

# European Security & Defence

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# Europe Has the Choice



At the end of May the citizens of the EU Member States will be called upon to elect a new European Parliament. A few months later, on 31 October, the term of office of the current European Commission comes to an end, and the new successors will step in. But Jean-Claude Juncker, who over the past five years has been vehemently pushing for European solidarity and has often cut a bad figure in doing so, will no longer be around as President. A front runner as his successor is tipped to be the German Manfred Weber. He comes as the front-runner of the Christian-Democratic and Conservative party coalition, the European People's Party, who, according to some surveys, are hoping once again to represent the strongest fraction in the European Parliament. True, there are no rules that say that the lead candidate of the strongest fraction will automatically be accorded the office of President of the Commission; nevertheless, there seems to be a broad consensus that this is how things go, so as to bolster what tends to be seen as the weak democratic legitimacy of the Commission.

The past five years over which the term of office of the European Parliament has extended coming now to an end, and during which the Commission functioned under Juncker, were shaped by the Brexit referendum in the UK and its turbulent implementation, the outcome of which still remains to be seen. Whether a majority of British voters would today still opt for leaving the EU, now that they are aware of the complications involved, cannot be foretold with any certainty. This changes nothing, however, with regard to the fact that many of the arguments on which pro-Brexiteers based their campaign were (and are) justified, but in turn without the conclusion necessarily being drawn that this means turning their backs on the Community. In Brussels there has long been the tendency (and still is) to accumulate more and more power and, step by step, to turn the European Community, conceived by its founders as a federation of States, into a kind of Federal State, without the citizens of the Member States ever having given any kind of mandate for this.

One reason for this is undoubtedly to be found in the intrinsic dynamics of the large bureaucratic bodies which have come into being over the course of decades in Brussels. The European Commission in particular is continually finding excuses to bring matters within its grasp which could (and should) in fact be dealt with at the national level. This gives rise to concern especially when ideologies come into play of which the obsession is to create the draft plan for the United States of Europe, so as to feature as a player on the world political stage, and not just in a minor role, but as a competitor to the United States of America. In the Trump era, this tendency has gained momentum, since underlying anti-Americanism can now conveniently be disguised as criticism of the current US President. Such mind games do no service to the security of Europe, which still rests on transatlantic solidarity within the NATO framework.

Efforts to assume as many powers as possible are countered by the inability of Brussels to resolve problems which do, in fact, confront the EU as a whole. Of primary concern here is the issue of how the Europeans should respond to the pressure of migration from Africa, which if anything keeps getting stronger. The image of Germany opening its borders September 2015 was indeed an issue which took centre stage in the Brexit referendum debate.

Within the EU, the UK has always pushed for a policy that only those matters should be regulated at the Community level which the sovereign national States are unable to deal with on their own. After the referendum, London was no longer able to add its weight to tip the scales on this issue. This has enabled those tendencies which are pulling in the opposite direction to be strengthened within the EU, and that in turn has fuelled antagonistic forces in a series of Member States, which will be reflected in the elections to the European Parliament, too. Some observers paint an image of explicit opponents to the EU becoming so strong that a crisis might threaten the very existence of Europe, but this is a gross exaggeration. Most Europeans are unchanged in their conviction that the EU is a rational thing, and a necessary thing. This should not be put in jeopardy by those few who are indeed fundamentally in opposition. The EU can only be put in danger if its long-criticised democratic shortcomings are not addressed, and if the reforms needed for this are rejected.

**Peter Bossdorf**



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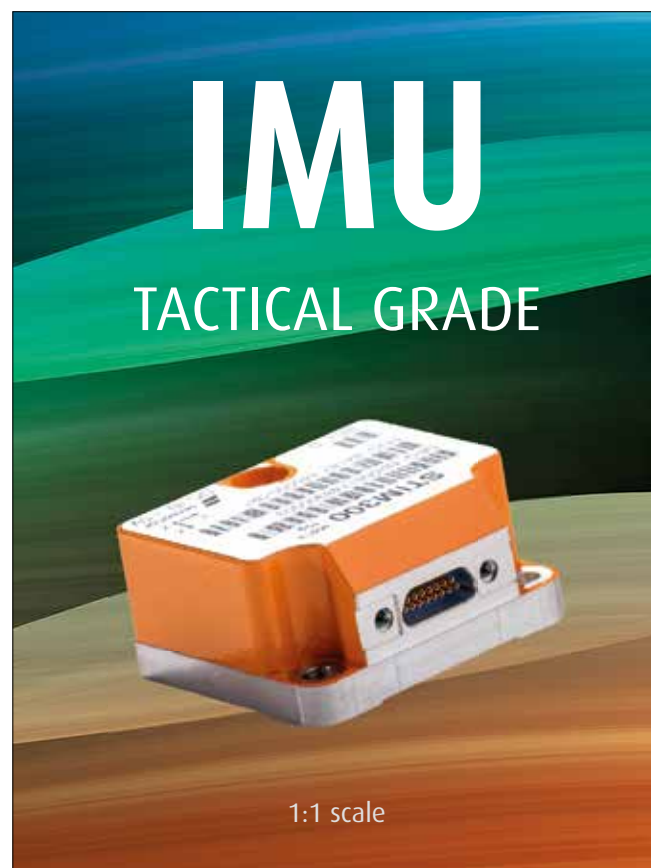
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## ■ New Maritime Imaging System

(ck) Ascent Vision Technologies (AVT), a designer of high-performance imaging systems, has developed a new multi-spectral imaging system for maritime intelligence, surveillance and reconnaissance (ISR) operations. The new gyro-stabilised CM262 combines advanced imagery and stabilisation technologies in a sub-12 kg compact



Photo: AVT

system. Three sensor configurations (including HD daylight, HD Mid-Wave infrared and a laser range finder) allow for high situational awareness and target acquisition by day and night. For long range target detection and identification, the CM262 offers 60x daylight and 20x MWIR continuous optical zoom. Optimised for the maritime environment, the CM262 delivers crisp imagery through sea glint, fog and smoke. Its video processor produces reliable and autonomous object tracking, improved on-the-move stabilisation, and robust video content analytics. The CM262 is well suited for border protection, maritime patrols and SAR missions.

## ■ Small SDR Manpacks

(ck) Based on its Software Defined Radio (SDR) products, Codan Communications has developed the SENTRY-H 6110-MP, one of the smallest and lightest tactical manpacks

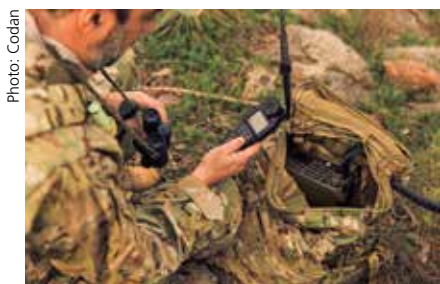


Photo: Codan

on the market. The SENTRY-H 6110-MP is easy to use, affordable and allows quick upgrades. Codan's competitive advantage lies in focussing on needs without costly and overdone utilities and features that are rarely or never used. Codan is focussed on providing its customers with only the functionality they need, avoiding an expensive one-size-fits-all architecture and offering solutions that are primarily tactical in nature, but when needed enable seamless communication and data transfer to the national level.

## ■ The Netherlands to Buy Expeditionary Survey Boat

(ck) The Netherlands' Defence Material Organisation (DMO) has contracted Damen Shipyards Den Helder (DSDH) to design and build a prototype Expeditionary Survey Boat (ESB) optimised for rapid environmental assessments and hydrographic surveys in harbours, river mouths, shallow waters, coastal areas and shipping channels. The craft will be manned by four persons; two to crew the boat and two technicians to operate the hydrographic equipment, and will be able

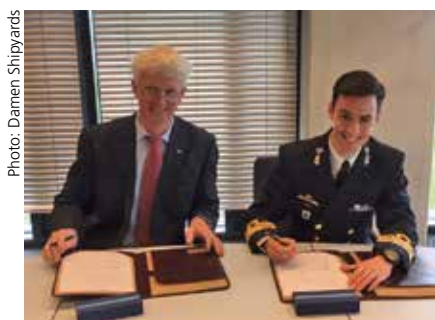


Photo: Damen Shipyards

to spend up over 60 hours continuously at sea at her survey speed of 5 knots. Designing that ship will be quite a challenge: the contract requires that the ESB be capable of being transported in davits on board large support vessels such as the JSS KAREL DOORMAN and the LPD JOHAN DE WITT, as well as other suitable vessels of the Royal Dutch Navy, to worldwide destinations. The result is that the boat must be limited in size, profile and weight to 15.7 metres in length, 4.18 metres in height and 24 tonnes overall. However, within those parameters she will need to carry a full suite of hydrographic equipment and incorporate both hardened weapons positions and ballistic protection around the wheelhouse, engine room and the gun positions. The ESB will replace the smaller vessels that are currently used for hydrographic surveys but which are not specifically designed for survey work.

