been going on for the last three years. Prior to the start of the civil war, the former Soviet-made Petya class light frigate and about 15 Osa-class assault boats were known to be in the inventory. The Syrian regime had invested mainly in coastal defence anti-ship missiles.

Lebanon

The Lebanese Navy, which did not have a significant modernization budget or program until the mid-2000s, and a low number of boats in the inventory, had a low level of preparedness for warfare. Lebanon, which currently has around 40 large and small coastal outposts, was considering purchasing Combattante FS56 class assault boats from France within the scope of the USD3 billion military aid package announced by Saudi Arabia in August 2014. However, due to Saudi Arabia withdrawing financial support from Lebanon, the plan was shelved.

Turkey

Turkey has shown remarkable progress in developing the local defence industry and naval programs have high priority in the realization of these ambitions. In the center of Turkey's defence industry renaissance and navy modernization, is the MILGEM program.

Under the MILGEM program, four corvettes were built and commissioned. The lead ship, F511 Heybeliada was commissioned in 2011, followed by F512 Büyükkada in 2013, Burgazada in 2018 and Kinaliada in 2019. Kinaliada is also the first Turkish warship to be equipped with indigenously developed anti-ship missile Atmaca.

An enlarged version of the MILGEM, the Istif class frigate project is also underway. The lead ship of the class, Istanbul is


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under construction at Istanbul Naval Shipyard. A total of 4 Istif class are expected to be commissioned.

One of the most complex projects of the Turkish defence industry is the design and construction of aerial anti air warfare destroyers under the TF2000 program. Designed around CAFRAD multi-mission radar and ADVENT combat management system, these ships are expected to displace around 6,500t and will form the backbone of Turkey's strategic air defence.

The construction of the TCG Anadolu LHD ship is also underway and is expected to be commissioned in 2021. Based on Spanish Navantia design, this ship is capable of operating F-35B STOVL fighter aircraft.

Turkey has one of the largest submarine fleets in the Mediterranean with 8 Type 209/1400 and four Type 209/1200 class submarines. A total of 6 AIP equipped Type 214TN submarines are being built at Golcuk Naval Shipyard. Turkish industry is also developing an indigenous heavyweight torpedo designated Akya.

The main surface combatants of the Turkish Navy are eight German-designed MEKO 200TN and eight US-designed FFG-7 class frigates. FFG-7 class frigates were modernized with indigenously developed GENESIS command and control system. Four of them also have been equipped with advanced air defence systems such as Mk41 vertical launching systems and SMART-S radars. Six former French Navy Aviso class corvettes and around 60 assault boats and patrol boats are also in the inventory.

Naval aviation consists of 25 US-made Sikorsky S-70B SeaHawk and 17 Italian-made AB-212SW helicopters and six CN-235MPA ASW aircraft. Delivery of 8 ATR-72MPA aircraft is expected to be realized shortly. The naval air arm has recently received an ISR capability boost with the introduction of indigenously developed Anka and Bayraktar TB UAS.

Conclusion

The geopolitics of the Eastern Mediterranean, which was reshaped with the discovery of energy resources, revealed the necessity of establishing the national defence mechanisms of the littoral states according to this new environment. In this direction, the countries of the region carry out comprehensive naval modernization and procurement programs within the framework of their economic opportunities and infrastructure.

When the naval procurement and modernization projects of the countries in the region are analyzed, it is observed that there are some common tendencies and preferences. These trends can be sorted as follows:

Corvettes and OPV's are ships that serve in coastal waters and undertake missions such as flags, crisis intervention, deterrence, terrorism and fighting asymmetrical threats, especially during periods of peace or operations other than war (OOTW).

Firstly, operation and maintenance costs of these ships are lower because they are not as large or as complex equipped as frigates. This factor is important especially in times of peace or tension. On the other hand, because they are larger in terms of tonnage than assault boats and fast attack craft, they can operate in relatively deep waters and in harsh marine conditions, or they can be used as a "floating police station" by carrying naval commandos, special forces, rescued hostages or seized terrorist / pirates.

The energy reserves and maritime trade lines in the Eastern Mediterranean, especially around the island of Cyprus, provide an ideal operational environment for such ships, given the hydrographic and oceanographic characteristics of the region. As a matter of fact, almost all countries of the region have investments in these types of ships. Of these, especially Turkey's MILGEM corvettes-built project with Egypt and Israeli corvette procurement programs are remarkable.

Submarines, due to their strategic power projection and intelligence collection capabilities, have become the main procurement priority of many navies around the world. With the electro-optical and electronic intelligence systems they carry, submarines are used as strategic intelligence and clandestine operation units that are at the forefront of peace and crisis periods. Therefore, they are highly effective platforms in terms of safeguarding marine interests, ensuring security and monitoring the activities of other states in the region. Turkey is the country with the largest submarine fleet in the region, followed by Israel, Greece and Egypt. Despite the severe economic crisis that it has undergone, Greece's efforts to complete its submarine procurement program are indicative of the decisive role of these platforms in the region.

Unmanned Aerial Vehicles and all C4ISR Systems in general are used to provide situational awareness through strategic, tactical or operative environmental conditions, and monitoring of friendly and hostile elements. By combining and evaluating the data collected by sensor systems of different qualities, a common picture is created. The fact that this picture is real-time, accurate and reliable enables decision-makers to develop sound strategies and policies and to respond quickly and effectively to possible crises. Among these systems, long range and high altitude unmanned aerial vehicles are particularly useful as they can stay in the open air for long periods of time. Israel, one of the countries in the region, stands out with its technology and products in this field. Israel, in such a national defence industry is followed by Turkey who began producing systems. Greece and Egypt are also known to be interested in such systems.

As a result, it is necessary to emphasize that the development of national energy strategies and the implementation of appropriate policies are possible only with the maintenance of an effective maritime power in the Eastern Mediterranean, where regional discoveries are intensified with energy discoveries. Successful development of energy and national security policies, which cannot be evaluated separately, is possible by dominating the picture on a global, regional and local scale and establishing and maintaining an independent national defence mechanism

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STM's Naval Expertise Propelling Export-Oriented Development and Collaboration Projects with the Turkish Defence Industry

In this interview, STM General Manager Murat İKİNCİ discusses STM's focused efforts in Naval Projects that are in step with National 2023 target. He shares with our magazine how STM's role in these projects are producing results for the maritime sector that are proudly demonstrated internationally.

Defence Turkey: Mr. İkinci, first of all thank you very much for your time for the interview. In 2006 STM made a significant expansion in the maritime sector with the MİLGEM project. During this process the main objective was "to create a dedicated team that will take an active role in the field of military shipbuilding industrialization and lead the national industry in this direction". Can you share some insight with our readers about the achievements over last 13 years in terms of staff, technological infrastructure and knowhow in line with this target?

Murat İKİNCİ: This process began with the MİLGEM Project which was initiated by the vision of the Turkish Naval Forces Command and through the determination and responsibility of the Presidency of Defence Industries (SSB). With the MİLGEM Project, naval projects have become one of STM's leading fields of activity, and within a structure that did not previously exist in the private sector in Turkey in the field of engineering, all of which has been created by STM.

Our role in the MİLGEM project, we had the opportunity to work together with our Naval Forces Command and to benefit from their knowhow and experience. As a result, STM amassed substantial engineering experience which has become important and a source of guiding experience for our forthcoming projects.

Within the scope of the MİLGEM Project, STM assumed the tasks of providing design service, classification, model tests, for all other systems except for the combat management system and the main propulsion system for the first two ships, and construction/ equipment materials to be used in the construction of the ship, from head to toe, so to speak, and all the services needed during the construction including the design service. During the construction of the third and fourth ships, STM also assumed the same responsibilities as well as the supply and integration responsibility of the main propulsion system. Within the scope of the contract we signed with the SSB in 2019, STM assumed responsibility as the Main Contractor for the MiLGEM-5 "I" Class Frigate Project, which will be built as the first ship of its class.

We provide turnkey engineering services in both national and international projects as the main contractor for the design, construction, modernization and detailed engineering activities for military surface ships and submarines, and in shipbuilding & modernization and maintenance/repair activities for surface and submarine ships and military facilities/shipyards.

Our company has been concentrating on the field of military shipbuilding and modernization, maintaining the level of engineering we have reached in the maritime field with an approach focused on sustainable and continuous development. We have become the leading company in this field, especially in recent years, executing national and international projects with more than 200 engineers and experts working in line with the progress that our country has achieved in the field of military maritime.

Defence Turkey: Within the scope of the MiLGEM Project, STM assumed responsibilities for the supply of platform construction and equipment materials and services as well as design services for the TCG Heybeliada and TCG Büyükada Corvettes and has undertaken the design responsibility for the platform and platform integration (including main propulsion system integration) of the Burgazada and Kınalıada Corvettes. Can you share your comments on the domestic participation rate achieved in the construction work of the Burgazada and Kınalıada Corvettes and the savings obtained by the integration activities of the main propulsion system rendered locally?

Murat İKİNCİ: Starting from the construction process of the TCG HEYBELİADA (F-511), which is the prototype ship of MiLGEM Ada Class corvettes, the idea of "what else can we localize?" has always been a subject matter for us. With efforts performed to this end, the domestic participation rate of 65% achieved in the first two ships of the project reached 70% in the 3rd and 4th ships.

The Main Propulsion System is a complex system that emerges as a result of the interaction of independent systems. The system components procured from different countries and manufacturers in order to establish the main propulsion system of Ada Class corvettes have been integrated in accordance with the CODAG (Combined Diesel and Gas Turbine) model within STM. In other words, STM has not procured the main propulsion system directly from a foreign company on a turnkey basis, whereas it has assumed the integration responsibility of the main propulsion system by making separate contracts with the manufacturers. This is a very important stage that should be maintained. We have achieved significant talent acquisition for our company and our country as well as significant foreign exchange savings through this integration.

Thanks to this stage, we believe that we will not only just be able to complete the integration of the Main Propulsion System in the future and that the experience and confidence we gain in order to localize the system step by step is more important than the achieved hard savings.

Defence Turkey: STM was assigned as the Main Contractor by the SSB in 2018 within the scope of

TCG Kınalıada F-514 ADA-Class MILGEM Corvette

the Istanbul Class (I-Class) Frigate Project, which is the continuation of the MiLGEM Project, the contract negotiations of which were made and finalized. The construction of the first of the four ships was initiated on January 19, 2017 at Istanbul Shipyard Command. Could you please tell us about the latest status of the project and the responsibilities of STM?

Murat İKİNCİ: The MiLGEM-5 "I" Class Frigate Project is a follow-up of the MiLGEM Ada Class Corvette Project, which is carried out by the SSB and the Turkish Naval Forces.

Within the scope of the contract signed between the SSB and STM, effective September 27, 2019, which is the anniversary of the Battle of Preveza, the MiLGEM-5 will be constructed under the main contractorship of STM by Istanbul Shipyard Command which has great experience and success in the construction of the MiLGEM Project Ada Class Corvette. The design of the ship was accomplished by the Naval Forces Command Design Project Office, where STM provided engineering support services. In this project, STM, as the Main Contractor, undertakes the responsibility of program management, design, documentation, shipbuilding, equipment, integration, verification and preparation of the MiLGEM Project Technical Data Package.

The launch of the ship, which will further develop our national and national warship production capability was initiated with the MiLGEM Project and is planned to be launched in the first months of 2021 and commissioned to the Naval Forces Command in the second half of 2023 following sea acceptance tests which are to be executed after outfitting activities.

Defence Turkey: The ceremony of the first welding of the Pirireis Submarine, the first submarine to be constructed within the scope of the New Type Submarine Project, was held on October 8, 2015 at Gölcük Shipyard Command. The design change needs in the submarine were fulfilled thanks to the intense efforts of Turkish engineers and technicians, and such efforts led to a shift in the delivery schedule of the submarines. What would you like to say about the current status of the construction activities of the Pirireis Submarine that is expected to be put into service in 2022? What kind of activities has STM performed so far?

Murat İKİNCİ: As you know, the 214TN submarines being constructed at Gölcük Naval Shipyard within the scope of the project are quite different from the previously built 209 Class submarines in terms of equipment, configuration and construction techniques. It should be noted that Gölcük Shipyard Command has been successfully conducting the construction of the first submarine of its class with high domestic and national industry participation, in contrast to its predecessors.

STM is the indigenization subcontractor of tkMS, which is the Main Contractor in the New Type Submarine Project, for all activities within the scope of improvement of Submarine Platform Systems, Submarine Construction Materials and Shipyard Infrastructure. The domestic participation that was almost absent at the beginning of the project has been successfully increased by the indigenization of many materials and systems including the Air-Independent Propulsion System components that will be included in the inventory for the first time and will enhance the strategic features of the submarine. Apart from this, the Integrated Logistics Service, which will significantly contribute to the design of the submarine, is also provided by STM. On top of that, the task of Talent Acquisition in the Submarine Design that our government assigned us is being fulfilled under this project. Currently, the level has been reached where Submarine Modernization Projects are assumed, and all kinds of Submarine Design activities are executed abroad.

Defence Turkey: The AY Class Submarines modernized by STM gained the capability to launch DM2A4 Heavyweight Torpedoes under the MÜREN AY SYS Project and 8 torpedo shots were performed during the tests. Has STM assumed any role in this activity?

Murat İKİNCİ: Modernization of the TCG Doğanay and TCG Dolunay submarines was realized at Gölcük Naval Shipyard Command within the scope of the Ay Class Submarines Modernization project, in which STM has undertaken a role as the main contractor. The project was successfully completed within budget and on schedule. Periscopes,

The Modernized Ay-Class S-354 Dolunay Submarine

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ED System and INS Gyros that were changed in the project have been developed to be incompatible with the MÜREN AY Combat Management System that were being developed at that time and all interfaces and connections to be used by the system to be integrated to the ship later have been prepared. I would like to express our pride that both of our submarines will continue their missions successfully for a longer period of time.

Defence Turkey: Within the scope of the New Type Submarine Project, production capability of the new type 30 PS 15B Battery Sets for REIS Class Submarines were also acquired for the Battery Factory. What could you tell us about the annual production capacity, the domestic participation rate and the activities executed until today?

Murat İKİNCİ: STM has also been carrying out the development activities for the infrastructure of the Submarine Battery Factory within the scope of the shipyard infrastructure development. Submarine Batteries, which have to be renewed continuously during the lifetime of submarines, will be able to be manufactured with a high proportion of domestic materials upon the completion of the project.

Defence Turkey: The RFP for the Preveza Class Submarine Mid-Life Update (MLU) Project was announced by the SSB and initiated on June 20, 2016. The domestic development project model will be implemented for four electrically/diesel driven Preveza Class (Type 209/1400) submarines, which were built at Gölcük Naval Shipyard and put into the service of the Turkish Naval Forces between July 1994 and July 1999. The contract was signed with the STM-Aselsan-Havelsan-ASFAT Business Partnership on February 8, 2019. Could you please inform us on the responsibilities undertaken by STM, the scope of the project and the activities performed to date?

Murat İKİNCİ: The contract was signed on February 8, 2019 and the project was initiated on July 17, 2019. STM has assumed a role as a pilot partner in the project which will last for 10 years. 9 of the 21 main systems undertaken as business partnerships are provided under the responsibility of STM.

Each Type 214TN REİS Class Submarine carries one Liquid Oxygen (LOX with 15,3 tons capacity) tank in side the pressure hull. In cooperation with STM-ARITAŞ Basınçlı Kalıplar Sanayi the LOX tanks for the REİS Class Submarines are being manufactured in Turkey

In this large-scale and complex project, STM has assumed the responsibility for the integration of all systems with the submarine platform. In addition, the change of 3 systems including the MÜREN Combat Management System is planned under different contracts during the same period. This project will be carried out at Gölcük Shipyard Command as with the AY Class Submarine Modernization Project.

Defence Turkey: Having successfully completed the AY Class Submarine Modernization Project, your company has taken part in the New Type Submarine Project, which covers the construction of REIS Class (Type 214TN) submarines with the Air Independent Propulsion (AIP) system for the Naval Forces and the Preveza Class Submarines MLU Project. Could you share more with our readers about your company's expertise in submarines?

Murat İKİNCİ: Submarines are the most advanced and complex platforms following spacecraft. It is obvious that you need to activate all facilities and capabilities of your country in order to design a submarine starting from scratch. Preliminary design activities start with scientific research in universities and research institutions, and then continue with the development of critical technologies for the submarine, and finally it is completed with 3-4 years of effort with a design team of five hundred people (at least 250) and an eco-system in the industry. As STM, we have been making utmost efforts to achieve this goal of our country for nearly 10 years. To this end, we successfully continue on our path for all the projects we undertake regarding the modernization or construction of submarines. We strive to readiness ourselves, our stakeholders and educational institutions for the National Submarine to be constructed in the future by providing information transfer and engineering support through agreements that we have signed. For example, for the first time this year, we organized a competition on submarine technologies and design without any prerequisites between undergraduate and graduate students studying at our universities in order to increase the number of academic studies on submarines and to raise awareness about submarines. STM's competent staff gives lectures at universities as well. As STM, we aim to increase the number of our submarine design team of over 60 people to a number sufficient for the National Submarine Design activities to be realized with the joint participation of all institutions which I have already mentioned.

Defence Turkey: STM is one of the parties involved in the Turkish Type Assault Boat Project initiated by the SSB in order to meet the needs of the new generation assault boats of the Naval Forces Command with national facilities. To this end STM designed the FAC-55 Fast Attack Craft and has performed tests. According to the information we have obtained, the speed requirement was reduced from 60 knots to 45 knots. Could you please inform us on the latest status of the project and the changes made to the requirements?

Murat İKİNCİ: The Turkish Type Assault Boat Project carried out by the SSB is a project that we place great importance upon and we have been working on it for a long time, starting from the feasibility stage. We are continuing our efforts to provide an effective platform solution that will meet the needs of our Naval Forces at the highest level, with rapid, high strike power and innovative features.

So far, we have crosschecked that we have designed a maritime platform for the FAC-55 Fast Attack Craft, which performs effectively up to 55+ knots in the test activities realized at internationally competent institutions. In the light of our knowhow and experience in the design of the FAC-55 Fast Attack Craft, together with the leading stakeholders of our defence industry, we aim to provide the Naval Forces with the most capable assault boat solution amongst the competitors in the world.

Defence Turkey: PNS Moawin (AOE-39), a 17,000-ton class marine tanker built within the scope of the Pakistan Navy's Fleet Replenishment Ship Project, the first export of STM on the basis of military ships and the largest export of our country in a single lot at that time, was launched on August 19, 2016 at Karachi Shipyard & Engineering Works and was put into service on October 16, 2018. What would you like to tell us about the experience gained from this project, where STM has been the Main Contractor and what type of feedback have you received from the end user regarding the ship during the previous year?

Murat İKİNCİ: PNS Moawin has been actively used in the Pakistan Navy since its entry to service and has accomplished many tasks and exercises. It successfully performed its duties in the international exercise AMAN-2019, which was organized by the Pakistani Naval Forces with the participation of senior government representatives. During this exercise and following Pakistan National Exercises, senior guests and press members followed the naval phase of the exercise at PNS Moawin.

During the course of the exercises the ship attended and underwent activities such as the replenishment of fuel, water, food, medicine, etc. to the other navy vessels. It was also observed that the ship was able to cruise smoothly even under harsh sea and wind conditions and that it was able to perform helicopter operations successfully thanks to its helicopter deck and hangar, and also provided medical support to other navy units through its medical facilities.

FAC-55 Fast Attack Craft

As expressed by Pakistani President Arif ALVI during the launching ceremony and the press statements in the media, the PNS Moawin is a modern and state of the art technology combat support ship. It is a ship capable of assuming many tasks in peacetime as well as emergencies and times of crisis. The commissioning of the ship into the inventory will provide the Pakistani Naval Forces superior flexibility in long-term operations. If required, the ship will also be performed in humanitarian operations as well.

STM has gained substantial experience in the establishment and maintenance of high-level cooperation with the Ministry of Defence Production, Naval Forces and military shipyards of a friendly and allied country, as well as in military shipbuilding, equipping, commissioning and testing activities. One of the most important gains in this project was the creation and development of a common working culture in all processes from the determination of ship configuration to the date of commissioning. This experience is positively reflected toward prospective projects.

Defence Turkey: STM recently signed a contract with the Pakistani Ministry of Defence Production on June 22, 2016, surpassing French DCNS Shipyard, Naval Group, the submarine manufacturer, in an international tender opened for the Mid-Life Update (MLU) of Khalid Class Submarines 'Agosta 90B'. During this period, three contract amendments were signed in June 2017, February 2018 and March 2019 for the provision of two submarines and important subsystems from Turkish companies. Could you please inform us on the current status of the project, activities performed so far and the important milestones of the project in the upcoming period?

Murat İKİNCİ: As the main contractor, we are in the phase of Assembly and Integration on the first ship, disassembly of system devices because of unavailable space on the second ship and the preparation of the location for the assembly. By the end of 2019, we plan to complete the installation and integration activities of the systems supplied within the scope of Mid-Life Update in the PNS/M HAMZA submarine, the first submarine of the Project, and to finalize the Setting to Work (STW) tests. We aim to deliver the first submarine of the project PNS/M HAMZA to the Pakistan Navy at the end of December 2020, after the completion of Harbor Acceptance Tests (HAT) in the first quarter of 2020, followed by the Sea Acceptance Tests (SAT).

PNS Moawin (AOE-39)

Simultaneously with the first submarine activities, we plan to complete the Factory Acceptance Tests (FAT) of the systems belonging to PNS/M KHALID which is the second submarine within 2020, to perform the Assembly and Integration activities and to finalize the Preparations for Set to Work (STW) tests by the end of 2020. Our main goal is to deliver PNS/M KHALID to the Pakistani Navy in December 2021, one year after the delivery of the first submarine PNS/M HAMZA.

Defence Turkey: The MLU of the first submarine, which started in 2018, was planned to be delivered within September 2020 or the first quarter of 2021, and the MLU of the second submarine PNS/M Saad (S-138) was scheduled to start in 2019. Could you please provide information about the modernization and improvement work to be carried out on submarines, the products to be procured from Turkish Defence Industry companies, especially from Aselsan and Havelsan, and the estimated labor / man x hours for each submarine?

Murat İKİNCİ: Our main goal for the French originated KHALID class submarines, which are the most popular underwater platform of the Pakistan Navy, is to incorporate the cutting-edge technology products which are indispensable in terms of both effective duty execution and deterrence in a modern submarine. STM, following the completion of our efforts on activity analysis and customer requirements for such platforms, we will provide the Integrated Underwater Command Control System (ESKKS) and Sonar Suite and Sonar Subsystems that work in integration with it, the Submarine Information Distribution System, Underwater/Torpedo Fire Control System, Attack and Navigation Periscopes, ESM, Navigation Radar, Static Converters, Steering Control System, Ship Self-Noise Measurement System, Submarine Rescue Buoy and Digital Bridge Information Console with a 45 bar strength, and in addition to these systems we provide the Auxiliary Cooling Water System to cool the ESKKS, Torpedo Counter Measure System and Electronic Map Display and Information System.

The integrated Underwater Command Control System (ESKKS) and Submarine Information Distribution System are supplied by Havelsan, the ESM, Torpedo Counter Measure System and Navigation Radar System are supplied by Aselsan and the Auxiliary Cooling Water System by Bronswerk, Turkey. STM provides the Submarine Rescue Buoy, 45 bar resistant Digital Bridge Information Console, Electronic Map Display and Information system in addition to all materials for all structural/technical design, analysis, documentation and installation. We can express with pride that we have involved dozens of Turkish defence industry companies in this ecosystem considering the cables for installation, pipes, valves, flanges, panels, consumables, etc.

In addition to the aforementioned supplies, we are working together with Poyraz3M Ltd for activities within the scope of Integrated Logistics Support (ILS). In addition, for the first time in the world in a modernization project in the field of “Diving Safety”, which is vital for the submarine platform, we cooperate and procure services from the IACCS member DNV GL for the control of all the modifications made in the resistant boats and waterproofing bulkheads, control of certifications for all materials and the workmanship towards such parts and finally for the provision of “Diving Safety Certification” for the submarines.

For each submarine, an average of 930-man x months is estimated within the scope of the MLU. This figure does not contain the man x month values of our Subcontractors and the Pakistan Military Shipyard that provide labor activities. We proudly state that the number of companies or countries that can undertake a submarine MLU project on such a scale is countable on just one hand.

Defence Turkey: STM is also involved in the Pakistani Navy’s Miniature Submarine Program that includes 3 Cosmos MG110 (SX756 / W) mini submarines which were purchased in the 1980s and are currently in the inventory. At the signing ceremony held on February 8, 2019, you presented the scale model of the new design mini submarine to the officials of the Pakistani Ministry of Defence Production. What would you like to say about this Project?

Murat İKİNCİ: The first project prepared by STM in line with the needs of the Pakistan Naval Forces was submitted in 2017. Within this framework, efforts on the design of small-sized submarines capable of addressing a wider market are continuing within the scheduled plan.

Defence Turkey: During the AMAN 2019 Multinational Naval Exercise held in February 2019, Pakistani Navy officials were very pleased with STM and its activities. According to the information we obtained, the Pakistan Naval Forces plan to meet the needs for the MoShip Submarine Rescue Mother Ship if the necessary budget allocation is made. In addition, the feasibility study of Gwadar Port was carried out by STM. Could you please inform us about the projects that STM is currently interested in and about the activities conducted in Pakistan?

Murat İKİNCİ: As you mentioned, the Pakistan Navy brought to the agenda the need for the MoShip Submarine Rescue Ship and they are making efforts to meet such a need depending on the proposals that will be in line with their budgets. STM continues to search for alternative

solutions for this request, and we will submit our study that includes alternative solutions for the Pakistan Navy in the near future. As mentioned before, the MLU of the Agosta-90 Submarines in the Pakistan Navy inventory is currently being carried out in Pakistan under the main contractorship of STM. In addition, Ormara Naval Harbor (ONH) Hydrodynamic studies and the port approach and in-port design are being carried out within the scope of our existing contract. STM is carrying on feasibility studies for the Submarine Maintenance Shipyard design to be located at Ormara Naval Harbor and Gwadar and Gwatar forward naval bases.

Defence Turkey: Has STM assumed any task/role in the Pakistan Naval Forces MiLGEM Corvette Project (later named the Jinnah Class by the Pakistan Naval Forces), the contract of which was signed on July 5, 2018 and was effective on March 11, 2019? Has there been any negotiation or cooperation with ASFAT? The construction of the first ship was planned to begin in September 2019.

Murat İKİNCİ: As I mentioned in the beginning of the interview, the export of the MiLGEM project, in which we take place in every phase from the outset, has been our target toward which we have been making great efforts as STM from the beginning and we continued these activities under the management and support of the Presidency of Defence Industries.

STM's first contact with the Pakistan Naval Forces was at the IDEAS/Karachi Fair in 2006. The Pakistan Naval Forces expressed their desire to participate in the design and prototype construction of the Turkish Naval Forces MiLGEM Corvette, and as a result of the ongoing negotiations since 2015, detailed studies have been initiated with a focus on the Pakistan MiLGEM "Jinnah" Class Corvette Project.

During this process, with the close support and contribution of our Naval Forces, the Pakistani delegation was invited to Turkey to examine the MiLGEM Class ships.

As a result of the ongoing efforts, the MiLGEM "Ada" Class Corvette was chosen as the platform thanks to our solutions and engineering recommendations, and a Letter of Intent was signed by the Defence Ministers of both countries at IDEF' 17 for the construction of MiLGEM corvettes in Karachi. The ongoing supply model was decided upon to be transformed into the model of direct purchase from Turkey and in the contract phase it was ensured to be a single Country and Ship as Turkey-MiLGEM.

Gwadar, Pakistan

Throughout this process, our main goal, as STM, has been to provide support for the sustainable development of technology and our defence industry through the national knowhow that gained via the MiLGEM Project, in addition to the export of the platforms that emerged during the MiLGEM Project.

As it is known, the contract for the supply of MiLGEM Class ships that will be constructed together by two allied countries and are to be acquired by the Pakistan Navy was signed with ASFAT. What is important is not the party of the contract; the important thing is that Turkey has obtained this project and the MiLGEM Corvette will be put into service of our friendly and allied country. We, as an organization with the greatest engineering experience in MiLGEM, are always ready to give our utmost support.

As STM, our efforts in shaping the Pakistan corvette project (the construction and delivery of which will be realized by ASFAT) as MiLGEM and obtaining it for our country will continue to bring forth benefits also to the navies of other countries.

Defence Turkey: What would you like to say about STM's expectations and targets for naval projects for the next decade?

Murat İKİNCİ: We have become a company that has proven its competence with the naval projects we have accomplished and been executing and that is recognized in the international military shipbuilding industry and by the naval forces of foreign countries. We have projects abroad that we have won as a successful bidder in international competition, which are a source pride for us. In the coming period, we aim to become an internationally recognized company that can compete with international companies by achieving export-oriented development in the global arena.

With the awareness that such dynamic relationships that are to be established both nationally and internationally in order to provide a sustainable national defence ecosystem, is an important input to carry us forward, we, as STM, aim to liaise with the leading institutions of our defence industry in promotion of defence export.

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

Murat İKİNCİ: While exerting efforts in line with the 2023 targets set by our Presidency of the Turkish Republic and the Presidency of Defence Industries for the domestic defence sector, the fact that we are taking part in projects where we can demonstrate our capabilities in the international arena and their successful completion strengthen the steps we will take for the future.

Last year, we ranked 97th on the Defence Top 100 list as one of the three Turkish companies and this year we ascended to 85th place. As STM, we aim to be amongst the top 50 companies on the Defence Top 100 list with an export-oriented growth in the upcoming period

Gas Conflict in the Eastern Mediterranean and the Role of Turkish Naval Forces in Protecting Turkey's Sovereignty Rights

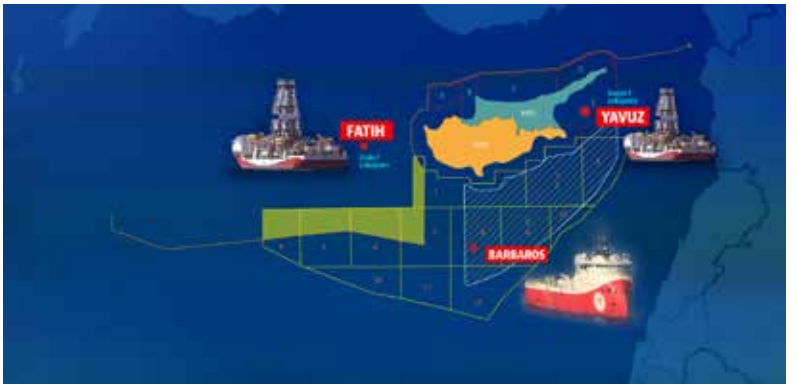
by İbrahim SÜNNETÇİ

The discovery of rich hydrocarbon (oil and natural-gas) reserves in the Eastern Mediterranean, once appreciated with hope that it could serve as a catalyst for peace, stability and cooperation in the region, in time has turned into a source of tension and conflict and a realization that greater resources lead to more disputes.