## ■ Personal Locator Beacons for RAF

(ck) Elbit's Emergency Personal Locator Beacon (EPLB) has completed certification and made its inaugural flight on an RAF TY-PHOON, following a series of trials with the UK MoD. The EPLB has now entered service with the RAF. It is the first man-mounted personal locator beacon to achieve accreditation (known as COSPAS-SARSAT) for unassisted operation in water. In the event of an accident or aircrew ejection from an aircraft, the EPLB delivers emergency alerts to the international search and rescue (SAR) satellites as well as homing signals to local

SAR teams to enable the rescue of stranded aircrew. The EPLB operates in all weather conditions and over a full range of temperatures, for a minimum of 24 hours, across land and sea. It activates automatically upon ejection, meaning that even an unconscious pilot can be detected. It can be fitted to a comprehensive range of aircraft, including fast jets, helicopters, and transport aircraft.



Photo: Elbit

## ■ Howitzers for Israel

(ck) The Israeli MoD has contracted Elbit Systems to supply fully automatic self-propelled howitzers to the Israeli Defense Forces. The contract has a total value of US\$125M and will be executed over a 12-year period; it also includes the supply of training simulators. The new howitzer is capable of automatic loading and laying. According to the applicable mission, the new gun system automatically selects the required projectile, propellant and fuse, loads them and lays the gun to optimally engage targets. The new howitzer will enhance the effectiveness of the artillery formations of the IDF while reducing the number of soldiers on each platform and significantly reducing life-cycle costs.

## ■ Codification Software for French MoD

(ck) The French MoD has contracted ESG Elektroniksystem und Logistik-GmbH to develop and integrate a custom codification solution, the focus of which will be the N-CORE NG codification software (NATO Codification System Repository) developed by ESG. Following an international tender, ESG N-CORE NG won the contract because of its flexibility in adapting to customer requirements and its existing interfaces to ERP systems and ASD S2000M applications. N-CORE NG is a codification solution for the NATO standard NCS (NATO Codification System). The NATO Codification System is a standardised system for identifying, classifying and assigning stock numbers to materiel. It allows maximum efficiency in logistics support and the administration of large and complex materiel data. N-CORE NG is currently the world's only codification system to be used by both state and industrial customers.

## ■ Digital Transformation in Defence

(ck) At the SYMDEX 2019 "Universe 4.0: The Digital Transformation in Defence" conference, EXPAL presented its engineering and systems integration solutions to evolve EUROFIGHTER TYPHOON capabilities. EXPAL works in the integration of air armament of the MK80 series that enhances the Eurofighter's operational supremacy in its air-surface training and real-fire missions. During the conferences, EXPAL presented the digitisation of the prototypes, treatment and analysis of the data collected during the flights of the EUROFIGHTER. This work



Photo: EXPAL

enables the integration of air armaments, ensuring the compatibility of the system in all loading conditions and operating envi-

ronment as well as identifying the effects upon the platform. The tests and simulations have been carried out in England and Spain, in extreme operational and weather conditions.

## ■ Sensor Upgrades for US Army CBRN Vehicles

(ck) The US Department of Defense has contracted FLIR Systems to upgrade the sensor suite of the US Army's CBRN re-



Photo: US Army

connaissance vehicles. The contract has a value of US\$48M, with execution extending through mid-2022. FLIR will be the lead integrator in the modernisation of the US Army's CBRN system. Under the contract FLIR will develop a platform-agnostic modular mission payload, which integrates chemi-

cal, biological and radiological sensors into a command and control (C2) system. This C2 system will allow for data integration from the sensors that will enable automation of certain tasks, reducing the warfighter burden. The C2 system will allow for collaboration between manned STRYKER vehicles, unmanned ground vehicles (UGVs), and sensor integrated drone platforms.

## ■ BLACK HORNETs for the British Army

(ck) The British Army has ordered FLIR's BLACK HORNET 3 Personal Reconnaissance System (PRS) for a total amount of US\$1.8M. The BLACK HORNETs will support platoon- and troop-level surveillance and reconnaissance capabilities. In 2013, the



Photo: FLIR



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British Army was the first military force to deploy this technology in an active combat zone, with troops operating in Afghanistan. At 32 grammes and with a flight time up to 25 minutes, the nearly silent, pocket-sized nano-UAS transmits live video and HD still images back to the operator. Its information feed provides soldiers with immediate covert situational awareness. FLIR has delivered more than 7,000 BLACK HORNETs to military customers worldwide.

## ■ Secure Connection Between Drone Pilots and Air Traffic Control

(ck) As the number of unmanned aerial vehicles (UAVs) or systems (UASs) continues to grow so does the need for secure connectivity with manned aviation. The primary concern when integrating UAVs into the airspace is safe and secure communication between all airspace users in the same geographical region. The surveillance of manned aviation is mainly based on primary and secondary radar technology, which cannot detect and predict the position of UAVs, while ATC communication currently relies entirely on onboard VHF/UHF radios, not available for many UAVs. To address this challenge, Frequentis and Sunhillo have jointly developed an Unmanned Aerial System Connector (UAS-C) to connect the UAV pilot in command (PIC) with air traffic control (ATC) units. The UAS-C converts UAS position data into standard aviation formats and provides a secure virtual radio communication link to connect to the existing ATC infrastructure. UAS-C provides air traffic controllers and command centres with reliable and secure ground-based UAS pilot communication while the UAV pilot uses the same virtual frequency as manned aviation users, minimising the risk of safety infringements. Since the communication equipment is located on the ground, UAS-C does not relay information through the UAS onboard radio equipment, reducing the overall weight of the UAS and increasing payload.

## ■ First End-to-End Flight for Remotely Piloted Aircraft

(ck) In March 2019, General Atomics Aeronautical Systems' (GA-ASI) Certifiable Ground Control Station (CGCS) was used to control the entire flight of an MQ-9B SKY GUARDIAN, including takeoff and landing. This is the first time the CGCS has been used to control an entire end-to-end flight of a Remotely Piloted Aircraft (RPA). David Alexander, President at GA-ASI, said, "Our vision is that MQ-9B will be the first RPA certified to

Photo: GA-ASI



fly in national and international airspace. To achieve that goal, our GCS needs to be type-certified, as well. Completing an end-to-end flight was an important step in achieving that ultimate goal." The CGCS architecture provides separation between flight and mission critical functions. Flight critical functions are performed using off-the-shelf avionics and flight computers running GA-ASI's certifiable DAL B software. The mission critical functions are separated and run alongside GA-ASI's Advanced Cockpit payload and weapons equipment.

## ■ Firing Tests for PIRANHA 5

(ck) In the presence of the Romanian procurement authority, General Dynamics European Land Systems (GDELS) has conducted a live firing test of its PIRANHA 5 IVF in Camp Rena in Norway. A fully-equipped PIRANHA 5 performed a series of shooting tests with

Photo: GDELS



a 30mm system in order to demonstrate its capability. The tests qualified the ELBIT UT30MK2 system for the 8x8 wheeled armoured vehicle for the Romanian procurement programme. In January 2018, and as part of the Romanian Army's plan to modernise its legacy wheeled armoured vehicle fleet, GDELS signed a contract with the Romanian Armed Forces to deliver up to 227 PIRANHA 5 in six different configurations. The PIRANHA 5 will be produced in Romania under a transfer of technology project between GDELS - Mowag and the Romanian company Uzina Mecanică București (UMB).

## ■ Black Box for Crash Recording

(ck) HENSOLDT has developed a new flight data recorder which combines various sensors in a compact design so that flight, video and audio data can be recorded. Thanks to

reduced weight, dimensions and energy consumption, it is possible to equip light aircraft and UAVs as well as business jets and small helicopters. The SFERIREC Lightweight Crash Recorder (LCR) contains all the necessary sensors for recording altitude and direction, engine temperature and speed as well as the pilots' voices. With a weight of only about one kilogramme, the HENSOLDT LCR is the lightest of its kind on the market. The product combines all recording functions (cockpit language, flight data and crash-protected memory) previously performed by various devices, and maintenance data can be read on an SD card. The system's sensors include an integrated microphone for ambient noise, a three-axis gyroscope, a three-axis accelerometer, a temperature sensor, a GPS receiver and an air pressure sensor. The new product is certified to ETSO-2C197 (ED-155).