Rising tensions in the Eastern Mediterranean could have a destabilizing effect on the regional countries. Due to disputes about the demarcation of Exclusive Economic Zones (EEZs) and rights to explore offshore natural gas fields in the Eastern Mediterranean, tensions are rising dangerously between the Republic of Cyprus, the Turkish Republic of Northern Cyprus (TRNC), Turkey, Greece, Egypt, Israel and Lebanon. Now it is feared that if the regional countries cannot not find a way, a solution, on how to share the new wealth between them, a new war could be ignited in the region due to the gas conflict.

The obvious solution on this dispute/conflict would be to establish mutual cooperation between Eastern Mediterranean countries Greece, Republic of Cyprus, Turkey, TRNC, Lebanon, Israel (including the Palestinian Authority) and Egypt in finding a way regarding the handling of natural gas reserves in and around the disputed EEZs and to share the new wealth between them.

It is clear that these new gas field discoveries valued in multi-billion dollars in the Mediterranean has attracted the attention of state and non-state actors such as the U.S., Russian Federation and EU member countries and lead to the establishment of new regional alliances or axis among Greece, Republic of Cyprus, Israel and Egypt to confront Turkey, which opposes the Greek Cypriot Administration of Southern Cyprus (GCASC)'s exploitation of offshore energy reserves and is insisting that a lasting peace deal must be reached between the Turkish and Greek Cypriots (TRNC and Republic of Cyprus) before international agreements over the hydrocarbon reserves can be made. However, regardless of Turkey's opposition,



the Republic of Cyprus continues exploration activities and giving licenses to big oil companies to find gas around Cyprus Island.

According to Turkey, the Republic of Cyprus does not have the right or the authority to sign EEZ agreements with riparian states and current actions of GCASC such as hydrocarbon exploration and exports are in direct conflict with international laws, and they violate the rights of TRNC citizens.

The concept of EEZ was designed by the 1982 United Nations Maritime Law Convention. The EEZ is an area which is beyond, and is adjacent to, a given country's territorial seas, and extends no more than 200 nautical miles (370 kilometers) from a country's own coastlines. When the 200 nautical miles from the coastline of a state intersects with the 200nm area of another state, as in the Black Sea, the Aegean and the Mediterranean, the two (or more) riparian states are expected to reach an agreement between themselves. There is no mutual agreement in place regarding the EEZs between Eastern Mediterranean countries. There are a few agreements signed between Greece, Egypt, Israel and the Republic of Cyprus on the demarcation of the EEZs. After a two-year negotiation in 2003, the Republic of Cyprus and Egypt have delimited the EEZ between them. On 17 December 2010, Israel and the Republic of Cyprus signed a bilateral agreement demarcating their maritime borders, EEZs, to facilitate offshore gas exploration. A preliminary agreement on the demarcation of the EEZ between Greece and Egypt was also signed in November 2014, when the first Trilateral Summit between Greece, the Republic of Cyprus and Egypt which had then taken place in Cairo. However, since the EEZs defined under these agreements significantly restricted the Turkish EEZ in the Mediterranean, the Turkish Government has not recognized any of these agreements. And this causes multiple problems when there is exploration and drilling activities for hydrocarbon in and around Cyprus Island. It is clear that in order to overcome potential military conflict in the Eastern Mediterranean Greece and the Republic of Cyprus have to find a way to agree with Turkey and the TRNC regarding the handling of natural gas reserves in and around Cyprus Island.

Hydrocarbon Deposits in the Eastern Mediterranean

The discoveries of oil and gas fields in the Mediterranean continue to increase in number year by year since 2009. A 2010 U.S. Geological Survey report estimated that there were 122 Trillion Cubic Feet ([TCF], equivalent to 3,455 Billion Cubic Metres [BCM]) of gas and 1,7 billion barrels of oil off the coasts of Israel, the Gaza Strip, Cyprus Island, Syria and Lebanon. Egypt, Lebanon, Israel and Cyprus Island are sitting on the Levant Basin in the eastern Mediterranean, where new gas fields have been discovered.

Ruling out the rights of Turkey, the TRNC and Lebanon, Israel, the Republic of Cyprus and Egypt are nowadays exploring new ways to use the gas fields Tamar (the Tamar drilling platform sits 25km west of the Ashkelon shore of Israel and contains roughly 320 BCM), Leviathan (located approximately 130km west of Haifa, Israel and contains roughly 600 BCM), Aphrodite (in Block

12, just 30 kilometers [19 miles] northwest of the Leviathan and contains 130 BCM), Zohr (situated more than 150km from the Egypt coast and contains an estimated 850 BCM [nearly 30 TCF of gas]), and Calypso (in Block 6 offshore Cyprus Island, Israel's news website Globes has reported that Calypso might hold 170-230 BCM of gas), which were discovered in January 2009, December 2010, December 2011, August 2015 and February 2018 respectively. Meanwhile, big oil companies are finding more and more gas around Cyprus Island for example, at the end of February 2019 ExxonMobil and Qatar Petroleum partnership made a big natural gas field discovery and named it after the symbolic owl 'Glaucus'. According to preliminary estimates, the capacity of the Glaucus-1 reserve is between 142 and 227 billion cubic meters. The Greek Cypriot Administration declared the discovery to be the largest reserve of Cyprus Island.

In early July 2019, the Republic of Cyprus and Egypt agreed to build a pipeline to take gas from the first big discovery to Egypt for eventual export. In 2019, the representatives of Israel, Greek Cypriot Administration, Greece, Italy, Jordan and Palestine met in Cairo. After the meeting, the 'Eastern Mediterranean Gas Forum' was announced. The aim of the Forum was to design the Eastern Mediterranean dish as an energy base and to cooperate in the use of the region's resources. Three countries of the Eastern Mediterranean, Turkey, Lebanon and Syria did not attend the meeting.

In late January 2018, Lebanon signed an agreement with a Consortium comprised of France's Total, Italy's Eni and Russia's Novatek. The deal allows the three companies to explore for gas in an area also claimed by Israel. Following the signing of agreement Israel and Lebanon have engaged in a war of words over a gas deal in disputed waters. Lebanon finally started offshore oil and gas exploration in May 2018 after authorities approved an exploration plan submitted by the Consortium. Lebanon has implemented its own legal framework to facilitate exploration in its waters and launched its first oil and gas production-licensing auction in January 2017. In April 2019 Lebanon's Council of Ministers approved the launch of the Second Offshore Licensing Round (SOLR). Companies interested in participating in the licensing round have been invited to submit their applications for Blocks 1, 2, 5, 8 and 10 before the January 31, 2020. According to open sources Lebanon has an unresolved maritime border dispute with Israel over a triangular area of sea of around 860 sq.km.

An Israeli Navy Sa'ar 5 corvette defends a natural gas extraction platform off Israel's coast

The new reserves gave Israel enough resources to not only satiate its own demand but to also make it a significant exporter. Before the discovery of Tamar and Leviathan, Israel had been dependent on natural gas from its neighbour Egypt. On 19 February 2018, for example, Israel and Egypt signed a multibillion-dollar agreement to export Israeli gas to Egypt. The discovery of the Zohr gas field (which become operational in December 2017), on the other hand, has decreased Egypt's need for Liquefied Natural Gas (LNG) imports from Israel and the Republic of Cyprus. The country plans to achieve self-sufficiency in natural gas by year-end and a surplus in 2019 and is moving ahead with its strategy to become a regional hub for energy.

New Axis in the Eastern Mediterranean

Following the discovery of rich hydrocarbon deposits in the disputed EEZs and the extent of the wealth became clearer the Greeks, Greek Cypriots and Israelis have engaged in intense negotiations over oil and gas exploration and a new axis emerged between Egypt, Israel, the Republic of Cyprus and Greece to confront Turkey. In addition to agreements for the exploitation of the Eastern Mediterranean hydrocarbon deposits, Greece and the Republic of Cyprus have also signed agreements with Israel and Egypt to cooperate in the defence field to protect their new wealth against potential threats. Greece and the Republic of Cyprus are slowly but steadily enhancing their strategic cooperation with Egypt and Israel. Defence ties between these countries have been strengthened as a result of regularly organized bilateral military exercises. Israel wants to improve military relations with Greece in order to counterbalance the expansion of Turkey's regional influence. On January 10, 2012, the Republic of Cyprus and Israel signed two important bilateral military agreements permitting the Israel Air Force (IAF) to utilize airspace and territorial waters around the island to safeguard and protect crucial energy resources and the exchange of classified information.

In April 2015, the Egyptian Minister of Defence Sedki SOBHI met with his Greek counterpart Panos KAMMENOS to discuss the possibilities to "enhance cooperation and military relations between the armed forces of both countries." In May 2015, Greek Air Force units performed in Egypt for the military exercise Horus 2015, where Egyptian, Greek and Republic of Cyprus Naval Forces conducted a joint practice drill in the Mediterranean. In December

2015 while the Egyptian Naval and Air Forces units were in Greece to participate in the joint military exercise Meidoza (Medusa 2015) 2015, Egyptian President Abdel Fattah El-SISI signed an agreement on with his Greek Cypriots counterpart Nicos ANASTASIADES and Greek Prime Minister Alexis TSIPRAS covering the cooperation on energy and security/defence issues.

Egyptian, Republic of Cyprus and Greek Armed Forces conducted the Medusa 2016 joint military drills, which were held in the southeast Aegean Sea and on the island of Crete from 5 to 8 December 2016. Units from the Egyptian Air and Naval Forces participated in the drills together with Greek forces. During the Exercise, Egyptian Navy ships were moored at Souda Naval Base. Furthermore, two Greek Air Force F-16s stationed in an Egyptian Air Force Base and the participating Egyptian F-16s operated from the 115 Combat Wing in Crete.

On 17 May 2017, Greece and Egypt signed the Military Cooperation Program (MCP) 2017 at Hellenic National Defence General Staff (HNDGS) Head Quarters. From 30 July to 3 August 2017 Egyptian and Greek Air and Naval Forces conducted a joint military exercise. Dubbed as 'Medusa 2017' the Exercise was held in the framework of the military cooperation between the two countries. After holding the first tripartite defence meeting of their countries at the air and maritime coordinating center in the southern city of Larnaca in December 2017, the Defence Ministers of the Republic of Cyprus, Greece and Egypt, Christoforos FOKAIDES, Panos KAMENOS of Greece, and Sedki SOBHI have agreed on joint ground, air and naval exercises, exchanging information and cooperating in the exploitation of energy sources in the Levantine region.

In June and December 2017 Israeli special forces from Unit 621, also known as Egoz, and a part of the 89th Commando Brigade, also known as the Oz Brigade, performed multi-day exercises, practicing urban and mountain warfare, with local troops in the Republic of Cyprus. And in October 2017 Republic of Cyprus soldiers travelled to Israel in order to train with the Egoz Commando Unit of IDF.

In April 2018 his Greek counterpart hosted IDF Chief of Staff Lt. Gen. Gadi EISENKOT for the first time, while Defence Minister Avigdor LIEBERMAN hosted the Greek Defence Minister in Israel. These meetings followed a major improvement in military ties between Israel and Greece and the Republic of Cyprus. On 3 May 2018 Commander of the Israeli Navy Vice Admiral Eli SHARVIT visited Greek Navy's Fleet HQ at Salamis Naval Base. In June 2018 Israel held a joint Air Force exercise with Greece. For the Exercise, which was conducted entirely in the air, without landing, and included two daytime flights, the IAF sent 40 aircraft from 10 different squadrons. The Exercise last 5 days, in which hundreds of fighter jets, helicopters and refuelling and cargo aircraft participated.

The Medusa-6 joint land and air exercise between Greece and Egypt, with the participation of Greek Cypriots forces was held from 23 to 29 June 2018 along Egypt's Mediterranean coast. The Medusa-6 Exercise is considered as a serious step to improve interoperability between the three countries in the Eastern Mediterranean. Greece took part in the Exercise, with two frigates, a submarine, a C-130 plane, eight F-16 jets, one Erieye EMB-145H EAW&C aircraft, one Chinook heavy lift helicopter and two Apache attack helicopters. The drill included naval and aerial training aiming at developing combat capabilities of the participating forces to deal with common threats and enhance security in the Mediterranean region. The Defence Ministers of Egypt, Greece and the Republic of Cyprus attended the main phase of the Medusa-6 Exercise.

The three countries conducted the "Medusa-7" joint military exercise on 24-30 November 2018 on and around the island of Crete. Greece's then-Defence Minister Panos KAMMENOS and his counterparts from the Republic of Cyprus and Egypt, Savvas ANGELIDIS and Lieutenant General Mohamed ZAKI, attended the final phase of the exercise. Egyptian, Republic of Cyprus and Greek Armed Forces conducted the "Medusa-8" joint naval and aerial exercise in Egypt's territorial waters in the Mediterranean from 13 to 19 April 2019, aimed to boost military cooperation between the three countries "in the framework of the annual plan for joint exercises by the (Egyptian) Armed Forces to promote and support military cooperation with brotherly and friendly countries," said a statement by the Egyptian Armed Forces. The Defence Ministers, Egypt's Lieutenant General Mohamed ZAKI, Greece's Evangelos APOSTOLAKIS and Savvas ANGELIDIS of the Republic of Cyprus observed the main part of the Medusa-8 exercise. The Medusa-8 exercise is one of the most important drills in the Mediterranean, and reflects the level of cooperation among Egypt, Greece, and the Republic of Cyprus.

A Turkish Navy FPB and a Gabya Class frigate provide protection to Barbaros Hayrettin Pasa research vessel on the East Mediterranean

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Turkey's Political and Military Reaction to the New Axis

It is absurd to believe that Turkey will sit with arms crossed as the alliance of Egypt, Israel, the Republic of Cyprus and Greece perform exploration and drilling activities for oil and natural gas in and around Cyprus Island and draw upon hydrocarbon reserves in Turkish and TRNC EEZs. Soon after tensions flared in the Eastern Mediterranean gas scramble, Turkey engaged in gunboat diplomacy in defence of its interests. It is clear that by ignoring Turkey's claims for its EEZ and testing its determination on this specific issue is a serious gamble and by this way Greece and the Republic of Cyprus are taking extremely risky and dangerous steps.

On 21 September 2011, as a demonstration of determination, Turkey signed the continental shelf delimitation agreement with the TRNC in New York, U.S. Soon after the Greek Cypriot Administration of Southern Cyprus (GCASC) issued licenses for oil and natural-gas exploration in its claimed EEZs in the Eastern Mediterranean, tension between Turkey and the Greek Cypriots-Greece duo increased dangerously. Having a claim that possible offshore reserves are also owned by the Turkish part of the island ,Turkey strongly criticized the move, underling that it was a clear breach of Turkey and Turkish Cypriots' rights and sent the Barbaros Hayrettin Paşa a seismic exploration vessel to the region for its own drilling purposes and one warship for the surveillance of foreign platform vessels being used for oil exploration.

Ankara insists that a lasting peace deal must be reached between the Turkish and Greek Cypriots before international agreements over the hydrocarbon reserves can be made. Turkey also rejected 2013's maritime border demarcation between Egypt and the Republic of Cyprus by saying it "violates the Turkish continental shelf at latitude 32, 16, and 18 degrees." In a letter submitted on 2 May 2017 to the United Nations (UN)' General Assembly, Turkey's permanent representative to the UN, Feridun SİNİRLİOĞLU, stated that

Fatih and Yavuz Drill Vessels are accompany with TCG Oruçreis ve TCG Gaziantep Frigates on the Mediterranean

"Turkey is committed to protecting its sovereign rights emanating from international law and will not allow foreign companies to conduct unauthorized hydrocarbon exploration and exploitation activities on its continental shelf."

In an interview on 4 February 2018 with the Greek daily Kathimerini, Turkish Foreign Minister Mevlüt ÇAVUŞOĞLU described the agreement signed between Egypt and the Republic of Cyprus in December 2013 on the joint exploitation of hydrocarbon reserves on the Eastern Mediterranean as "null and void." "We have clearly stated that the agreement violates Turkey's continental shelf," Minister ÇAVUŞOĞLU noted. On the other hand, on 7 February 2018 Egyptian Foreign Ministry spokesman Ahmed Abu ZEID warned in an official statement against contesting the agreement on the demarcation of the maritime border between Egypt and the Republic of Cyprus. In February 2018, Egyptian Foreign Minister Sameh SHOUKRY, defended not only the Republic of Cyprus offshore gas exploration projects but also stated that the 2003 EEZ maritime agreement with the Republic of Cyprus is valid. So, any Turkish move to block this would be taken as an attack on Egypt, as well.

Some of the so-called licensed areas, established by the Greek Cypriot Administration of Southern Cyprus (GCASC) in 2007 in the south of Cyprus Island, partially overlap Turkish maritime jurisdiction areas in the Eastern Mediterranean. In this context, the so-called Block 1, 4, 5, 6 (where the Calypso, the second natural gas reserve in Cyprus is located in) and Block 7 are partially within Turkey's EEZ. That is why on 9 February 2018 Turkish Naval vessels, on manoeuvres in the Mediterranean Sea, prevented the Saipem 1200 drill ship, working for Italian energy firm ENI, to reach a disputed offshore block. After being warned by Turkish Naval Forces (TNF) the Saipem 1200 vessel manoeuvred out of the area and set sail for Morocco.

Turkey initially demonstrated significant effort to negotiate with international energy companies participating in the drilling activities around the Island of Cyprus. Turkey even invited other parties to perform joint search activities, however its efforts and invitations were not answered. As tensions flare over the hydrocarbon reserves around the Island of Cyprus, Turkey then announced it would launch its own oil and gas research/ drilling activities in the Eastern Mediterranean. Turkey granted exploration licenses to Turkish Petroleum in 2009 and 2012 in the Eastern Mediterranean off the Island of Cyprus. Since April 2017 Turkey has accelerated its seismic research and drilling activities in the Black Sea and the Mediterranean. This has been achieved with the help of Turkey's first seismic vessel Barbaros Hayrettin Paşa, which was bought from Norway in 2013. It has been conducting exploration in the Mediterranean since April 2017. On 31 May 2018 Turkey sent its first drilling vessel Fatih, formerly known as the Deepsea Metro II, to the Mediterranean for deep-sea well drilling operations, marking the beginning of a new era in its energy plans. Fatih is equipped with the cutting-edge technological equipment and is

Beyaz Fırtına Military Exercise

able to drill up to 12,000 meters. Turkey currently continues oil and gas exploration activities in the Eastern Mediterranean at full speed. Escorted by Turkish Navy frigates the drilling vessels "Yavuz" and "Fatih" continue drilling activities in the eastern Mediterranean Sea off Cyprus Island since spring 2019. At the end of August 2019, Turkey's second seismic exploration vessel, the MTA Oruc Reis, previously conducted seismic surveys in the Black Sea and Marmara, was also sent to the Eastern Mediterranean. Turkey continues its research and drilling activities in the Mediterranean with the two seismic and the two drilling vessels.

Turkey declared its readiness to go to war over the hydrocarbon wealth claims in the Eastern Mediterranean in 2014. On 9 November 2014, the then Commander of the Turkish Naval Forces Admiral Bülent BOSTANOĞLU told reporters during the 'Blue Whale 2014' Naval Exercise that he had been ordered to implement new rules of engagement in the Eastern Mediterranean if Turkish vessels encountered Greek, Egyptian or Israeli ships. "The Prime Ministry handed over the rules of engagement to the Chief of Turkish General Staff (TGS) and the Chief of TGS handed them over to the Naval Forces Command. We will act in line with these rules of engagement in the event we face a situation over this issue," Adm. BOSTANOĞLU told reporters.

After witnessing the Beyaz Fırtına (White Storm) Military Exercise, a biennial military drill conducted during 14-25 May 2018 in the East Mediterranean and the Aegean waters, the then Chief of TGS General Hulusi AKAR (on July 9, 2018 appointed as Turkish MoND) said that "the Turkish Armed Forces (TAF) are determined to protect our country's rightful interests, in accordance with international law and conventions in all our territorial waters." "We always say if dialogue and cooperation cannot solve the issue, we will use our powers without hesitation," General AKAR warned.

In August 2019 after receiving a brief about Turkey's activities in the Eastern Mediterranean and Aegean Seas while aboard the Turkish Navy frigate accompanying Yavuz drilling vessel Turkish Minister of National Defence (MoND) Hulusi AKAR made it clear that Turkey will not sit and watch without doing anything, while others drill for oil and gas. "We have defended our own rights, and the people of Turkish Republic of Northern Cyprus (TRNC) to the end and will continue to do so. Nobody should try to test our strength," MoND AKAR said. Turkey has consistently contested the Greek Cypriot administration's unilateral drilling in the eastern Mediterranean, asserting that the TRNC also has rights to the resources in the area.

As one of the leading regional powers in its region and having one of the strongest naval forces in the world, in terms of number and technology, Turkey has to establish a robust and constant presence in the Mediterranean to face any challenges in disputed maritime domains and to prevent any fait accompli on the continental shelf issue. For this purpose, in April 2018 Turkey deployed at least 14 naval surface and under surface platforms (two-three frigates, two-three corvettes, one or two submarines two-three fast patrol boats and six or seven corvettes) to perform 24/7surveillance (to monitor drilling activities) and reconnaissance missions in the Eastern Mediterranean. In this context the TCG Barbaros frigate and three corvettes were dispatched to monitor the Turkish EEZ around the Island of Cyprus.

To show its determination and deterrence Turkey has been conducting large naval exercises in the Mediterranean during recent years. The Turkish naval exercise "Mavi Vatan", translated "Blue Homeland", which took place from 27 February to 8 March 2019 and was an important show of force on 462,000 square kilometers in the Black Sea, the Aegean and the Eastern Mediterranean, with 103 naval vessels (including 13 frigates, 6 corvettes, 16 assault boats, 7 submarines, 7 mine hunters, 17 auxiliary vessels, 14 patrol boats, 22 landing crafts and a training ship) and with the participation of 20,000 soldiers. Blue Homeland 2019 was Turkey's largest naval exercise until then in the country's history, testing its ability to wage war simultaneously in the Black Sea, Aegean Sea and Eastern Mediterranean. This was conducted at a time of rising tensions over Turkey's plans to increase its efforts to explore for gas and oil off the coast of Cyprus Island during 13-25 May 2019 Turkish Naval Forces

Turkish Unmanned UAV platforms are monitoring the the Drill Vessels 7/24.

Command carried out Deniz Kurdu 2019 (Sea Wolf 2019), the largest planned exercise in the history of the Republic, with the participation of 131 ships, 57 planes, 33 helicopters and 25,900 military personnel simultaneously in three seas surrounding (Black Sea, Aegean Sea and Eastern Mediterranean) Anatolian peninsula. Regarding the Deniz Kurdu 2019 exercise MoND AKAR said, "With the exercise, we aim to show the resolution of the Turkish Armed Forces and capability to protect the country's security as well as its rights and interests in the seas."

Turkish Naval Forces & Protection of Turkey's Sovereignty Rights in the Eastern Mediterranean

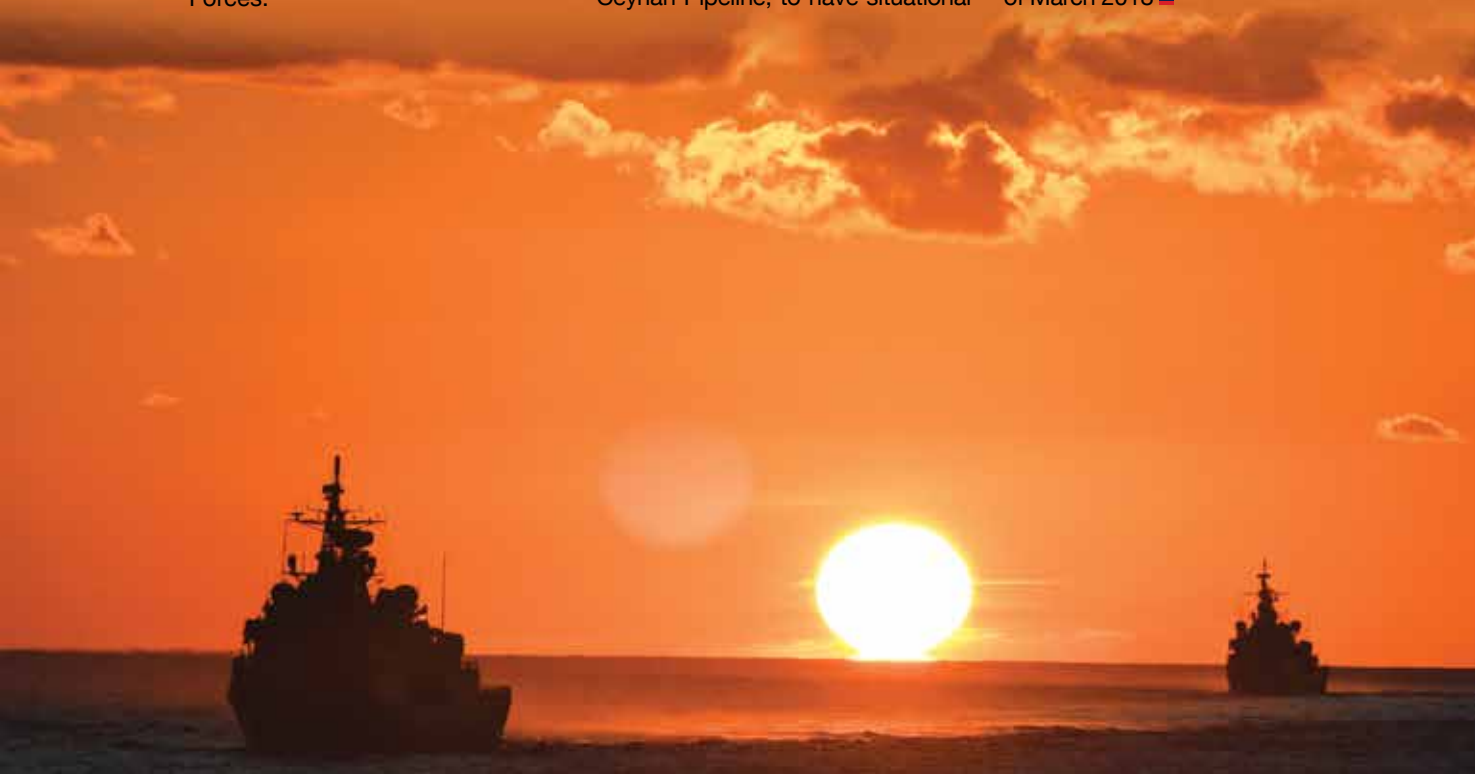
Due to its geo-strategic position and geopolitical situation Turkey is obliged to be a maritime state and dictates it to have and sustain a powerful naval force. The Turkish Naval Forces Command (TNFC), the maritime muscle of Turkey, is organized into four major subordinate commands, which includes; Fleet Command (Gölcük, Kocaeli), Northern Sea Area Command (Istanbul), Southern Sea Area Command (Izmir) and Naval Training & Education Command (Istanbul). As part of on-going transformation efforts that were started in 2011 within Fleet Command, three separate Task Group Commands (namely North, South and West) have been formed. In 2015 in order to assure coordination and cooperation among those three Task Group Commands, the War Fleet Command (covers frigates, corvettes and fast patrol boats) was established and subordinated to the Fleet Command. Today, the Fleet Command, which constitutes the striking power of the Turkish Naval Forces, is the largest of the naval components and consists of: War Fleet Command, Submarine Fleet Command, Mine Fleet Command and Naval Aviation Command (the Command commemorated its 104th anniversary in June 2018).

Although it has shrunk considerably after the bloody coup attempt carried out by the Fetullahist Terrorist Organization (FETO) on 15 July 2016, today Turkey still boasts one of the largest Naval Forces in the world. In July 2019 the Turkish MoND disclosed that since 15 July 2016 17,505 personnel including generals and admirals have been discharged from the TAF. During his address at Turkish Grand National Assembly (TBMM) on 1 November 2018 MoND AKAR disclosed that since 15 July 2016 15,153 personnel including 150 generals and admirals, 7,595 officers, 5,723 sergeants, 1,261 specialists/contracted private and 424 civil servants were discharged from the TAF. The number of Generals and Admirals in the TAF decreased from 325 (in total 358 including 325 in Army, Navy and Air Force, 32 in Gendarmerie and 1 in Coast Guard) to 261 (to 196 if we count Gendarmerie and Coast Guard, which have been affiliated under the Ministry of Internal Affairs following the bloody coup attempt), due to discharges that were carried out after the bloody coup attempt. In this context, while there were a total of 54 Admirals (2 Admirals, 4 Vice Admirals, 12 Rear Admirals [UH] and 36 Rear Admirals [LH]) in the TNFC before July 15, 2016, as of August 21, 2016 32 Admirals, 65 Officers, 75 Sergeant and 5 Specialist Sergeant have been discharged from the Turkish Navy. As of February 2017, the number of Generals/Admirals increased to 201, and to 215 as of 1 July 2018. With Supreme Military Council (YAŞ)'s decision dated August 2, 2018; the number of Generals/Admirals were increased to 244 as of 30th August 2018 thanks to new promotions. The situations of the Generals, Admirals and Colonels within the TAF, who will be promoted, whose term of office will be extended and who will be retired due to lack of cadre or on grounds of age, are discussed during the YAŞ meeting held in August every year. In a press briefing held after the Supreme Military Council's annual summer meeting on 2 August 2019, Presidential Spokesperson İbrahim KALIN announced that the number of active generals and admirals will drop from 241 to 233 after the implementation of YAŞ 2019 decisions.

According to open sources before YAŞ 2019 promotions (1 Rear Admiral [LH] has been promoted to Rear Admiral [UH] rank and 11 Colonels have been promoted to Rear Admiral [LH] rank) and retirements (1 Rear Admiral [UH] and 7 Rear Admiral [LH] have been retired due to lack of cadre) there were 50 admirals in TNFC including 1 Admiral (Naval Forces Commander), 1 Vice Admiral (Fleet Commander), 6 Rear Admirals (UH) and 42 Rear Admirals (LH). According to our estimation as of 1 September 2019 the TNFC has 53 admirals including Naval Forces Commander Admiral Adnan ÖZBAL, Fleet Commander Vice Admiral Ercüment TATLIOĞLU, 6 Rear Admirals (UH) and 45 Rear Admirals (LH), which is still less than the figure that it had before 15 July 2016.

Considering the fact that approximately 87% of Turkey's foreign trade is performed via maritime shipping, ensuring the security of neighbouring seas and sea lines of communications, where Turkish maritime trade is concentrated and protecting the sovereignty rights and maritime interests of the country is of vital importance for Turkey. Supporting the defence of the TRNC and the protection of its vital rights and interests at sea is also among the objectives of the Turkish Naval Forces.