Photo: Hensoldt



## ■ Battlefield Cloud

(ck) Israel Aerospace Industries (IAI) has launched a decentralised communications cloud called OPAL that connects all platforms in the combat arena, manned and unmanned, to enable real-time information exchange. This enables all members to exchange information for a comprehensive operational picture of the battlefield. OPAL is a secure communications network that connects different networks and platforms without fixed base stations. The cloud is compatible with any platform, including modern combat aircraft, tanks, ships or ground forces. OPAL offers the advantage of optimising effectiveness in achieving mission objectives by providing a common real-time picture of the situation, maximising the use of resources and the ability to carry out multiple missions within a given time-frame. OPAL thus improves survivability by exchanging threat data with air and ground units and increases flight safety through collision avoidance alerts. Ultimately, OPAL saves time and money because new operational capabilities can be deployed quickly without having to change hardware or aircraft avionics software blocks.

Photo: IAI



## ■ Raytheon to Develop NASAMS for Australia in Adelaide

(ck) Under the Australian Government's Short Range Ground Based Air Defence programme known as LAND19 Phase 7B LAND19 programme, the country will procure the National Advanced Surface to Air Missile System (NASAMS). NASAMS is



Photo: Raytheon

manufactured by Raytheon Australia and KONGSBERG Defence & Aerospace. The contract has a total value of AUS\$2.5Bn. The new Raytheon Australia Centre for Joint Integration will be built in the defence industry precinct of Adelaide with an AUS\$50M investment from Raytheon and support from the Australian Government. Australia will become the 10th country to use the short-to-medium range air defence system, which has been adopted by Norway, Finland, Spain, The Netherlands, Oman, Lithuania and Indonesia. NASAMS is comprised of the Raytheon Sentinel radar, the KONGSBERG Fire Distribution Centre, and the Raytheon Advanced Medium Range Air to Air Missile (AMRAAM.) It will replace the Australian Army's ageing RBS-70 MANPADS. The Australian designed and built Thales HAWKEI will be used as the NASAMS launch vehicle.

## ■ Artillery Shells for the German Armed Forces

(ck) The German Bundeswehr has contracted Rheinmetall to supply over 32,000 rounds of artillery ammunition for a total value of €109M, with an option for a further 11,000 rounds worth around €37M. Delivery is slated to begin in 2019. The contract runs for a period of five years. The order follows a first batch of 30,000 procured by the Bundeswehr in 2009. The ammunition ordered by the Bundeswehr is the 155mm DM121, which has an effective range of up to 30 kilometres when fired from the PzH 2000 self-propelled howitzer. Featuring insensitive characteristics, this high explosive



Photo: Rheinmetall

round can also be used in training operations and field exercises: annual consumption will therefore be in the region of several thousand rounds. The DM121 features outstanding performance parameters. The shell, which contains several kilograms of high-performance explosive, can engage targets up to 30 kilometres away and is highly accurate: at the maximum range, approximately 85% of all shells land within an area the size of a football pitch.

## ■ Raman Analysers for the US Army

(ck) Rigaku Analytical Devices, a US-based developer of handheld spectroscopic analysers, will provide the Rigaku PROGENY ResQ 1064nm handheld Raman analyser for chemical identification as part of the US Army's Dismounted Reconnaissance Sets, Kits, and Outfits (DRSKO) programme. The DRSKO programme deploys large kits of technology to Department of Defense (DoD) locations around the world for characterisation of suspected chemical, biological, radiological, and nuclear (CBRN) hazards. The PROGENY ResQ analyser provides the military, hazmat teams, border protection, law enforcement and others with the latest advances in laser technology for chemical identification of explosives, chemical warfare agents (CWAs), toxic industrial chemicals (TICs) and other threats. Rigaku's 1064 nm Raman technology identifies a broader range of substances than older generation technology, providing fast, actionable results in seconds.



Photo: Rigaku

## ■ INVISIO Communications Equipment for US Forces

(ck) The US Army has commissioned INVISIO to supply communication equipment for the Security Force Assistance Brigades (SFAB). This follow-up order has a total value of SEK26M. Deliveries will take place between April and September 2019. The contract includes a communication system with control units and headsets for use with a radio. The contract with the US authorities obliges the company not to provide any further information. The order is a sign of the modernisation of communications equipment that is taking place worldwide in the defence and security sectors. INVISIO systems ensure good hearing

protection and enable the user to communicate under extreme conditions while maintaining a constant awareness of the situation. The



Photo: US Army

Security Force Assistance Brigades are specialised units whose main task is to carry out advisory and support operations with allies and partner states. The soldiers in the SFABs are well trained and will help the brigade combat teams to develop their operational readiness by freeing them from advisory missions.

## ■ Recovery Cranes for the German Armed Forces

(ck) In February 2019, a German manufacturer of heavy-duty cranes delivered the first of 71 protected mobile recovery cranes to the German Bundeswehr. In June 2017, the German procurement authority, BAA- INBw, awarded Liebherr the order with a total value of €150M. The contract encompasses 33 G-LTM protected armoured crane vehicles and 38 G-BKF protected recovery cranes. The designers placed special emphasis on survivability: all of the vehicles are equipped with protected driver and crane cabs from Rheinmetall. Delivery of the remaining vehicles is scheduled for 2021. The



Photo: Liebherr

G-BKF has two recovery winches and a wheel lift mounted on the rear for recovering and towing a wide variety of vehicles. It can also lift heavy loads; its 20.9-metre-long telescopic boom handles loads weighing up to 20 tonnes with great precision. Similar in design to the standard civilian model, the G-LTM mobile crane is a four-axle mobile crane with a protected driver's cab and protected crane cab which performs well in all types of terrain. A six-cylinder, 330 kW Liebherr diesel engine with maximum torque of 2,335 Nm gives the G-LTM sufficient power.

## ■ MMP is Cold Weather Qualified

(ck) Following hot weather tests carried out in Djibouti in August 2018, in early 2019 the DGA (French Procurement Agency) and the



French Army (STAT) tested the MMP land combat missile in extreme cold conditions at Vidsel Proving Ground near the Arctic Circle. In three firing scenarios the missile success-

Photo: MBDA/Anders berg



fully hit its target, confirming the operation of the system's image processing algorithms under typical winter and subpolar conditions with a snowy background. The first scenario was made in LOBL mode (Lock On Before Launch) on a vehicle moving at 70 km / h. The second scenario successfully engaged a cave target in low trajectory and in LOBL mode. The third scenario, using the Beyond Line Of Sight (BLOS) mode, was made using GPS coordinates transmitted by the FELIN system (French Army Digitised Soldier System). Lock-on was achieved during flight against a tank not visible from the launch position. The tank was then successfully struck on its roof. This campaign complements the technical evaluation of the system since the start of deliveries at the end of 2017.

## ■ Innovation in Search and Rescue

(ck) Orolia, a developer of Resilient Positioning, Navigation and Timing (PNT) solutions which improve positioning even in GPS-denied environments, has installed second-generation Cospas-Sarsat technology on

Photo: Orolia



search and rescue (SAR) ground stations for the US National Oceanographic and Atmospheric Administration (NOAA) in Florida and Hawaii. These ground stations have been upgraded with Second Generation Beacon (SGB) signal processing capabilities to quickly locate the source of distress signals. The Cospas-Sarsat SAR system has developed specifications for a Second Generation 406 MHz SAR beacon that uses a modern spread spectrum signal to achieve more accurate and robust performance. The NOAA Florida

and Hawaii ground stations are now the only Medium Earth Orbit Search and Rescue (MEOSAR) ground stations in the world to receive the SGB signal specification capability.

## ■ Romania to Buy PATRIOT Interceptors

(ck) The Romanian government has signed an agreement with the US Army for additional PATRIOT capability. The purchase includes an undisclosed quantity of Raytheon GEM-T interceptors for use with the PATRIOT Air and Missile Defense Systems. The procurement is being conducted via the US Department of Defense's foreign military sales process. The PATRIOT system is the backbone of Europe and NATO's defense against lower tier ballis-

Photo: Raytheon



tic missiles, cruise missiles, advanced aircraft and drones. Fifteen other nations rely on the PATRIOT system, including the US and six other European nations: Germany, Greece, the Netherlands, Spain, Poland and Sweden. All of Romania's PATRIOT fire units will be newly built; the missiles will have Gallium Nitride components. The agreement between Romania and the US Army sets the stage for the US government to begin contract negotiations with Raytheon.

## ■ Image Intelligence for Swiss Armed Forces

(ck) The Swiss procurement agency, armasuisse, has contracted Thales to supply the Swiss Armed Forces with an IMINT / GEOINT image intelligence system based on the company's proprietary MINDS multi-sensor image interpretation and dissemination system which is the export version of France's SAIM system. This intelligence system will enable the Swiss Armed Forces optimally to exploit still imagery and

Photo: Thales



video feeds from current and future sensors. Deliveries will begin in early 2020. Built around the Thales MINDS / SAIM system, the platform will enable capture, analysis and optimal exploitation of all types of imagery data. It will be completely virtualised to facilitate integration with the customer's existing infrastructure, and will incorporate AI technologies, thus enabling the most relevant intelligence to be distributed to the Swiss authorities.

## ■ SEASPIDER Tested in the Baltic Sea

(ck) In cooperation with the Centre for Marine Technology and Research of the German Armed Forces (WTD 71), ATLAS ELEKTRONIK GmbH has tested the SEASPIDER. The complete "Sensor to Shooter" functional chain of a hardkill surface ship torpedo defence system, with

Photo: ATLAS ELEKTRONIK



Torpedo Detection, Classification and Localisation (TDCL) and the SEASPIDER Anti-Torpedo-Torpedo (ATT) was demonstrated on a surface ship in the Baltic Sea. The demonstration included the TDCL sonar and SEASPIDER prototypes and a surface launcher. During the tests, both an AUV derived from an Mk37 torpedo and DM2A3 torpedoes were used as threats, which SEASPIDER detected and localised with passive and active TDCL. SEASPIDER acquired the threats and homed in on the nearest Point of Approach (CPA). Following the evaluation of the test results in 2018, information and images have now been released. ATLAS ELEKTRONIK is currently working on the SEASPIDER ATT and the ATLAS ELEKTRONIK surface ship torpedo defence suite.

## ■ Armour Hardware for the US Army

(ck) The US Army has awarded O'Gara-Hess & Eisenhardt Armoring Company (O'Gara Armoring) a five-year, Indefinite Delivery/Indefinite Quantity (ID/IQ) contract to produce armour hardware, turret systems (AHTS) and platform integration kits (PIKS) for the US Army. Using a combination of transparent and opaque armour,



the turrets provide gunners with 360-degree protection while maximising visibility. Additionally, an integrated accessory package mitigates injuries from blasts, collisions and rough terrain. PIKS enable Remote Weapon Station (RWS) installation on a variety of platforms, including the recently-fielded Joint Light Tactical Vehicle (JLTV), as well as the Mine Resistant Ambush Protected vehicle (MRAP), High Mobility Multipurpose Wheeled Vehicle (HMMWV) and M1 Main Battle Tank. Production will start immediately. Located in Fairfield, Ohio, O'Gara Armoring traces its lineage to coachbuilders from the 1870s. It transitioned to armoured vehicles in the 1950s, starting with President Truman's presidential limousine.

### ■ PREEcept Fires the First Shot

(ck) With PREEcept, RINA has introduced a new warfare simulation that is said to significantly improve the cost dynamics of simulations. PREEcept is a simulator that visualises tactics and procedures so that students can see how their military planning is playing out. RINA procured a comprehensive military model on a scale of 1:300 and added weapon effects, ranges and distances that could be accurately measured, creating a model that can be used in conjunction with the UK MoD's VBS3 Defence

Virtual Simulation system. By using terrain built into VBS3, maps corresponding to the model terrain can be printed, providing a



common solution for war games and military planning training. This cost-effective solution allows military commanders to develop and hone their skills in a virtual and a physically modelled environment. Each scenario can be reset multiple times and - since VBS3 was chosen as the defence simulation tool - license costs are eliminated. Military simulators are often expensive, but PREEcept can be delivered at a fraction of the cost, which is why both NATO and MOD have shown interest so far. The simulation has seamlessly merged map, model and virtual simulation, integrating weapon effects and ranges into a physical environment that can be replicated in a virtual environment. RINA supports training events and brings all necessary simulation devices and the model to any required location.





### ■ The World's Largest Aircraft Takes to the Skies

(ck) Scaled Composites has made aviation history with the flight of the world's largest wingspan aircraft. During the initial flight the team tested specific handling qualities to validate the design. The



aircraft flew for 149 minutes, reaching a max speed of 165 KIAS (knots indicated airspeed) before landing safely. Scaled Composites has been working with STRATOLAUNCH since 2011, designing, building, and testing this, the world's largest composite aircraft. The original mission for STRATOLAUNCH was to develop an air launch platform to make access to space more convenient, reliable, and routine. STRATOLAUNCH is a twin-fuselage launch platform built to deliver payloads into space at multiple orbits and inclinations during one mission.



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# Diver Propulsion Devices – A Silver Bullet Or A Blessing In Disguise?

Military diving is undergoing a period of development and evolution, driven by advances in Underwater Breathing Apparatus (UBA), technical and performance developments in Diver Propulsion Devices/Vehicles (DPD/Vs) and evolving threats. This evolution has resulted in the blurring of lines between the traditional military dive disciplines, demanding greater performance from UBAs or to be more precise rebreathers. The ability to operate across a spectrum of capabilities and integrate with an ever-increasing range of technologies, platforms and systems, in an increasingly complex and cluttered environment. A vital part of the blurring of the lines is the merging of deep water operations (54-100 msw) and shallow water (10-54 msw) capability, pushing the limits of depth and endurance, requiring significantly more capable UBAs to meet the mission requirements, often varying in depth and environmental characteristics. In addition to this, access to and utilisation of DPD/Vs has rapidly become a key component of the underwater battle space, expanding the capability of what was historically a recreational diving

product born in the 1980's. The advantages of DPD/Vs for underwater swimmer activities are predominantly grouped into two main headings;

- Safety improvement
- Mission extension.

### Safety Improvements

One of the limiting factors to achieving the mission are physiological limitations of the diver and his/her ability to perform underwater, this performance limitation is based on the effort required to complete the task. A swimming diver will ventilate in excess of 40l/minute, which equates to an oxygen consumption of 1.78 l/minute. Therefore, if



DPD/V's like the RasRotinorJILL8055 can also be used as combat load carriers to include navigation systems, sonar systems and weapons carriage.

Combat Swimmer	Covert Infiltration	Maritime Counter-Terrorism	Submarine Infiltration	Manned Underwater Vehicle	Explosive Ordnance Disposal	Mine Counter Measures (MCM)
As a general rule, combat swimmer capability may require sub-surface operations to cover a minimum of three to four hours duration and in the region of 5 Km. Front-mounted pure oxygen diving apparatus is typically used.	Closed circuit, shallow water transit (at 3-5 metres depth), with the ability to undertake occasional short duration depth excursions to evade ships, patrol boats and other defences.	Swimmers will typically use pure oxygen rebreathers to enable them to approach a ship or Offshore Energy Installation (OEI) undetected prior to executing deliberate assault options, or place tracker beacons to follow suspect vessels.	Submarine exit & re-entry operations would require the diver to be submerged for long periods in a confined space whilst underway.	These operations are hazardous and involve swimmers being carried as passengers in a free-flooded submersible capable of speeds of up to 10 knots in extremely cramped conditions, day and night with limited or no visibility.	Navy Clearance Divers or Underwater Demolition Teams (UDT's) carry out a range of tasks under this remit. These may include the safe disposal of unexploded ordnance (UXO), such as responding to the discovery of a World War Two bomb on a beach, or assisting in clearing a safe route for special forces during Maritime Counter Terrorism (MCT) operations.	Navy Clearance Divers are often required to carry out mine clearance operations, whereby the divers must locate, neutralise and remove a number of mines.

The evolution in military diving has resulted in a blurring of lines between the traditional military dive disciplines.

the effort required is reduced (by virtue of the fact that a DPD/V is used) to say 1.0 l/minute oxygen consumption, then a significant time extension is possible.

In addition to effort, other limiting factors affecting a swimming rebreather diver are defined by;

- Gas and CO2 canister endurance
- Thermal constraints
- Oxygen toxicity
- Rebreather performance.

### Mission Extension

From the above, it is clear that DPD/V's offer more tactical capability primarily from an endurance standpoint. This, coupled with advances in rebreather design, allow for a depth capable package, which manages the physiological issues and improves general diver performance. DPD/V's can also be used as combat load carriers to include but not limited to navigation systems, sonar systems and weapons carriage. However, as we introduce additional benefits to the mission set, such as DPD/Vs, other issues and challenges are also encountered.

### Challenges for DPD/V Use

The introduction of DPD/Vs creates additional challenges for the diver, which range from core temperature loss to increased drag and reduced comfort. These can be mitigated with careful support equipment selection and intelligent set design.