Due to the ongoing disputes on the delimitation of maritime jurisdiction areas (EEZs) in order to demonstrate a powerful presence against possible risks and threats existing in the Eastern Mediterranean and to discourage it and to prevent any fait accompli on the continental shelf issue, the TNF's main area of concentration has been shifted from the Aegean to the Eastern Mediterranean. In order to ensure maritime security in risky maritime areas, the TNF ensures its constant presence either with a national asset or in coordination with NATO and/or multinational maritime task groups, to protect sea lines of communications. To provide security for the increasing tanker traffic at sea following the activation of the of Baku-Tbilisi-Ceyhan Pipeline, to have situational awareness in Turkish maritime jurisdiction areas and to assert its constant presence in large numbers around Cyprus Island, the TNF launched a national Maritime Security Operation named 'Mediterranean Shield' in the Eastern Mediterranean on 1 April 2006. Since February 2018 Operation Mediterranean Shield only covers duties and operations being carried out by the TNF surface and under surface platforms in the Eastern Mediterranean. Due to rising tensions in the Eastern Mediterranean, in order to show its strength in the Mediterranean, the TNF has boosted its presence and deployed 26 naval vessels (including submarines) simultaneously under both Operation Mediterranean Shield and NATO/UN task forces as of March 2018



by Saffet UYANIK

A Brief Look at Current Surface and Submarine Platforms of The Hellenic Navy

The Hellenic Navy is the naval force of Greece, part of the Hellenic Armed Forces. The Hellenic Navy carries out the necessary missions and tasks to preserve the territorial integrity of the country, protect Greece's sovereign rights and national interests, and fulfill the objectives of the national defence policy. To achieve those tasks, the Hellenic Navy maintains many surface combatants and submarines in its inventory. Greece constitutes a region with significant geopolitical importance for the West with its 6,000 islands and islets scattered in the Aegean and Ionian Seas and it connects the Black Sea, the Straits, the SE Mediterranean, Cyprus and the Middle East. Therefore, the development of naval power is a primary defence objective. The main local operation area of the Hellenic Navy is the Aegean and the Ionian Sea. As Greece lies between three continents (Europe, Asia, Africa), there is a great deal of sea traffic and potentially illegal activity (smuggling, illegal immigration, possible terrorist activity, etc.) This creates an uncertain environment for sea operations and gives adversaries many hiding opportunities. The Hellenic Navy keeps a continuous naval presence on the Hellenic islands, Eastern Aegean, and the broader region of the island of Corfu (Kerkyra). This presence is exercised by warship patrols, which confront any activities against Greece's national security and assist the Coast Guard in intercepting illegal immigrants as well as smugglers. The Hellenic Navy also contributes to social activities and participates in peace-support missions. Naval operational training is conducted at various levels as the Hellenic Fleet participates in both national and NATO exercises.

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To accomplish its missions successfully, the Hellenic Navy disposes of a sizeable fleet consisting mainly of frigates, fast missile boats, and submarines, equipped with modern electronics and weapon systems. The Navy also operates numerous logistic ships necessary for supporting battle units. The frigates which constitute the core of the Hellenic Fleet, with large displacement and strong firepower, can simultaneously conduct all types of missions such as anti-surface warfare (ASuW), anti-aircraft warfare (AAW), and anti-submarine warfare (ASW). The total displacement of the fleet is approximately 150,000 tons, and it is the 22nd largest Navy in the world according to the total number of vessels. The Hellenic Navy also operates several naval aviation units. Modern weapons of the Navy include the HARPOON, PENGUIN, and EXOCET surface-to-surface guided missiles, the SEA SPARROW, and EVOLVED SEA SPARROW surface-to-air guided missiles, and the PENGUIN anti-ship guided missiles fired from the modern S-70B-6 Aegean Hawk helicopters. These helicopters, together with the older AB-212 ASW helicopter and the new P-3B maritime patrol aircraft, constitute the core of the Fleet's air-arm. They participate both in surface operations and in anti-submarine missions since they are equipped with specialized submarine detection systems and respective armaments.

The Hellenic Navy had its most significant change during the early 1970s when Greece was the first Mediterranean naval force to order missile-equipped Fast Attack Craft (Combattante II) and the Type 209 submarines. US military aid continued in the form of FRAM II class destroyers. In 1979, the Hellenic Navy placed an order for two modern Standard class frigates (the Elli class). These were the first acquisitions of new main surface vessels, rather than the use of second-hand ships, in almost four decades. Hellenic Navy was enhanced to his maximum point during the last decade. The arrivals of Hydra class (MEKO 200 HN) and more Standard class frigates along with the orders for more missile corvettes, Poseidon class Type 209 submarines, and naval helicopters allowed the retirement of the obsolete vessels. Greece also received four Charles F. Adams class destroyers from the US Navy in 1992. However, all four have since been decommissioned as their electronics and missiles were considered not able to stand in a modern battlefield.

The Hellenic Navy's fleet of warships and auxiliary ships is harbored in the two major HN Naval Bases at Salamis Island near Piraeus and Souda Bay on the island of Crete.

The Hellenic Navy operates 13 frigates as its primary strike force. The fleet consists of **the Hydra Class (Meko-200HN) and the Elli Class (Kortenaer Class) Frigates**. Four of these vessels are Hydra class frigates, which are based on German MEKO 200 series modular warships. Greece decided to acquire the Hydra class (Meko 200 Mod 3HN) on April 18, 1988. Initially, the program previsioned the commission of six vessels and partially secured through US FMS aid. The lead ship of its class HS Hydra (F-452), which was built by the German company Blohm and Voss in Hamburg, was ordered on February 10, 1989, and commissioned in 1992. The remaining three ships were ordered on May 10, 1989 and constructed at the Hellenic Shipyards in Skaramagas. HS Spetsai (F-453) was commissioned in 1996, HS Psara (F-454) in 1998 and HS Salamis (F-455) in 1999.

Based on the MEKO 200 frigates, the Hydra class is made from high-tensile structural steel with a yield strength of S355 N/mm². The frigates have high-level shock resistance specifications required for the fire control and radar systems, which provide blast and gas pressure protection to preserve the integrity of the onboard weapon systems. One of the key features of the MEKO design concept, the vessels have twelve self-sufficient watertight compartments, which can operate independently of each other regarding the supply of electrical energy, ventilation, air conditioning, and firefighting facilities. The MEKO-200 frigate is also fitted with a permanent air protection system called Constant Sealed System, which increases survivability compared to the other naval vessels. As the compartments can function independently, the bulkheads can be sealed off simply by closing the doors, which significantly enhances damage control. The frigates can also be continuously operated as complete NBC citadels during in extreme cases. The air conditioning, air pressure, and status of outer doors can all be monitored and controlled through the NAUTOS naval automation system. The central NAUTOS, developed by Siemens, can be operated from the two Damage Control Section areas and the damage control headquarters (DCHQ) in the machinery control room (MCR).

HS Salamis F-455

The Hydra class frigates have a length of 117.5m, a beam of 14.8m and a maximum displacement of about 3,400 tons. The vessels are fitted with two MTU 20V956 TB82 diesel engines (3,830kW) and two GE LM2500-30 gas turbines (22,300kW) in a CODOG (Combined Diesel or Gas) arrangement. The ships have a top speed of 31 knots (gas turbines) and a cruising speed of 21 knots (diesel). The Hydra class frigates are equipped with the Thales Nederland STACOS Mod 2 (Links 11 and 14) command and control system (C2) and Mk XII Mod 4 IFF. The sensor suite of the frigates includes an MW08 3D air search radar (F/G-band), a DA08 Fast Fourier Transform (FFT) medium-range air and surface radar (F-band), two STIR-18 fire control radars (I/J/K-band), and a Racal ARPA26890 BT navigation radar (I-band). The frigates are armed with 8 Boeing Harpoon Block 1C anti-ship missiles packed in two quad launchers (AN/SWG-1A(V)) installed on the upper deck behind the mainmast, and 16 Raytheon Sea Sparrow surface-to-air missiles fired from Mk 48 Mod 2 vertical launchers located aft of the ship's funnels. In May 2007, Greece awarded Thales to upgrade the STIR fire control system to allow the firing of the RIM-162 ESSM surface-to-air missiles. HS Salamis (F-455) was the first ship to be upgraded, and the other three vessels were upgraded in 2008.

The main gun of the frigates is the FMC 127mm mk45 mod 2A with a fire rate of 20 rounds per minute. The vessels are also equipped with two six-barrel General Dynamics/Raytheon Phalanx Mk 15 Mod 12 close-in weapons systems (CIWS) for self-protection. The anti-submarine warfare system consists of two triple launched 324 mm Mk 32 Mod 5 tubes installed on the port and starboard sides of the ship. The frigates are armed with active and passive homing Honeywell Mk46 Mod 5 torpedoes with a range of 11km. The vessels are fitted with the Raytheon SQS-56/DE 1160 hull-mounted sonar system to detect enemy submarines. The Hydra class frigates use different types of countermeasures for self-defence and electronic warfare. The equipment consists of four SCLAR decoy launchers, SLQ-25 NIXIE torpedo decoy, Argo AR700 electronic support measure (ESM) system, Argo APECS II electronic countermeasure (ECM) system, and Telegon 10 ESM system. The ship accommodates a single Sikorsky S-70B-6 Aegean Hawk or a 10-ton class helicopter. The Aegean Hawk can carry two Mk46 torpedoes or the Kongsberg Penguin Mk2 Mod 7 anti-ship missile.

In 2015, Greece intended to modernize the Hydra class frigates. The Hellenic Navy planned to implement a mid-life

modernization program with a cost of €400 Million that would extend their lives to 2035. However, this upgrade was postponed due to the financial difficulties of Greece. In May 2019, the modernization plans were resurrected again with limited funds (€150 Million). As the available funding is not enough for a full modernization program, it is expected to cover only the CMS, ESM, sensors, and radars, which are necessary for the combat capabilities of the ships.

Along with Hydra class frigates, the Hellenic Navy also operates 9 Elli class Frigates. These ships are ex-Royal Netherlands Navy Kortenaer class frigates (also known as Standard class or S-class frigates). Kortenaer class frigates were designed in the late 1960s as a replacement for the older ASW destroyers in service in the Dutch Navy. Between 1978 and 1982, a total of twelve frigates were built in the Netherlands. Ten were constructed at the former Royal Schelde Shipyard in Vlissingen and two by the former Wilton-Fijenoord Shipyard in Schiedam. The lead of the class HS Elli (F-450), and its sister ship HS Limnos (F-451) were sold to Greece while still under construction. These two frigates became the most modern warships of the Hellenic Navy at that time. Eight of the remaining vessels HS Adrias (F-459), HS Aegeon (F-460), HS Navarinon (F-461), HS Kountouriotis (F-462), HS Bouboulina (F-463), HS Kanaris (F-464), HS Themistoklis (F-465), and HS Nikiforos Fokas (F-466) were later transferred to the Hellenic Navy during the period between 1993 and 2003.

The Elli class Frigates have a displacement of around 3,800 tons at full load. The vessels are 130.5m long and 14.6m wide. The propulsion is Combined Gas or Gas (COGOG), which allows the ships to reach full speed in less than two minutes. The ships are fitted with 2 Rolls Royce Tyne RM1C gas turbines (3,700 kW) and 2 Rolls Royce Olympus TM3B gas turbines (19,200 kW) and have a maximum speed of 30 knots with a range of 4,700 nm at 16 knots. The ships are armed with an OTO Melara Compatto 76mm naval gun as their main weapon. The OTO Melara Compatto 76mm has a maximum range of 16 km with a fire of 85 rounds per minute. For self-protection, the Elli class vessels are equipped with a Raytheon Mk15 Phalanx Close-In-Weapon System (CIWS) to defeat anti-ship missiles and other hostile air threats. Unlike the other frigates of the class, HS Elli and HS Limnos have a second gun installed on top of the helicopter hangar instead of the Phalanx CIWS. Alternately, those ships have two Phalanx systems installed on each side of the hangar. Some ships of the class, HS Adrias (F-459), HS Aegeon (F-460), HS Navarinon (F-461), and HS Kountouriotis (F-462) are also equipped with two Oerlikon Mk10 20mm autocannons at each side of the mainmast. The Mk10 autocannon has a maximum firing range of 4,400m and a cyclic fire rate of 450 rounds per minute.

Each frigate is armed with 8 Boeing RGM-84D Harpoon anti-ship missiles carried in two Mk141 quad launchers to engage surface targets. The Elli class frigates also carry Raytheon Sea Sparrow surface-to-air missiles in 8-cell Mk29 Guided Missile Vertical Launching System (GMVLS) to provide anti-aircraft protection. The ships equipped with two twin Mk32 Mod 9 torpedo launchers in fixed positions for Anti-Submarine Warfare (ASW). The tubes can launch Honeywell Mk46 Mod 5 lightweight torpedoes with a maximum range of approximately 11km to engage fast attack submarines and surface targets. A mid-life modernization program for six of these frigates, HS HS Elli (F-450), Limnos (F-451), HS Adrias (F-459), HS Aegeon (F-460), HS Navarinon (F-461), and HS Kountouriotis (F-462), was started at Hellenic Shipyards in 2004 and completed in 2009. The upgrade program aimed to extend the service lives of the frigates by 20 years. As part of the modernization program, the Sewaco Mk2 Combat Management System (CMS) was replaced with Thales TACTICOS system, new and improved sensors like the Thales MIRADOR electro-optical target tracker and Thales SCOUT Mk2 LPI navigation radars were installed, WM25 fire-control radar and LW08 long-range air-search radars were upgraded, Elettronika SPHINX electronic support measure (ESM) was replaced with the EDO CS-3701 system, and flight decks were strengthened to allow the landing of Aegean Hawks. The hangars of HS Elli and Limnos frigates are 2m longer than the Standard class frigates to accommodate an AB-212 ASW helicopter. The modernized frigates can also carry an S70 Aegean Hawk.

The Hellenic Navy currently operates 11 submarines. The newest and most advanced

HS Kountouriotis (F-462)

boat of the fleet is **the Type 214 Papanikolis Class submarine**. The Type 214 is a diesel-electric submarine developed by the German Howaldtswerke-Deutsche Werft (HDW), and it is considered to be one of the most advanced conventional submarines in service. It features diesel propulsion and an additional air-independent propulsion (AIP) system using Siemens proton-exchange membrane fuel cells (also known as polymer electrolyte membrane - PEM) compressed hydrogen fuel cells. The AIP technology allows the submarine to operate without access to atmospheric oxygen (using a snorkel). The Type 214 is derived from the Type 212 submarine. However, unlike its smaller predecessor, Type 214 lacks a non-magnetic steel hull, which makes the boat hard to detect using a magnetic anomaly detector. Greece signed a contract to procure three Type 214 submarines for the Hellenic Navy on February 15, 2000 and placed an additional order for the fourth unit in June 2002. HS Papanikolis (S-120), the first Type 214 boat, was built at HDW Kiel Germany in February 2001 and launched on April 22, 2004. In January 2005, HDW's ThyssenKrupp Marine (TKMS) parent company bought Hellenic Shipyards in Skaramangas near Athens and built the other three submarines, HS Pipinos (S-121), HS Matrozos (S-122), and HS Katsonis (S-123) in Greece.

The pressure hull of the Type 214 submarine is made from advanced HY-100 steel, which allows it to have an increased diving depth of approximately 400m, with a length of 65m and a beam of 6.3m. The displacement of the vessel is 1,700 tons when surfaced and 1,980 tons when submerged. The Type 214 subs have 8 x 533 mm torpedo tubes, and four of the eight torpedo tubes are capable of firing UGM-84 Harpoon missiles. The Papanikolis Class submarines of the Hellenic Navy uses the WASS (Whitehead Alenia Sistemi Subacquei) Black Shark heavyweight torpedoes. The Black Shark is a dual-purpose, wire-guided torpedo which is fitted with Astra active/passive acoustic head and a multitarget guidance and control unit incorporating a counter-

HS Papanikolis (S-120)

countermeasures system. The Type 214 subs are powered by Hybrid diesel electric main machinery. The boats are fitted with 2 x MTU 16V-396 (3.96 MW) diesel engines, and 2 x Piller Ntb56.40-10 generators (0.97MW). The AIP system is based on 2 x HDW BZM120 PEM fuel cell modules (silver oxide and aluminum, 120 kW each) with a low noise skewback propeller.

The Papanikolis Class submarines have a maximum speed of 12 knots (surfaced) and 20 knots (submerged). The maximum range of the subs is 12,000 nm at 6 knots (surfaced), 420 nm at 8 knots (submerged), and 1,248 nm at 4 knots (fuel cells). The vessels can accommodate a total of 27 sailors, including five officers. The subs can also carry food, fresh water, and fuel for 84 days of operation. The sensor suite of the Type 214 submarines consists of the sonar systems, an attack periscope, and an optronic mast. The ATLAS Elektronik ISUS 90 integrated sensor underwater system integrates all sensors and command and control (C2) functions on board the submarine through the link 11 tactical data link provided by BAE Systems. The Papanikolis class submarines are equipped with a hoistable radar mast that does not penetrate the pressure hull. The radar mast hosts the transmitter of the Thales SPHINX LPI (Low probability of intercept) tactical radar, the electronic support measures system (ESM), and the global positioning system (GPS) sensors.

In 2006, HS Papanikolis was found to have numerous technical problems, which cause excessive propeller cavitation, overheating of the AIP fuel cells, and excessive rolling in bad weather when surfaced. Hellenic Navy refused to accept the delivery of the vessel until all the boat's technical problems had been solved. In October 2008, the vessel successfully completed a further series of sea trials, which showed that the excessive rolling problem had finally been fixed, and the rest of the problems were also considered solved. In May 2011, HDW canceled the contract for the additional two Type 214 boats in response to bribery allegations involving Abu Dhabi Mar, which became the majority shareholder of Hellenic Shipyards in 2010.

Other than the Type 214 boats, Hellenic Navy also operates a submarine flotilla of seven **Type 209 vessels**. The Type 209 is a diesel-electric attack submarine developed exclusively for export by Howaldtswerke-Deutsche Werft (HDW) of Germany. Despite not being operated by the German Navy, five variants of the class (209/1100, 209/1200, 209/1300, 209/1400, and 209/1500) have been successfully exported to 13 countries, with 61 submarines being built and commissioned between 1971 and 2008. The Hellenic Navy is also the first user of Type 209 vessels. Before the Type 214 entered service, the Hellenic Navy fielded 4 **Glavkos class Type 209/1100 boats** (S-110, S-111, S-112, S-113) commissioned between 1971-1973, and 4 Poseidon class Type 209/1200 boats (S-114, S-117, S-118, S-119) commissioned from 1979-1980.

The Glavkos class includes four Type 209/1100 diesel-electric submarines, constructed at the

S-116 Possedion

HDW shipyard in Kiel. In 1989, as the boats neared their 20 years of service, the Hellenic Navy started the "Neptune I" program to upgrade the 4 Glavkos class boats. HS Glavkos (S-110) was retrofitted in Germany in 1991, and the other three underwent a modernization process at the Salamis Naval Base in Greece until 2000. The boats with "Neptune I" upgrades received flank array sonar and significant electronics upgrades, including the ability to fire UGM-84 Harpoon anti-ship missiles. In the late 1970s, Greece ordered a second batch of four Type 209/1200 submarines named the Poseidon class in Greece.

In 2002, Hellenic shipyards began the "Neptune II" modernization program. HS Okeanos (S-118), the third vessel of the Poseidon class, was modernized at Hellenic Shipyards as part of the Neptune II program and recommissioned into the Navy in 2014. The upgrades included cutting the hull and installing a 6.5m long Air-Independent Propulsion section, hydrogen storage tanks for the AIP, flank array sonar, electronics upgrades, an electro-optic mast with satellite communication capability, and Harpoon missile firing capability. The new upgrades were so extensive that HS Okeanos (S-118) is categorized now as a Type 209/1500.

There are several variants of the Type 209 submarines with different model numbers. Although the dimensions may vary slightly between them, all versions are powered by a combined diesel-electric arrangement that features 4x MTU diesel engines and 4x 120-cell AEG generators. The AEG electric motor is directly attached to the propeller. The Type 209 boats have a maximum speed of 11 knots on the surface with up to 22 knots when submerged. The maximum range is 11,000 nm at snorkel depth with a mission endurance window around 50 days. The vessels can dive to a depth of 250m; however, they can also dive to 500 in theory. Just as the other diesel-electric submarines, the boats are required to surface to recharge their batteries and to replenish their oxygen supplies. The vessels have a total crew complement of 35. The Type 209 submarines are armed with 8x 533 mm bow torpedo tubes and 14 torpedoes. The vessels can dispense naval mines and the Type 209/1200s used by Greece are also capable of launching UGM-84 Harpoon anti-ship missiles.

The Hellenic Navy operates ten **gunboats of the Osprey and Asheville Class**. Both Osprey HSY-55 and Osprey HSY-56A classes are designed by the Hellenic Navy following a modular concept so that weapons and sensors can be changed as required. They were built by Hellenic Shipyards (HSY) in Greece. These ships are similar to Gunboats Class HSY-55 and were also constructed by Hellenic Shipyards (HSY). They are the most modern patrol vessels of the Hellenic Navy. The first ship of the class named HS Machitis (P-266) was commissioned on October 29, 2003. These vessels are similar in appearance to Gunboats Class Osprey 55. The first pair was ordered on February 20, 1990. HS Pyrpolitis (P-57) was launched on September 16, 1992, and HS Polemistis (P-61) on June 21, 1993. Each ship can carry 25 fully equipped troops. Alternative guns and Harpoon missiles can be fitted as required. All of the four ships of the class are still in active service. The two Asheville Class gunboats are former US Navy vessels, bought and transferred to Greece in 1989.

The fleet consists of 17 **Missile Boats**, also known as **Fast Attack Missile Crafts**. A fast attack craft (FAC) is a small, fast, agile and offensive warship armed with anti-ship missiles, gun or torpedoes. FACs are usually operated in close proximity to land as they lack all-round defensive capabilities to survive in blue water. The size of the vessel also limits the fuel, stores and water supplies. Their displacement may vary between 50–800 tons and can reach speeds of 25–50 knots. The primary purpose of these vessels is fast-attack offensive anti-ship warfare. The Hellenic Navy operates four types of missile boats. These are the Roussen (Super-Vita), Laskos (La Combattante III), Kavaloudis (La Combattante IIIb), and Votsis (La Combattante

IIa) classes. The La Combattante III and La Combattante IIIb were upgraded in 2006. For the Combattante III crafts, Thales delivered a TACTICOS combat management system, including four multifunctional operator consoles, one surveillance radar, a fire-control tracking system, one electro-optical tracking, and a fire control system, an integrated low-probability-of-interception radar, two target designation sights, and a tactical data link. The weapon suite of the Combattante IIIs remained unchanged. Thales was also responsible for the integration of existing guns, surface-to-surface missiles, and torpedoes. The La Combattante IIa ships are scheduled to be decommissioned upon completion of the two newly ordered Roussen gunboats.

The Roussen class is a British-design fast attack missile boats improved and customized for the Hellenic Navy. The plans of the Roussen Class missile boats are based on smaller Vita class boats serving in the navies of Qatar, as well as similar size vessels built for Oman and other countries. The hull is made of steel and the superstructure is made of Aluminum. Vosper Thornycroft (now BAE Systems Surface Ships) provides the electricity transmission system, the management board, electrical equipment and systems countermeasures. The main armament of the ships is eight Exocet MM40 Block II/III anti-ship missiles with a range of up to 70/180 km respectively. They are complemented by an Otobreda 76 mm naval gun in the bow and two smaller 30mm cannons as secondary weapons located on the ships' superstructure. The vessel's primary anti-air and anti-missile weapon is the RIM-116 RAM missile system which comprises an on-board Mk-31 launcher with 21 projectiles, as well as the DR3000 and AR900 electronic support measures systems and the Mk36 SRBOC decoy launcher. The sensor suite includes the MW08 3D G-band surveillance radar, the Mirador electro-optical target tracker and the Scout Mk-II low probability of intercept (LPI) radar which is integrated to the TACTICOS combat management system.

HS Roussen (P-67)

The Hellenic Navy currently operates 9 **Tank Landing Ships** of the Greek built **Jason Class (LST) and the Ukrainian/Russian built Zubr Class (LCAC)**. The Jason landing craft can transport 287 troops plus 22 battle tanks or any other combination of other armored vehicles. The Jason-class LST is a tank landing ship designed and built in Greece through a cooperation of Elefsis Shipyards with the National Technical University of Athens and the Hellenic Navy. Along with the Zubr class LCAC, they are the main amphibious warfare ships of the Hellenic Navy. The first was laid down on 18 April 1987, second in September 1987, third in May 1988, fourth in April 1989 and fifth in November 1989. Completion of all five and the last three were severely delayed by the shipyard's financial problems, which was privatized in October 1997. Greece tried to start building a sixth ship in 2000 but cancelled it before construction began. The ships are capable of transporting 350 infantry troops, but they can transport up to 1,200 infantries for short distances, and they can also carry up to 22 main battle tanks (MBTs) or a variety of other equipment such as armored personnel carriers (APCs), howitzers, MLRS, and, trucks. Each ship of the class is armed with one Oto Melara 76mm/62 Mod 9 compact naval gun, two Breda 40mm/70 guns and two smaller Rheinmetall 20mm (2 twin) guns. The primary radar of the ships is the Thomson-CSF TRS-3030 Triton (G-band) 2D Surface-to-Air & Surface-to-Surface Radar. The Thomson-CSF Vega II command and control system and Pollux TRS3220 fast-scanning fire control radar is also installed on the ships.

The Zubr Class is an air-cushioned landing craft (LCAC). This class of military hovercraft is, as of 2012, the world's largest, with a standard full load displacement of 555 tons. The hovercraft is designed to sealift amphibious assault units (such as marines and tanks) from equipped or non-equipped vessels to non-equipped shores, as well as transport and plant naval mines. The purchase of HS Cephalonia (L-180) for the Hellenic Navy was the first time a Soviet design had been built for and purchased by a NATO member. The Zubr crafts have a military lift of total 130 tons of cargo with 3 battle tanks, 8 armored vehicles, 10 personnel carriers and 140 troops or combinations of those and a speed of 40 knots when fully loaded. The Zubr class landing craft has a cargo area of 400 square meters and a fuel capacity of 56 tons. It can carry three main battle tanks (up to 150 tons), or ten armored vehicles with 140 troops (up to 131 tons), or 8 armored personnel carriers of total mass up to 115 tons, or 8 amphibious tanks or up to 500 soldiers (with 360 soldiers in the cargo compartment)

by İbrahim SÜNNETÇİ

RIM-116 Rolling Airframe Missile (RAM) Ship Self-Defence Weapon System & RIM-116C Block II Missile

Raytheon Missile Systems and the RAM-System GmbH (RAMSYS), consortium of Diehl BGT and MBDA Deutschland GmbH in Germany, are prime contractors and co-operating partners for the RAM Program. RAMSYS and Raytheon Missile Systems are continuing to deliver the latest Block II version of the RIM-116 Rolling Airframe Missile (RAM) Ship Self-Defence Weapon System. The RAM Block II is designed to pace the evolving anti-ship cruise missile threat and improve performance against complex stream raid engagement scenarios.

The Rolling Airframe Missile (RAM) is a fire-and-forget Close-In Weapon System (CIWS) for ship self-Defence against Anti-Ship Missiles (ASM), helicopters, aircraft and surface targets. The RAM was designed to engage the most challenging threats and is one of the few ASM Defence systems capable of effectively coping with multiple and high-density raids, even in littoral scenarios. The RAM Mk31 Guided Missile Weapon System consists of a rotatable and elevating launcher (Mk49 GMLS) with 21 cells for the storage of the highly precise RIM-116 Block I and Block II missiles and is integrated with the Combat Management System (CMS) of the naval platform. The RAM's specific self-Defence capabilities include fast reaction time, multiple-threat engagement (more than 4 threats), high maneuverability and high lethality.

Upon target acquisition and assignment by the fire control system of the ship being attacked, based on target data delivered by the onboard sensor equipment, the entire target engagement process runs semi or fully automatically. This means, from this point on the sensor, fire control and computer capacities of the ship firing the missile are free for other tasks. In a typical engagement, radar and passive tracks of a target are correlated by the Combat Direction System, (CDS), which designates the target to the weapon system. A launcher is assigned to the target and subsequently a RAM round is fired. After launch, the RAM Missile detects radar emissions from the target to make midcourse guidance corrections. As the target is approached, guidance is switched to infrared homing for final corrections. Detonation of the warhead within lethal range of the target is initiated by a signal from the optical fuze (Active Optical Target Detector/AOTD). A contact fuze located in the control section provides an alternate method of fuzing by detonating the warhead upon target impact. The MK 20 Mod 2 AOTD is a narrow-beam, active optical proximity fuze system which has been adapted from the AIM-9 Sidewinder program to improve performance against anti-ship cruise missiles at extremely low altitudes over water. The AOTD transmits pulsed IR energy through the four forward windows and an IR detector/receiver receives the reflected energy. Since the missile is rolling through its length axis, via the AOTD's windows/optics a 3D picture of the outer atmosphere is obtained and if the missile could not perform a direct hit to the target and have a passing target the AOTD transmits a signal towards the warhead and then the warhead explodes so even if it's not a direct hit, a tactical hit is achieved.

Normally each aircraft target, which is a relatively straight target, is engaged by one missile but against anti-ship missiles – which needs about 30-40 seconds to hit the vessel – some navies, in accordance with their operational and military doctrines, prefer to fire 2 missiles against 1 target. In case the anti-ship missile is hit by the first missile, the second missile, that knows there is a first missile, continues its flight since there's no target anymore and destroyed after reaching its maximum range, there's no self-destruction mechanism on RAM Missile.

The RIM-116 RAM Missile incorporates passive radio frequency (RF) and Infrared (IR) sensors (dual-mode guidance capability) allowing track and guidance against both radiating and non-radiating threats. The supersonic 5-inch RIM-116 RAM Missile was originally developed using existing AIM-9 Sidewinder components along with a STINGER infrared frequency seeker. The RAM

Missile utilizes the Sidewinder fuze (AOTD upgraded for RAM), warhead, and solid propellant rocket motor. The guidance section consists of a passive RF Receiver and two RF Antennas (interferometer antennas) along with a STINGER IR Seeker. The control section consists of an electromechanical system that directs two variable control wings (canards) and two fixed wings. The RAM Missile is enclosed in a canister that also serves as a launching tube.

The RAM incorporates a statically controlled rolling airframe during flight with full maneuverability obtained by a single plane of control surfaces and a closed loop autopilot. A body fixed RF interferometer incorporates only two forward facing antennas, obtaining two planes of target information over the roll cycle. The IR sensor is mounted to a free gyro seeker, which also serves as the inertial reference for body decoupling. The RAM Block I IR sensor incorporates 80-element linear array, which uses the free gyro spin and missile roll to provide an accurate inertially referenced IR image. This allows real time acquisition and discrimination of targets in a variety of maritime backgrounds.

The RAM has been in production since 1989 and is operational on over 220 Launchers on more than 165 ships, ranging from 500-ton Fast Attack Craft to 95,000-ton aircraft carriers in 11 countries worldwide. In total RAMSYS and Raytheon Missile Systems have produced more than 5,500 missiles including RIM-116A (Block 0), RIM-116B (Block I), RIM-116B-1 (Block IA HAS [Helicopter, Aircraft, Surface]) and RIM-116C (Block II). In more than 590 flight tests and operational firings performed against current and looming advanced anti-ship threats the RAM has proven first-shot kills on target in self-Defence scenarios such as lowest level sea-skimming, diving and highly maneuvering profiles in single, stream and wave attacks - achieving a kill-performance above 95%.