Rebreather design is not normally considered when linked to DPD/V use but it is worth noting that sets that generate a high Work of Breathing (WOB) when towed, will reduce the effective gains associated with gas and canister endurance, and can also increase the possibility of oxygen toxicity, CO2 retention (hypercapnia) and nitrogen narcosis. In addition to this, sets that are not designed to be used in a high speed hydrodynamic environment can become uncomfortable to use over long periods, with increased drag and burden on the diver.

The position and location of the counter-lungs is critical to the set design. Front-mounted sets can create additional drag and be cumbersome when used with a DPD/V. Whereas a streamlined back mounted set, with tailored counterlung(s), is more suited and capable for DPD/V operation thereby increasing mission duration, combat load carrying and maintaining a lower WOB.

Personal thermal issues are worsened by using DPD/Vs, in that with reduced swim effort there is no 'natural' heating. Passive and active heating systems can and should be deployed with DPD/V use to offset the issue.

In summary, DPD/V's are the 'weapon of choice' for the modern advanced military diver but the choice must be a combination of the mission requirement, rebreather set performance and combat load required. Specialist training will also be required.



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# The Visegrad Group's Role in the European Security System

Michal Jarocki

**Deterioration of the European security system in the aftermath of the Ukrainian crisis and worsening of relations between Russia and the West led the four Visegrad Group countries to renew their partially abandoned defence cooperation in order to enhance current and adopt new regional security measures.**

On 1 July 2019 several thousand soldiers from the Czech Republic, Hungary, Poland and Slovakia will start to serve as the so called Visegrad Battlegroup, which will be formed as part of the European Union's quick reaction force. For six months they

will be responsible for the establishment of an effective command chain as well as the distribution of duties and supervision of tasks and orders delegated to dedicated units assigned to the battlegroup, while they remain stationed in their home countries.

tary rapid reaction capacity requirement, the force will be capable of reaching operational readiness within 15 days and arrive in the theatre of operation within ten days.

V4 battlegroup's soldiers might be sent to conduct a variety of tactical operations within a range of 6000 km from Brussels, stationing in distant regions such as Africa or the Middle East. Acting as EU's quick reaction force, such contingent will have to be capable of operating stand-alone for 30-120 days.

The V4 armies have prepared to operate as the EU's QRF component for the past two years, conducting multinational workshops, seminars, consultations, trainings and field exercises. Each contributing nation was individually responsible for the assignment of soldiers and officers for their national contingents, as well as organising and conducting certification processes at national levels.

The Polish contingent will comprise soldiers from the aforementioned Krakow-based 6th Airborne Brigade complemented by tactical level elements from several other units, such as the 12th Mechanised Brigade in Szczecin, and was certified late last year during the Puma-18 exercise held from 13 to 19 November at the Wedrzyn training grounds.

The event was the culmination of a year-long training programme for Polish soldiers, many of whom experienced serving in the scope of multinational stabilisation and peacekeeping missions in Afghanistan or Iraq in the past.

However, with the conclusion of training programmes at national levels, certification of the whole battlegroup is required in order to confirm the interoperability and readiness of particular contingents to fulfil their tasks and meet the challenge of cooperating with other Visegrad Group partners within the rapid reaction force structure.

The complex certification of the V4 battlegroup will be carried out this May during the Common Challenge-19 exercise organised at the Nowa Deba training grounds in Poland, during which particular national contingents will perform various tasks, acting independently or as a joint task force.



Photo: MoD Hungary

*Visegrad refers to the Hungarian City of Visegrad on the river Danube, where the partnership was established on 15 February 1991.*

are expected to be ready to perform a wide range of operational tasks, if ordered and resulting from a potential deterioration of the security situation in Europe, while maintaining their combat effectiveness through a series of multinational, locally organised staff and combat exercises and drills.

Poland, as the biggest contributor of troops, will act as the framework nation of the battlegroup, and as such will be responsible for coordination of works related to the estab-

lishment of an effective command chain as well as the distribution of duties and supervision of tasks and orders delegated to dedicated units assigned to the battlegroup. Furthermore, soldiers from V4 countries will be supported by a Croatian contingent, which will join the battlegroup according to an agreement made by ministers of defence during a meeting in Brussels on 20 November 2018. The exact number of troops assigned to the battlegroup by the contributing nations is still to be announced, as well as the distribution of tasks and responsibilities. However, it is expected that according to the EU's mili-

## Author

**Michal Jarocki** is an independent, Warsaw-based defence expert who has reported on security issues and developments from a qualified "insider" position for many years.

## V4 Security Priorities

The upcoming rotation of the V4 EU battlegroup will be the latest in a series of multinational initiatives devoted to improving and enhancing cooperation between the Visegrad Group's member states. Its main goal is to integrate and coordinate the policies of the Czech Republic, Hungary, Poland and Slovakia in the face of a changing post-cold war security system in Europe, which is the result of the crisis in Ukraine, among others, and deterioration of relations between Russia and the West to an extent not experienced since the Cold War.

Throughout their involvement in the EU's rapid reaction force initiative the V4 partner states aim to achieve several goals related to their defence policy priorities at the European level, including the ability to reach long-standing agreements on mutually debated matters and provide coordinated reactions to regional political and military developments which could have far-reaching implications on the V4 Group's security.

Visegrad Group nations also strive to remain involved in main political initiatives within the EU, which might affect the European security system in the future, as well as to maintain their position as strong and reliable partners in the discussion about the vision of the Common Security and Defence Policy (CSDP), enhancing defence cooperation between V4 members and contributing to various initiatives devoted to the preservation of a peaceful political and military environment within the EU and in its neighbourhood.

For the same reason the V4 member states formed their initial battlegroup within the EU QRF, which remained on stand-by from 1 January to 30 June 2016. At that time the



Photo: Wikipedia

**As part of NATO's enhanced forward presence (eFP) action plan and following the 2016 Warsaw Summit, Poland deployed to Latvia a contingent of 200 troops, including a tank company comprising 14 PT-91 TWARDY MBTs.**

group was composed of more than 3,900 soldiers, with Poland serving as the framework nation, contributing around 1,870 soldiers. Other V4 countries delegated smaller contingents varying from 728 (Czech Republic) to 466 (Slovakia) specialists. Additionally, a small contingent of Ukrainian soldiers served along in an auxiliary capacity. During the initial assignment, countries forming the V4 battlegroup shared their responsibilities depending on their capabilities and dedicated skills of troops forming the quick reaction force. Accordingly, Poland was tasked with forming the battlegroup's command structure, a manoeuvring battalion (formed by the 12th Mechanized Brigade), a reconnaissance component and an air component, The Czech Republic provided logistic support.

The Hungarian contingent was composed of special forces and engineering teams, as well as specialists responsible for civilian-military cooperation (CIMIC) and psychological operations (PsyOps). Slovakia, on the other hand, delegated a contingent of NBC protection specialists and Ukraine, cooperating with its Polish counterparts,

was tasked with providing air transport support with one Il-76 airlifter.

Although, the V4 battlegroup was not ordered to deploy during its initial six months, delegated troops took advantage of the opportunity to strengthen their cooperation capabilities throughout a series of regionally organised trainings and exercises, which helped the soldiers to remain on standby and in full readiness to engage in any form of military operations under the EU quick reaction force mandate, if so required.

Furthermore, the formation of the first V4 EU battlegroup started a new chapter in security-related cooperation of the Visegrad Group's member states, which until lately seemed to forget about and undermined the role which this political body played in their ambition of joining the EU and NATO since the end of the Cold War. After achieving these goals each state started to devote most of its political and economic resources to improve individual partnerships with selected Western states instead of continuing mutually agreed and regionally focused initiatives within the Western political and military blocs.

However, in the face of the global financial crisis which hindered military modernisation efforts of V4 countries nearly a decade ago, forcing them to postpone major investments in their self-defence capabilities, as well as the deterioration of security system in Europe, the Visegrad Group's members decided to rebuild their security cooperation capabilities, especially in accordance with guidelines set by NATO's Smart Defence and the EU's Pooling and Sharing initiatives.

Therefore, forming of the first V4 EU battlegroup served as an example of how a group of relatively small European countries with limited defence capabilities and facing challenges with regard to military modernisation in a period of limited investment budgets can share their individual capabilities in order to form a joint task force ready to engage in different combat or peacekeeping activities in the region.



Photo: MoD Poland

**From July 2019 soldiers from all V4 nations will start to serve as the so-called Visegrad Battle Group.**



Positive outcomes of forming the first V4 battlegroup in 2016 helped to set new goals for regional security cooperation, which will see the reinstitution of the regional QRF not only in 2019 but also in the years to come. Lately, officials from Visegrad Group member states have repeatedly confirmed that negotiations are underway to form the third V4-concentrated battlegroup in 2023, which again might involve third country support elements, enhancing the multinational character of the whole structure.



*Slovakian infantrymen during an exercise*

## Transatlantic Defence Cooperation

Moreover, V4 cooperation in the field of defence and security goes beyond the EU' CSDP policy, involving the group's members in other multinational military initiatives, such as NATO's build-up on its eastern flank under the enhanced forward presence (eFP) action plan, implemented in the aftermath of the 2016 Warsaw Summit. Since the beginning of eFP initiative, some members of the V4 Group devoted their resources in order to comply with the planned increase of NATO forces in the Baltic States and Poland, contributing troops to multinational task forces deployed near Russian borders.

Each V4 country deployed its contingents to selected Baltic States and Poland on a rotational basis, enhancing the pan-Alliance cooperation and ability to jointly enforce peace and security along NATO's eastern border. As of February 2019 three out of four Visegrad Group members have been actively involved in the eFP initiative, with most of the troops stationing in Latvia under the Canadian command stationed in Adazi. As the biggest contributor of all V4 countries, Poland deployed to Latvia a contingent of 200 troops, including a tank company

comprising 14 PT-91 TWARDY MBTs, as well as providing a national contribution to the battlegroup's HQ and other support elements. The Polish component is supplemented by a Slovak contingent of 152 troops formed by a mechanised infantry company, HQ staff and support elements as well as 60 Czech soldiers forming a mortar platoon. Simultaneously, the Government in Prague deployed 230 soldiers, including a mechanised infantry company, to Lithuania, where Czech troops serve under the German command in Rukla.

Furthermore, the V4 countries will form a crucial part of next year's NATO spearhead force as part of the Very High Readiness Joint Task Force (VJTF), with Poland acting as the framework nation of the land component. Visegrad Group nations will prepare contingents to immediately react to military and non-military threats to the Alliance, prepared to deploy to their theatres of operation within days. Poland will provide a contingent of around 3,500 soldiers, mostly assigned to the 21st Podhale Rifles Brigade.

## Failed Industry Integration

As much as the cooperation of V4 countries for improvement of the regional security

system thrives, it corresponds with minimal to none effect of year-long attempts to set boundaries for the integration of each country's defence industry, which could utilise mutual modernisation needs of the Visegrad Group's national armies. Most joint investment projects, which usually did not extend beyond political declarations of regional leaders, already failed at launch due to the inability of the V4 partners to reach final agreements on technical requirements, share of production work and decide on industrial contractors.

First attempts to set up a defence industrial cooperation within the V4 Group date back to early 1990', when member states decided to modernise their Soviet-era equipment. Due to the fact that most of the V4 partners operated the same type of weapon systems including tanks, armoured vehicles, combat and utility helicopters and fixed-wing aircraft, the Visegrad members saw a number of benefits resulting from joint procurement and modernisation efforts, including scaling down the total investment costs and preserving their national defence industries in the face of inevitable market competition with superior Western business counterparts.

The planned modernisation of a fleet of Mi-24 attack helicopters, which in the late 1990s and early 2000s were operated by the armies of every Visegrad Group member state, was one of the major early date attempts to set up a joint defence programme among the V4 countries and at the same time a good example of how failure to overcome political differences and disagreements, inability to put aside particular interests in order to achieve a mutually understood goal, as well as third actor's involvement and lobbying, can hinder joint efforts to increase the level of regional security and enhance the interoperability of the armed forces of close neighbours.

In 2002 V4 political leaders signed an agreement upon which around 100 Mi-24 combat helicopters were to be modernised to comply with NATO standards with the help of a preferred Western industrial partner. Work and costs were to be distributed

Photo: Wikipedia



*A Mi-24D helicopter of the Polish Army. A programme in the 2000s for the joint modernisation of the V4 countries' Mi-24 fleets was cancelled after no agreement could be reached.*



evenly among all four partners, with Poland acting as the coordinator of the joint programme, making use of its relatively advanced military helicopter industry.

The V4 members perceived the planned modernisation of the Mi-24 fleet as a chance to integrate regional defence industry and a big step towards the long-awaited access to Western defence blocks such as NATO. At the same time the Visegrad partners anticipated promising export opportunities, as at that time a number of countries in Africa, Asia, the Middle East and Europe continued to operate soviet-era military equipment, including a large number of Mi-24s, which needed to be overhauled or modernised.

Nearly a year after signing the initial agreement on the Mi-24 modernisation, the whole programme was cancelled, when the Czech Republic and Hungary decided to withdraw their support due to budgetary problems, change of modernisation and procurement priorities and slow progress of preparational efforts, for which Poland, as the project's main coordinator, was blamed for.

Moreover, ever since its launch in 2002, the Mi-24 joint modernisation programme was intensively criticised by the Russian Federation, which perceived it as a potential threat to its own defence industry. According to media articles dating back to that time, Moscow tried to lobby among V4 nations against the project, convincing them to make an individual attempt to maintain and modernise its combat helicopter fleet, especially in cooperation with the original manufacturer, the Mil Moscow Helicopter Plant.

## Missed Cooperation Opportunities

To this day, despite effective cooperation within European and transatlantic political and security institutions, the V4 countries lack the will and ability to launch and complete mutually agreed defence procurement and modernisation programmes; instead, the preference is on acting independently or in partnership with higher developed Western European and American industry partners.

In 2015 the Slovak Army was in the midst of its ambitious modernisation programme, which included, among other projects, the procurement of several dozen modern, wheeled armoured vehicles in several configurations. After a rigorous selection process the Polish company Rosomak, now a subsidiary of the state owned PGZ (Polish Armaments Group), turned out as the preferred bidder and was invited for further negotiations. The company offered its renowned and combat proven Rosomak

8x8 platform, modified according to Slovak requirements, which included adaptation of the locally developed TURRA remote weapon station.

The Polish company was chosen mostly due to the fact that its Rosomak 8x8 platform shows a very high degree of commonality with the Finnish Patria's AMV 8x8 vehicle, on the basis of which it was developed. Additionally, Rosomak guaranteed lower production and maintenance costs in comparison to Western partners, which seemed to be a crucial argument for the Slovak MoD. Despite initial optimism and will of cooperation shown by the Polish and Slovak

in some of the countries were taking too long due to various internal factors, which led other partners to pursue the acquisition separately.

Since its formation in 1991, the Visegrad Group has suffered several setbacks, resulting from differences and inconsistency of security and defence priorities of its members. Despite temporary layoff in V4 cooperation after the Group achieved its main goal of access to the EU and NATO, V4 seemed to finally catch new winds in its sails in the past decade, as the security system in Europe and its surroundings deteriorated, especially in the aftermath of the Ukrainian crisis.



Photo: Patria

**After the Slovak Republic's effort to acquire the Rosomak 8x8 armoured vehicle from Poland failed, the country decided on the procurement of the Finnish AMV from Patria.**

partners, a final agreement has never been reached and Bratislava eventually decided to withdraw from the project. Although the reason for the negative outcome of a prospective partnership was never officially revealed, local media sources indicated in the past that lack of political goodwill and prolonged negotiations at industrial level brought the Slovak MoD to the point at which it preferred to award the contract for the new armoured vehicle to the original manufacturer of the AMV, Patria Land Systems Oy.

Other major joint defence programmes of the V4 Group, which often were cancelled even before launched officially, included the modernisation of a fleet of T-72 MBTs, the development and procurement of tracked IFVs, and 3D mobile air defence radar systems. Most projects were abandoned due to a V4 inability to reach a mutual agreement on technical requirements or procurement procedures under the terms of which the planned investment was to be executed, as well as the preferred acquisition timeframe, especially when decision making processes

The V4 countries, which once again feel endangered by the worsening of relations between Russia and the West, feel committed to enhancing and strengthening their political and military cooperation. As a result of the visible shift in security policy priorities, the Visegrad countries agreed to mutually conduct a series of large scale exercises and create joint V4-oriented defence structures, such as the EU's battlegroups or NATO's quick reaction forces.