Between 2007 and 2012, the RIM-116C RAM Block II upgrade was developed. The RAM Block II was delivered to the US Navy in August 2014 and the Initial Operational Capability (IOC) for the Block II Missile was achieved on 15 May 2015. On 28 March

2013, RAMSYS was awarded a procurement contract for 445 RAM Block II missiles for the German Navy. The missiles will be delivered between 2016 and 2019 and replace older Block 0 missiles, which after more than 20 years, have reached the end of their service life. As of mid 2019 roughly 600-700 RAM Block II Missiles have been delivered of which 400 for the US and rest to Germany and one other customer.

The upgrade comprises a kinematic increase in maneuverability (Enhanced Kinematics, 4 canards vs. 2 for Block 1A) to engage particularly sophisticated anti-ship missiles as well as the integration of an Evolved Radio Frequency Receiver (passive) including signal for the highly accurate evaluation of target data and Upgraded Control and Autopilot System (digital autopilot). These performance characteristics ensure excellent protection against current and future conventional and asymmetrical threats. In particular, they also guarantee protection against hypersonic anti-ship missiles performing maneuvers during final approach and low-signature threats. The Block II upgrade significantly expands the missile's effective engagement envelope by introducing a larger dual-thrust rocket motor and independent four-canard control actuator system to increase effective range and deliver a three-fold improvement in maneuverability. One of the design criteria for the Block II Missile was the new parameters. Block II is an answer for supersonic missile threats. According to Raytheon Missile Systems the RAM Block II Missiles are 2.5 times more maneuverable and have 1.5 times the effective intercept range.

The RAM Block II Missile is a little bit longer and larger than the Block I version but there is enough space in the Mk49 Guided Missile Launching System (GMLS, Launcher). Even the Block II Missile is a little bit heavier, roughly 20 kg, than the Block I versions the total weight of 21-Cell Mk49 Mod 3 Launcher is about a half a ton heavier then when it was equipped with RAM Block II Missiles but there's no update required for the trains and for the platform due to the increase in weight. Since from the outer dimension the RAM Block II canister is still the same with the RAM Block I it can be directly put it into the MK49 GMLS. For full integration a software update is required in the below deck equipment and in the hardware components. In this context the Combat Management System (CMS) of the ship that normally thinks there is a RAM Block I Missile in the canister/Launcher with previously identified parameters, needs new software for Block II Missile to let it recognize that there is a Block II Missile inside the canister. For the CDS (Combat Direction System, which designates the target to the weapon system)a software update is obviously requested because of the physical and electronical parameters, and the parameters regarding the RAM Block II's sensor suite, which is different and has higher performance, the CMS has to recognize how to interact with that – that is the main problem for the integration of the RAM Block II on a

vessel with the RAM Mk31 Guided Missile Weapon System. But it is not a significant endeavor, it is relatively quite easy to integrate.

Stabilized by rolling through the air, the RIM-116B (Block I) and RIM-116B-1 (Block IA HAS [Helicopter, Aircraft, Surface]) Missiles have a length of 2,819 meters, a diameter of 127 millimeters and weigh 73.4 kg, including a 11.3 kg blast fragmentation warhead (with a 3.58 kg [7.9 lbs] explosive). The Block I and Block IA/HAS missiles are able to travel at a speed of over Mach 2 and have a maximum operational range of 5.1 nm, which was increased with the Block II version. The RIM-116C Block II Missile has a length of 2.88 meters, a diameter of 159 millimeters and weighs 91 kg. The RAM Block II Missile is claimed to have a maximum operational range of 7.5 nm, maximum speed of Mach 2.80 at sea level and can accelerate at +60G's.

In 2017 the US Navy revealed its plans for a further upgrade of the RIM-116C RAM Block II missile as part of efforts to improve the missile's performance against complex multi-missile raids. Known as the RAM Block IIB Raid Engineering Change Proposal (ECP) the upgrade will provide an upgraded seeker and Missile-to-Missile Link (MML) capability to counter emerging complex raid threats. Meanwhile in June 2019 Raytheon Missile Systems disclosed that the U.S. Navy has completed a series of guided flight tests for the improved the RAM Block 2A Missile at the Naval Air Warfare Center in China Lake, California from the Navy's self-Defence test ship off the coast of Southern California. Raytheon expects to deliver the missile to the Navy by the end of 2019.

RIM-116 RAM Ship Self-Defence Weapon System & Turkish Naval Forces

The Mk49 Mod 3 Lancers supplied from RAMSYS are used in 4 ADA Class Corvettes constructed under the MİLGEM (National Vessel) Project. Aselsan and RAMSYS signed a €10 Million contract on 31 December 2007, for the procurement of one 21-Cell Mk49 Mod 3 Launcher and the electronic sub-systems required to integrate the system into the TCG Heybeliada Corvette, the

first ship built under the MİLGEM Project. With this contract award, the Turkish Naval Forces became the 7th RAM user (this number has now reached 11) after Germany, the U.S., South Korea, Greece, Egypt, and the UAE. A further contract valued at €18.4 Million was signed with RAMSYS on 19 December 2008, for the supply of 25 RIM-116B-1 Block IA/HAS (24+1 [telemetry]) Missiles to be used on the TCG Heybeliada Corvette. RAMSYS also supplied 25 RIM-116B-1 Block IA/HAS (24+1 [telemetry]) Missiles and the Mk49 Mod 3 Launcher for the TCG Büyükada Corvette. The €17.6 Million contract for the 25 RIM-116 B-1 Block IA/HAS Missiles was signed on July 20, 2011.

The last two ADA Class Corvettes, TCG Burgazada, and TCG Kınalıada are planned to use RAM Block II Missiles. In this context, negotiations with both RAMSYS and Raytheon Missile Systems (via the FMS channel) for the procurement of RAM Block II Missiles to meet the Navy's requirements were carried out during 2017 and 2018. Considering that RAMSYS may be subjected to the export license restrictions of the German Government, Turkey requested an offer from Raytheon Missile Systems in 2018 through the FMS channel and Raytheon Missile Systems announced in May 2018 that they would provide the U.S. Navy and U.S. Allies with the RAM Block II to protect ships from incoming missiles. According to Raytheon, this contract, which has options that could increase its value to US$529,8 Million, combines purchases for the Navy and the Governments of Qatar, Egypt, and Turkey. The contract is expected to be completed by 2023. However, according to our sources since the contract for the procurement of RAM Block II Missiles has not been signed yet the deliveries could not take place before the commissioning of the third ship of ADA Class Corvettes TCG Burgazada (F-513) on 4 November 2018, and the fourth and last vessel TCG Kınalıada (F-514) on 29 September 2019. According to video footage from the commissioning ceremonies, while there were only nine canisters (probably either dummy or filled with RIM-116B-1 Block IA/HAS missiles) in the Mk49 Launcher on the TCG Burgazada, the Mk49 Launcher on TCG Kınalıada was empty. Consequently, the corvettes have entered into the service of the Turkish Naval Forces without air Defence missiles ■

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“In the PREVEZE Class We will Drop in New Periscopes!”

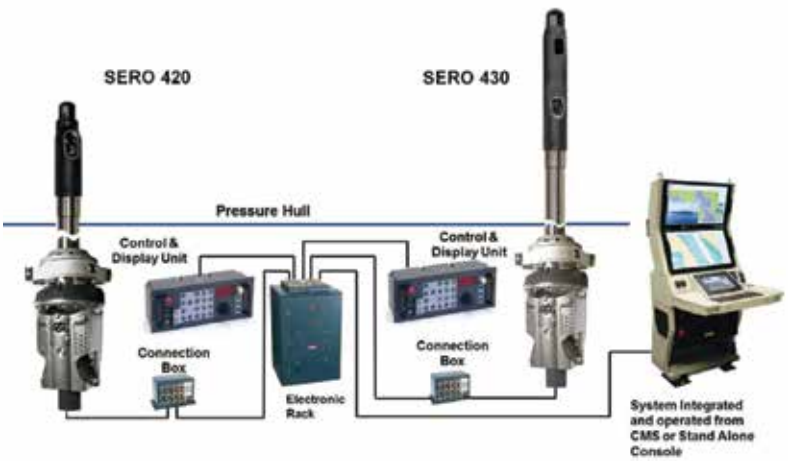
HENSOLDT Optronics’ (which emerged from Carl Zeiss Optronics) heritage in submarine systems dates back to the beginning of the 20th century. In 1903, the company developed and produced the world’s first fully functional periscope for the German Navy’s “Forelle” submarine. Since then, HENSOLDT Optronics have continuously been pushing technological boundaries and setting new standards in the field of periscope systems. Today, the company has successfully supplied and installed over 3,000 periscopes and optronic mast systems and is capable of offering a complete range of periscopes and optronic masts to meet the requirements of modern submarines, enabling them to meet the challenges of the future.

Defence Turkey talked with Harald HANSEN, Director Sales Maritime at HENSOLDT Optronics GmbH to get firsthand information on HENSOLDT Optronics’ activities in Turkey, their cooperation with Turkish companies and on the periscope and mast systems selected for the integration on Turkish and Pakistan Navy submarines.

On August 5, 2019 HENSOLDT Optronics GmbH announced that it had received a contract from Savunma Teknolojileri Mühendislik (STM) under the PREVEZE Class (Type 209/1400) Diesel-Electric Submarines Mid-Life Upgrade (MLU) Project, to upgrade existing search and attack periscopes onboard four PREVEZE Class Submarines. Under this contract, HENSOLDT Optronics will provide a total of four SERO 420 Attack Periscopes and four SERO 430 Search Periscopes to replace L3 KEO (formerly known as Kollmorgen)’s Model 76 Search and Attack Periscopes ordered in 1987 which were integrated on the submarines during the early 1990s. The periscope upgrade of PREVEZE Class Submarines for the Turkish Navy is the third collaboration project of HENSOLDT Optronics with STM.

As the Prime Contractor of the AY Class (Type 209/1200) Diesel-Electric Submarines Modernization Program STM selected HENSOLDT Optronics and on March 30, 2011 a contract was signed for the delivery of two SERO 250-A Attack Periscopes and two SERO 250-S Search Periscopes to be installed on the TCG Doğanay (S-351) and TCG Dolunay (S-352) submarines. Following the completion of their modernization activities the TCG Dolunay was re-delivered to the Turkish Navy on April 9, 2014 and TCG Doğanay on April 22, 2015. Periscope modernization for the AY Class Submarines’ was HENSOLDT Optronics’ first project with STM. According to Mr. HANSEN this was a very professional and successful project with STM.

HENSOLDT Optronics has also been involved in Pakistan Navy’s Agosta 90B Class Submarines MLU Project, covering the comprehensive upgrade of three submarines, in which STM acts as the Prime Contractor. This is HENSOLDT Optronics’ second project with STM. For the Pakistan Navy’s Agosta 90B Class Submarines HENSOLDT Optronics



is supplying OMS 200 Optronics Masts (Attack Periscope) and SERO 430 Search Periscopes to Prime Contractor STM under a contract awarded in October 2016. This project also was a very complex and was professionally managed and executed by HENSOLDT Optronics as well.

HENSOLDT Optronics was also selected by German Shipyard TKMS (HDW), the Prime Contractor of the Turkish Navy's New Type Submarine Program (covering the construction of 6 REIS Class Type 214TN AIP Submarines at Gölcük Naval Shipyard) and secured a contract in July 2011 for the delivery of six SERO 420 penetrating Attack Periscopes and six OMS 100 non-penetrating Optronics Masts, coupled with Gabler's hoistable mast systems.

Defence Turkey: Can you elaborate on the periscope and mast systems selected for the Turkish Navy and Pakistan Navy submarines?

Harald HANSEN: For the AY Class, we supplied the refit Periscopes SERO 250 Attack and SERO 250 Search. The difference is the addition of a Mid Wave Infrared (MWIR) capability on the search periscope's mast. Recently we have identified the need for increased stealth on the Attack version of SERO 250 and are developing an Ultra Low-Profile mast solution known in the past as a "Needle Nose" head section.

SERO 250 Periscope

For the NTSP a periscope and an optronic mast solution is preferred: a SERO 420 and a OMS 100. The Pakistan contract has a SERO 430 and a OMS 200. Since 2004, more than 45 submarines have been equipped with this classic combination of a Direct View periscope and a non-hull penetrating optronics mast. With the installation of the SERO 420 / OMS 100/150 paired systems, today's submariner is able to undertake a wider range of important tasks in "All weather and All Light conditions" that was not possible with earlier systems.

The PREVEZE Class has both, a SERO 420 and a SERO 430. The difference between the SERO 420 and the SERO 430 is the IR. So the PREVEZE Class will have 2 periscopes. That's the configuration for Turkey and the PREVEZE Class now.

Defence Turkey: Which one is an attack periscope, and which one is surveillance?

Harald HANSEN: At the moment they will be identical periscopes with Attack (Tactical) and Search (Surveillance) capability. Both will be fully integrated into the Combat Management System and given the professionalism of the Turkish Navy they will set up their concepts of operation (CONOPS) for the various mission profiles they will face.

Defence Turkey: You have also a Twin Optronic Mast solution. Can you elaborate on these solutions?

Harald HANSEN: The trend in the New Build SSK (diesel driven submarines) is towards Twin Optronic Mast installations. The change is driven mostly by the changes in the architecture and operation of the Combat Management Systems (CMS) and the way tactical operations will be conducted.

The loss in ability to hang on to an ocular box and see outside directly of the Direct View of a classical periscope necessitates a relook at the Human Machine Interfaces (HMI) of the Optronic Mast, especially regarding safe passage and coming to periscope depth. These challenges have now been addressed in our latest HMI solutions with the introduction of Quick Look Around, Panoramic View display and the transfer of video in real time and at full definition via Fiber Optics.

OMS 150&200

The OMS 150 and OMS 200 are a combination of non-hull penetrating optronic mast systems for new-built submarines. For modern submarine operations, the unique combination of OMS 150 and OMS 200 optronic masts represent the peak of technological innovation.

Defence Turkey: What is the benefit of this configuration? For example, even if your product portfolio includes both the hull penetrating Direct View periscopes and a non-hull penetrating optronic masts, like the Turkish Navy, most of the navies still prefer to have the classic hull penetrating periscope systems…

Harald HANSEN: It's a long and difficult debate. If you speak to operators who have a lot of experience on a periscope, they just say that they will never give away a periscope, especially in the refit markets. Navies undergoing studies towards the definition of requirements for new build submarines, which will be delivered in the 2030's are more orientated to twin optronic masts. Some navies like the Swedish only have got one optronic mast. SSBN and other larger submarines have long ago switched to twin optronic masts, as this best suits their operations mostly based on the principle of "Dive Deep Stay Deep". However there we now experience that even these submarines are far more conscious of Stealth and are now asking for an Ultra Low Profile Mast for when they need to operate in confined waters like the Littorals.

The big debate is stealth, and one of the debates which is a bit skewed is visual stealth. As an Optronic Mast replacement for the Attack Periscope we developed the OMS 200 optronic mast with the same size tube as you would find in the periscope. The trend to increase visual stealth now is to go even smaller than this and produce tube sizes of less than 100mm. To meet this demand, we are in the design and development phase of our Ultra Low Profile Optronic Mast known as the OMS 300. The challenge here is to ensure that the mast from a visual detection point of view does not create surface disturbances such as wake and plume which is the focus of modern ASW periscope detection systems.

A View from the Combat Information Center (CIC) of a PREVEZE Class Submarine

Defence Turkey: Are you cooperating with Gabler or Calzoni for masts?