However, despite generally positive reactions to the deterioration of the European security system, the V4 countries seem to omit the long lasting problem of inability to set up cooperation principles for the modernisation of their armed forces under joint development or acquisition programmes, which might lead not only to improvement of their respectful defence industries, especially in the face of growing competition on regional and global markets from Western and American business partners, but also scaling down procurement and maintenance costs for years to come. ■

# Forging New Relationships

## The Czech Defence Minister Visits his Austrian Counterpart



Photo: Georg Mader



Photo: via author

### Interview with the Czech Defence Minister Lubomir Metnar and the Austrian Defence Minister Mario Kunasek

*Metnar and Kunasek spoke about Czech-Austrian defence cooperation and other military-related issues.*

For years there were no military-political relations at the highest level between Prague and Vienna. In 2008, the Austrian defence attachés in Prague, Budapest, Lubljana, Bratislava, Bucharest, Sofia and Athens respectively were withdrawn and replaced by so-called "roving attachés". However, there are about 40 individual joint initiatives at the troop level, some of which are now even supported by the new European Defence Fund. Overall, a meeting of the two ministers was overdue when Czech Defence Minister Lubomir Metnar visited his Austrian counterpart Mario Kunasek on 19 March 2019. ESD listened to what both ministers had to say.

**ESD:** I suppose that after such a long time without contacts at the highest level there was much to discuss between you and your colleague from Prague. What were the key topics in your exchange?

**M. Kunasek:** First of all, I am glad that we can finally exchange personal experiences on this level, and I am sure this will not be the last time. There was also an invitation from my colleague Minister Metnar, which I am sure I will follow. In addition to a general exchange of information on the European security situation, we discussed the use of training facilities.

**L. Metnar:** It was a very pleasant and friendly welcome, and we would like to thank Minister Kunasek. We have had good bilateral cooperation at the troop level or within the framework of structured European cooperation PESCO, with a total of 40 projects in the field of military technical or general training.

**ESD:** Minister Metnar, the Czech Republic has been a NATO member for over 10 years, while Austria has been neutral since 1955. What could you do together?

**L. Metnar:** While today we clearly have different strategic approaches and parameters, our relationship with Austria during the Cold War - perhaps because of older historical roots - was different from that of other NATO countries. And today we are good neighbours and partners in Europe, which is why I regard our cooperation as very important. It is at a high level. I would like to mention here the Austro-led project on NBC detection.

**ESD:** In fact, it was the aforementioned Austrian invitation to the Czech Republic to participate in the project now funded by the EU Defence Fund on air or network-based protection of deployed troops against NBC agents [Unmanned

sensor network for ABC protection / defense (CBRN / Surveillance as a service, SaaS)]. Could you imagine that?

**L. Metnar:** I can well imagine that because the project did not just start yesterday. When we also talked about PESCO, the topics of NBC defence and detection technology soon came up. For a long time, the Czech Army has been working to protect itself against delivery systems of such weapons of mass destruction, both in cyberspace and with sophisticated domestic passive positioning systems. We have agreed to focus on this, and Austria is interested in our capabilities. Presently, we only have observer status for this project, but on the basis of the EDA and the EU Defence Fund, various projects are constantly being developed and evaluated and effective platforms for closer cooperation are being maintained.

**M. Kunasek:** Indeed, the Czech Republic currently has observer status in this CBRN





Photo: Georg Mader

**On 19 March 2019, Czech Defence Minister Lubomir Metnar visited Austrian Defence Minister Mario Kunasek in Vienna.**

project but given the very high competence and know-how of the Czech Army, I have reiterated our invitation to them to participate actively in the project.

**ESD:** Passive detection systems such as VERA-NG from ERA in Pardubice are world market leaders. How did your Austrian colleague react to passive detection technology? In view of the undeniable Czech expertise, would you like to work more closely together in EW?

**L. Metnar:** We did also talk explicitly about passive airspace surveillance and the parameters of systems like our VERA-NG. Yet,

that was just an exchange of information without any specific cooperation agreements. Austria has a more theoretical approach to combat in cyberspace and wants to include intergovernmental components of internal security. This must be taken into account when testing cooperation.

**ESD:** In 2015, border protection was an important issue for both countries. During the Austrian EU Presidency in 2018, Minister Kunasek proposed using the military for this task, as was and is the case for army assistance on the national eastern and southern borders until 2011 and again from

2015. The idea was that regular soldiers would support the border police along or at 'hotspots' along the EU's external borders. What is your take on that?

**L. Metnar:** In my previous position as Czech Minister of the Interior, I discussed this issue with my Austrian colleagues, and we more or less agreed. Improving the protection of the EU's external borders, especially the southern ones, must be a central issue for all of us, especially with regard to illegal migration. During the difficult period of the migration crisis in 2015, we have also deployed police officers and soldiers to the border. Today, however, we no longer have a migration crisis, and the number of illegal immigrants fell sharply last year. This does not mean, however, that we should relax in this respect. We must constantly work on new concepts and measures that work effectively to this end. The Czech Republic is very much involved in this process and actively supports the development of all necessary measures.

**ESD:** What measures do have in mind?

**L. Metnar:** I would like to mention, for example, the joint defence projects under PESCO and COOPSEC [Cooperative Security], such as the CEDC countries' October exercise [Central European Defence Cooperation since 2010, with Austria, the Czech Republic, Slovakia, Hungary, Slovenia and

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**Austria's jet SAAB-105 are 49 years old; they will only fly for two or three more years.**

Poland (as observers)]. At Allensteig Proving Grounds in Austria in 2017 and with Hungary, Croatia, Slovakia and Slovenia as observers, we delivered training on effective crowd management techniques, logistical support for police, and border surveillance. While we participated with 80 soldiers, but Austria had 2.200 soldiers there! Another COOPSEC exercise is planned for autumn 2019, this time in Hungary. The rapid transfer to the EU external border using military mobility should also be any area where training is needed. We are also planning to integrate the interior ministries, FRONTEX and the partner countries of South-Eastern Europe.

**ESD:** If such a crisis situation were to occur again, would Czech soldiers be deployed at their internal borders?

**L. Metnar:** This is not an issue at the moment, but definitely yes. The law also provides for close cooperation between the police and the army in such threat scenarios.

**ESD:** And how about supporting FRONTEX missions with Czech troops?

**L. Metnar:** The above-mentioned model, of course, only applies to our national borders. Of course, we are ready for international missions, such as the support of FRONTEX. Nowadays, foreign deployments are a constant reality for our army.

**ESD:** Regarding future airspace surveillance over Austria: Last year, AERO-Vodochody from the Czech Republic made an offer for new L-39NG jet trainers. Since the replacement of the old SAAB 105 has become an urgent matter, what should we do with the EUROFIGHTER, not to mention an exchange?

**M. Kunasek:** We are very grateful for the offer made and renewed by my Czech colleague. We are pleased to receive all the figures, data and facts that will help us to make a decision. The Austrian public is focusing on the EUROFIGHTER, yet in reality, as you said, it is much more urgent to replace the daily aerial surveillance part currently covered by the SAAB-105. They will only fly for two or three more years. Everyone knows that we are in a decision-making process at a government level until the summer and do not want

to rush things. In any case, there is an interest in having an intergovernmental agreement.

**ESD:** Minister Metnar, do you understand that Austria needs time to make a decision, and how quickly could such aircraft be delivered by the Czech company?

**L. Metnar:** I have reiterated our offer for 2018. We understand that such an acquisition is a substantial, lasting, sovereign and national decision. We, therefore, fully understand that Austria wants to make sound choices. If it then finds interest in our offer - the purchase of the L-39NG training aircraft - we will have to discuss the timeframe and everything else related to it. Perhaps, you know that this newest model only flew last Christmas. Fortunately, we have spoken openly and clearly about it, and as long as no decision has been made, I consider predictions about delivery cycles to be speculative and misleading.

**ESD:** Minister Kunasek, how do you see this offer in terms of time pressure or value for money? Would this latest version of the ALBATROS jet meet Austrian requirements?

**M. Kunasek:** Let me repeat at this point that this issue has been important to me from the outset. And we must find a solution quickly. As you know, our Chancellor Sebastian Kurz has said before Christmas that we will not take this sensitive and highly political decision on the future composition of our airspace surveillance before the middle of the year, because we have to wait for the results of the [third] parliamentary [Eurofighter] investiga-

tion. Of course, I take note of the offer and we will use the time to explore everything. In the end, a lot of taxpayers' money is at stake and it is, therefore, necessary to strike a balance between growing necessity and a 'steady hand'. That is why I will not comment on individual offers here, nor do I know them personally in detail.

**ESD:** Minister Metnar, can you give details about the offer of the AERO company? How many planes, at what price, and with what delivery schedules, since it takes about two years?

**L. Metnar:** I do not want to go into that now. It will be a decision of a sovereign state that has not yet even defined its demands and parameters. That is when it will be time to talk about numbers, timelines and numbers. We both have experiences with such large acquisitions to modernize the armies, I think.