Harald HANSEN: We mostly work with Gabler and Calzoni and hopefully soon MacTaggart & Scott in the UK, as a supplier (even under contract to Hensoldt Optronics) for the Mast Raising. As an example, in the case of the Agosta 90B Class Project, we are responsible for the supply of the lifting arrangement. So we subcontract Gabler. Now, in the case of the PREVEZE Class we are also are responsible for providing the material for the installation of the periscopes.

Defence Turkey: Are you going to select the OEM for the mast system, or will the end user make the decision on the mast system?

Harald HANSEN: This is very project dependent. In the New Build projects where a shipyard has the main supply contract the decision is that of the shipyard. In the refit project markets where HENSOLDT has the full responsibility either to a Navy or a company such as STM, the decision is normally ours. The decision is normally based on price and delivery lead time.

Defence Turkey: Is Calzoni in discussion for the Pakistan Navy's Agosta 90B Class?

Harald HANSEN: No, the contracts are already in place. We went out an open tender to Calzoni and Gabler. Because bear in mind that the mast is not only for the periscopes, it's also for the snort mast and the communication mast, so I think from an STM point of view they looked at the full portfolio. And finally, in consultation with STM we made the decision to go with Gabler for Agosta 90Bs.

Defence Turkey: What about the mast requirement for the PREVEZE Class Submarine MLU Project? Have you also selected mast systems provider for the PREVEZE Class?

Harald HANSEN: For the PREVEZE Class what we are effectively doing is taking out the existing periscopes solution and dropping in the new periscope. For a periscope solution, that's the pressure hull, inside you have the yoke, on top of this you have lifting hydraulic rods. The other thing that needs to be done is in the pressure hull there are bearings over here, these three bearings need to be replaced and then on the pressure hull there's a penetrator. It's just effectively a box with a hole in it with a brass bush into which the periscope must slide. So that all exists, and we will just replace this with new. For the periscope replacement it is not a complex issue.

Defence Turkey: So, the existing mast system on the PREVEZE Class is Gabler's product?

Harald HANSEN: Yes, the existing system is Gabler and so we'll merely contract Gabler for the replacement of Bearings and Hull Penetrators Gland. It becomes a bit more difficult when you go to this mast (optronics mast such as OMS 200) because now what you have to do is you have to put on yag a complete lifting arrangement with a hydraulic ram that is sitting inside the yag, with the two stroke solution, so this is a lot of metal inside of there, and that is what we have to supply to be able to lift this mast on Agosta 90Bs. So, in the case of Agosta 90B Class, we strip out all of the existing systems and then we have to put in complete new solutions from Gabler.

Defence Turkey: Which one is cheaper?

Harald HANSEN: It has depended only on the complexity and scope of supply. Both are competent companies and our experience with both has been very satisfactory.

Defence Turkey: Can you elaborate on HENSOLDT Optronics' existing cooperation with Turkish companies?

Harald HANSEN: We've got a lot of business with STM – it's a good company and we work with them; we look for opportunities in which we could collaborate.

In the execution of our contracts and in fulfillment of offset obligations we also work very closely with other Turkish supplier such as Aselsan, AYESAŞ and others.

Defence Turkey: HENSOLDT Optronics and STM (BAUMIND) are further expanding their collaboration with the development of a Diver Optical Observation and Communication System (VIPERFISH). What can you tell us about VIPERFISH?

Harald HANSEN: The Bahçeşehir University (BAU), in Istanbul established a Research & Development organization called BAUMIND (BAU İnovasyon ve Danışmanlık A.Ş.), very professional engineers and scientist doing technology development, and R&D in underwater diver communication. We were developing a system known currently as VIPERFISH, which allows special operations divers to communicate easily with a submarine, whilst been also observed visually in infrared and optics. The development is an exciting activity between HENSOLDT Optronics, STM and BAUMIND are under the supervision and control of STM. The major principle for this is the ability to be able to see and communicate to divers in proximity to the submarine. So, we can visually observe the diver now and talk to the diver. It's now going a bit further as on the surface we can even talk to special operation forces or even better we can start talking to diver vehicles.

Harald HANSEN, Director Sales Maritime at HENSOLDT Optronics GmbH

We are still in the definition phase (with hardware ongoing evaluation on both sides with great success) and discussions with End Users (Navies) and shipyards are positive.

Defence Turkey: What about the range of VIPERFISH?

Harald HANSEN: The prediction for the communication range is 50m to 100m, which meets the requirement (given other longer-range communication in acoustics is possible but restricted), and it is always subject to environmental conditions. You want to talk to the diver when they are close. And the good thing is that they will be able to observe the diver.

We intend to install VIPERFISH as a stand-alone system on the fin. It will not be raised very high; its primary function is for under water communication. As operator interface we will supply a universal console. And in the diver solutions there will the capability, on the arm or around the goggles, to be able to communicate.

The big issue with the smaller submarines is that when the divers come back to the submarines they don't know where they are, so they have to swim up to the platform and knock on the pressure hull to say "I'm outside, can you please pick me up"– now at least they can talk as they approach the submarine. It's better to have a dedicated solution for divers. We're building this only for diver communication.

Defence Turkey: Mr. HANSEN thank you for sharing your time for our readers

Leonardo Delivers 1,000th AW139 Helicopter – Multirole Champion

Leonardo recently delivered its1,000th AW139 helicopter. The event represents an historic achievement: the AW139 is the most important helicopter program in the last 15 years on an international level, and it is also able to set a production record in the Italian aviation industry's outlook. The 1,000th machine of this model was delivered to Italy's Guardia di Finanza (Customs police) during an official celebration which was held at Leonardo's plant in Vergiate (Varese - Italy).

The AW139's first flight dates back to the beginning of 2001. The helicopter boasts orders of over **1,100 units from more than 280 customers in over 70 countries on all continents.** The aircraft has shown extraordinary levels of reliability and operational capabilities with almost 2.5 million flight hours recorded since the first delivery took place at the beginning of 2004. Data of use testifies to the extreme versatility of the AW139 which satisfies any market need: more than 30% for public utility tasks such as search and rescue and air ambulance, law enforcement, firefighting, disaster relief; over 30% for offshore transport; around 20% for military tasks; the rest account for VIP, institutional and corporate transport missions. Many of the AW139 missions are perfomed over-seas for medium to long rage operations, including SAR and maritime surveillance.

The AW139 has grown significantly in just a few years, adapting to the changing needs of customers. The maximum take-off weight increased from 6.4 to 7 tons. Almost 1,000 mission kits and equipment have been certified. With advanced protection systems against icing, the AW139 can fly in all weather conditions. This model is also the only one in the world capable of flying continually for over 60 minutes without oil in the transmission, twice as much as the 30 minutes set by the certification authorities. Despite the experience and maturity achieved in 15 years of operational activity, the AW139 remains a young and modern program which is destined to play a leading role well into the future.

The AW139 fleet has a global presence: around 30% in Europe, almost as much in Asia and Australasia, 15% in the American continent, followed by the Middle East. The AW139, along with Leonardo's other new generation models, has played a significant role in the evolution of the market. These aircraft have contributed to the company taking a 40% share of the world's civil sector in terms of value as of 2018.

The AW139 represents a turning point in the rotary-wing sector through the introductory **concept of the Leonardo "helicopter family"**. The AW139 is, in fact, the forefather of a helicopter family that is comprised of the smaller and lighter **AW169** and the larger and heavier **AW189** Models, the only case in the world, that share the same design philosophy, the same high performance, the same flight characteristics and the same certification standards, as well as the same approach to maintenance and training. A concept that allows operators with large diversified fleets, with models with weight ranging from 4 to 9 tons, to create significant synergies in crew training, flight operations, maintenance and logistics support.

Oman's First Hercules was Launched by ARES

ARES Shipyard has proudly announced the launching of the very first patrol craft for Oman on 11 September 2019.

The shipyard signed a contract to supply 14-off ARES 85 HERCULES Fast Patrol Craft to the Royal Oman Police Coast Guard (ROPCG) to be delivered within a four-year acquisition program. It is also known as the first naval export program to the Sultanate of Oman ever to be accomplished in the history of the Turkish Republic.

ARES 85 HERCULES is capable of achieving very high-speeds up to 55 knots which will be used to patrol and secure the nation's waters, to prevent arms and drug trafficking as well as illegal immigration and to control human trafficking in the Gulf of Oman. The vessel has a 12.7-mm auto stabilized remote controlled naval gun which provides versatile firepower which can be adapted to meet the needs of a wide variety of potential scenarios. Additionally, it has a suite of naval communications equipment, electro optic (E/O) sensors and X-band naval radars. The vessel can launch and recover a military type RHIB for boarding and SAR missions.

Moreover, the shipyard has been providing extensive operator and maintenance training to over 200 personnel of the ROPCG over a period of approximately 300 days within the shipbuilding program via ARES engineers, specialized and certified tactical trainers. The vessels will be delivered with a 7-year hull warranty and an onsite ARES team of engineers will provide 24/7 warranty engineering and technical support to the end users in Oman.

NexGen: Global Supply Chain Partner for the OEMs!

NexGen Digital's young, dynamic and proactive team with 20 years of know-how and experience in the IT sector in System Integrator and Consultancy, organized a seminar at the Divan Hotel Tunalı Hilmi in Ankara on Wednesday, 18 September. WECO Electrical Connectors Inc. and Harvatek Corporation participated in the NexGen Digital seminar.

NexGen Digital was founded in 1998. The company established their presence by providing outstanding service to OEMs and contract manufacturers across the globe, sourcing obsolete and hard-to-find electronic components and serving as an authorized distribution partner. With a corporate philosophy of unmatched quality and complete customer satisfaction, NexGen Digital won many big contracts and loyal customers quickly, gaining the preferred supplier position for many of their clients. In 2007, NexGen Digital established an Anti-Counterfeit Lab to provide a documented line of defence against counterfeit parts. Today, it is a leading global independent distributor of semiconductors and passive components. The Irvine, California based company now has an ESD-certified in-house anti-counterfeit lab, a sourcing network that spans North America, Great China and Western Europe. NexGen Digital is available 24/7 to partner with leading Original Equipment Manufacturers (OEMs) and contract manufacturers. In addition to providing high quality products in the fastest and most efficient way possible, NexGen Digital also offers various services including Global Sourcing, Preferred Supplier, Customer Bonded Inventory, Excess Inventory Insurance and Quality Lab to help its clients solve their growing business problems.

In 2019 NexGen digital established a new company, NexGen Micro Electronics, for its franchise companies. NexGen Micro Electronics is a leading global authorized distributor of electronic components (semiconductors and passive components). The company focuses on solutions for continuous value-add to supply chain constrictions for OEM's and Contract Manufacturers all around the world. NexGen Micro's ELITE Program brings effective, longevity innovations, as a trusted supplier while exceeding industry standards and its customers' expectations. NexGen Micro Electronics is certified with AS9120, ISO 9001:2015, ANSI/ ESD S20:20-2014. NexGen Micro provides full traceability on the components delivered. In addition to the products they offer, the company also offers various services to help its users solve business problems. They have offices in Asia, Europe, and North America, but right now they are most active in the US and Turkey.

As an engineering-based company specialized in developing, manufacturing and optimizing electrical connection solutions for energy, industrial, electrical and electronic markets, WECO Electrical Connectors Inc. has been in business for over 30 years. The company designs and manufactures custom as well as standard terminal blocks, electronic modules, connectors for printed circuit boards, and other components related to electrical and electronics industries. WECO's success can be attributed to its ability to identify and exploit electrical and electronics technology to provide exceptional "SOLUTIONS BY DESIGN" to its customers.

Harvatek Corporation was founded in 1995 in Hsinchu, Taiwan. It became a publicly traded company on the Taiwanese Stock Exchange in 2003. Today, it is a leading manufacturer of semiconductor chips and LEDs with a wide spectrum of applications. The company designs, manufactures, tests, and exports these products to domestic and international OEM manufacturers, trade retailers, and design houses. With the highest quality products, unparalleled customer service, and perpetual emphasis on innovation, Harvatek has become one of the world's most preferred LED suppliers. Also, one of the SMD LEDs leading manufacturers in the world with 800 employees worldwide.


AVIATION
TURKEY
VOLUME 1 - ISSUE 1 - YEAR 2019
TURKEY'S FIRST
INTERNATIONAL AVIATION MAGAZINE
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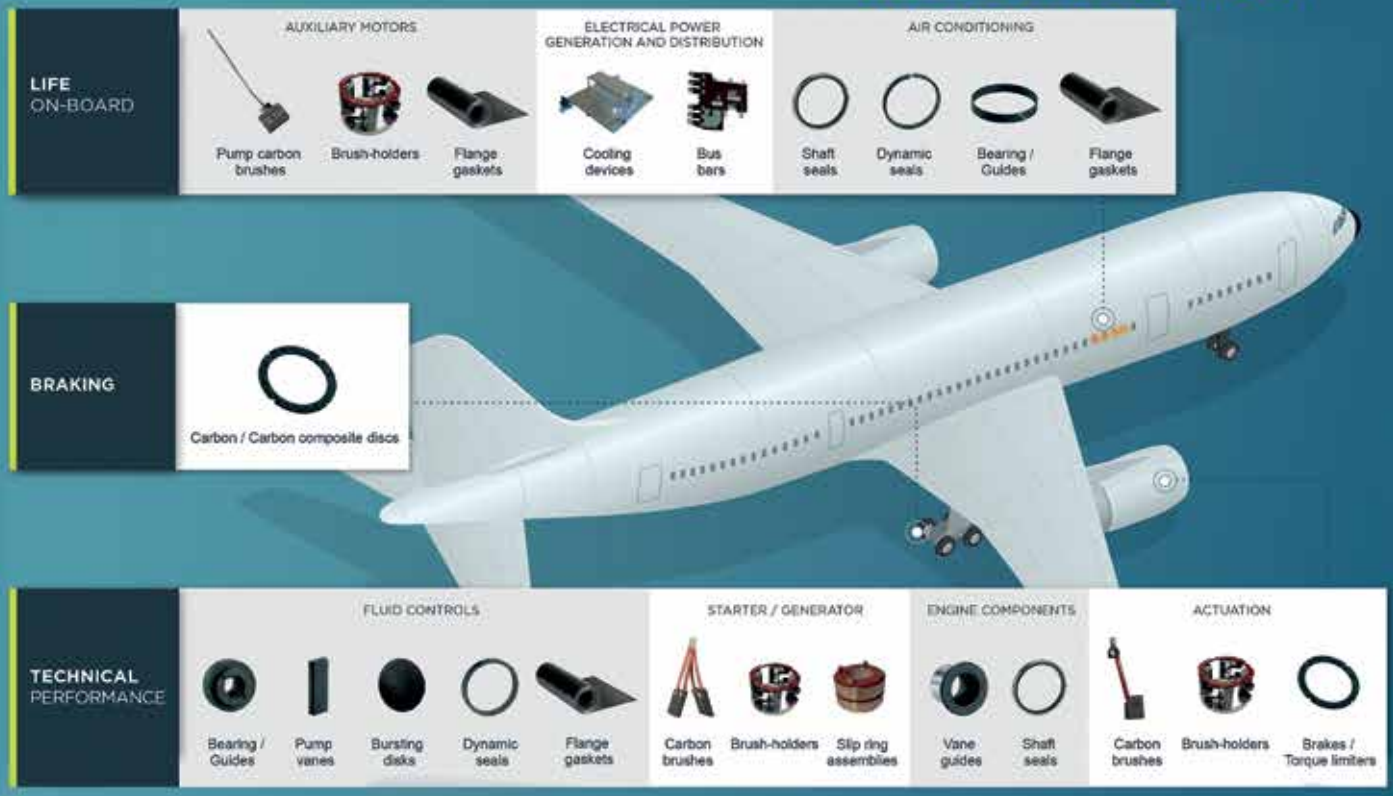
AERONAUTICS



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