**M. Kunasek:** I would like to add here that although we have not talked about possible supply cycles, I believe that these are or will be properly assessed at an expert level.

**ESD:** In 2017 or 2018, Austria had asked the air forces of several countries whether they could provide training quotas or training sessions for Austrian AF personnel if the fleet of "105" aircraft suddenly were to die prematurely.

**L. Metnar:** Yes, it is part of the project we offered in 2018. Of course, there should be a bilateral agreement. It is possible to train Austrian pilots and ground personnel in modern facilities in our country, such as in LOM-Prague or LOM-Pardubice. [Author's note: Even before this visit, it was agreed that in spring 2019, pilots of the Austrian AF would visit or use the modern simulation centre LOM Pardubice].

**ESD:** The Austrian side has once again stressed that it prefers a procurement agreement between its Government and that of the manufacturer country. Do you see any particular advantages in this?



**The Czech Republic has offered its AERO L-39NG jet trainers to Austria.**



**The Cooperative Security Agreement (COOPSEC) includes the countries of the Central European Defence Cooperation (CEDC) – Austria, the Czech Republic, Slovakia, Hungary, Slovenia, and Poland.**

**L. Metnar:** The advantage of doing business at intergovernmental level is that it is simpler or more effective. In other words, when a state buys from another state, it receives a government guarantee, as opposed to a traditional offer or deal between a company and a government. We have discussed this model and it might be the right one for us if Austria has made up its mind.

**ESD:** Let us talk about something else: The Czech Republic is a troop contributor in

Afghanistan. The US under Donald Trump now wants to withdraw troops there or possibly withdraw altogether, even though the region is far from being pacified. How will the Czech Republic react?

**L. Metnar:** Yes, President Donald Trump said he wanted to withdraw his troops from Syria and later from Afghanistan. Political negotiations are underway between the US and Afghanistan. We will see what the outcome of these talks will be - everything else will depend on it. If the US withdraws, the Czech Government will, of course, react, and we cannot rule out that we will do the same. It is a very complex issue and it is a very long-term effort that has lasted 17 years. The military steps were followed by political and diplomatic talks aimed at political stability in the country. Their outcome will depend on what happens there and also on the assessment of our local engagement. I personally think that when it comes to the withdrawal of the US forces, we will also be looking into the withdrawal of our troops too.

**ESD:** Minister Kunasek, mentioned that you have also spoken about stability in the Western Balkans. Do you agree about what could be done there?

**L. Metnar:** Yes, we have actually been talking about this for a while. We have analysed the current situation and talked about perspectives. Both Austria and the Czech Republic are involved in this part of Europe and share the interest in actively promoting the various processes that have been under way for years. We are still willing to deploy soldiers and to do everything in our power to promote the integration of these nations and peoples into European structures and into the structures of the Security Alliance. However, this is also a very complex matter and a challenge that does not allow for rapid solutions.

**ESD:** So, it can be said that both sides have renewed their weakened relations in this renewed encounter?

**Kunasek:** It was a very friendly and cooperative visit in the best sense of good neighbourly relations and also from a military point of view. In any case, I am looking forward to working on the tasks discussed together.

**L. Metnar:** I thank my host for his sincere words and a good climate between us and our armed forces. I felt very welcome in Vienna.

**The interview was conducted by Georg Mader.**

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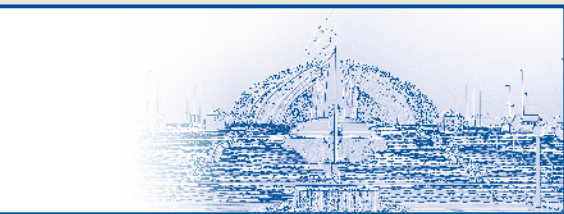
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## Viewpoint from Islamabad

Photo: Zafar Khan



### The Pulwama Crisis and the Dangers of Escalation

**Zafar Khan**

**Assistant Professor at the Department of Strategic Studies,  
National Defense University, Islamabad**

The Pulwama incident on 14 February 2019, in which 40 Indian policemen were killed, once again triggered a crisis between India and Pakistan when India, under the ambitious Prime Minister Narendra Modi, immediately blamed Pakistan for the attack without providing any credible evidence. As usual, Pakistan immediately denied all allegations as unfounded and stated that Pakistan would take action against the already banned groups if the Indian government provided evidence against them. In fact, Pakistan has already taken massive action against

this banned group because this and immediate de-escalation in the South Asian region is in Pakistan's interest. Meanwhile, the Modi Government preferred preventive air strikes against Pakistan across the Line of Control (LoC), rather than providing usable evidence that could resolve the crisis between the two rivals through credible dialogue. Later, the Pakistan Navy claimed to have thwarted a similar pre-emptive strike by the Indian Navy against the port of Gwadar in Pakistani waters, further escalating the crisis between India and Pakistan.



Photo: Adam Jones

### Nuclear Rivals

There are also recent reports that India has tried to launch some ballistic missiles at targets against Pakistan, and Pakistan has responded by using some of its own missiles as retaliatory gestures. The Indian air strikes over the LoC and Pakistan led to immediate retaliation and the tit-for-tat triggered a severe crisis between the two nuclear rivals. The Pulwama crisis poses a serious risk of escalation in South Asia. The question arises: why is India becoming more and more willing to change the status quo and risk a dangerous escalation in South Asia? There are some plausible reasons why India is becoming more assertive and ambitious to achieve its political and military goals.

First, power projection is a goal India is trying to achieve with advanced conventional and modernised nuclear forces and sophisticated launch systems. Some of India's advanced capabilities include nuclear-powered submarines, the purchase of advanced aircraft, Multiple Independently targetable Reentry Vehicles (MIRV), the Ballistic Missile Defence System (BMD), the possible introduction of the advanced S-400 air defence system, aircraft carriers, ballistic missiles, including intercontinental missiles, and the improvement of the capability to produce even more nuclear warheads. All these developments reinforce India's desire for power projection in the wider South Asian region.

*A fence at the India-Pakistan border near Amritsar, Punjab*



Second, the continuing border skirmishes and past crises, including the Pulwama incident, reflect India's motives to maintain its dominance of escalation over Pakistan. In general, India's strategy of flexible conventional and nuclear response should signal to potential opponents (China and Pakistan) that India wants to uphold its dominance in force development and conflict escalation; India does not want its opponents to outperform India in force development.

### Mutual Assured Destruction

Third, it also shows India's quest for a war-fighting strategy that would allow fighting a limited war without provoking Pakistan to use its nuclear weapons. India has developed a temptation for a counterforce targeting strategy. India considers Pakistan to be much weaker and its response strategy implies that India may be able to overpower Pakistan's deterrent forces with a first strike strategy, convinced that India would protect itself with its BMD and its sophisticated air defence system, which it will eventually use against Pakistan in the not too distant future. However, it is very questionable whether India would successfully destroy all Pakistani nuclear forces; Pakistan's heavily dispersed and concealed nuclear forces might retaliate against India. In short, it would activate mutual assured destruction (MAD) in South Asia. During the peak of the Cold War, both the Soviet Union and the US had achieved first strike capabilities, but due to the fear of mutual assured destruction, both were deterred to carry out preemptive nuclear first strikes. The Cuban missile crisis in 1962 is one of the classic examples in this context.

Fourthly, literature suggests that an Indian Government may take an increased risk if winning an election is preferable to the dangers of escalation. The Pulwama incident is just another incident that the Modi government is using to bolster its political regime with Indian elections approaching.

Fifth, the timing of the unnecessary escalation of the Pulwama crisis shows India's broader strategy, which involves India strengthening its strategic partnership with the US to contain China while developing India's economy and persuading various powers to sell their advanced conventional and nuclear technologies to India.

All these geopolitical and geo-economic imperatives make India confident that it will maintain its dominance of escalation to its advantage. Partnering with leading powers is important for India, as these powers compete with each other to offer India their nuclear and advanced conventional technologies. This is to India's advantage; it is unlikely that these powers would halt India's ongoing quest to gain room for manoeuvre for a limited war against Pakistan, which has the potential to be dangerous for all of South Asia.

Although the current escalation between India and Pakistan is slowly subsiding due to the US and nuclear deterrence, Pakistan will take defensive measures against its potential adversary. However, talks are essential to avoid a future crisis and to create a system of strategic restraint in South Asia. A dialogue between India and Pakistan, including the Kashmiri people, might help to de-escalate the crisis and to hold renewed discussions to resolve all outstanding issues, including the long-standing Kashmir issue.

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# Viewpoint from New Delhi

Photo: J.C. Menon



## Travails of the Indian Air Force

**J. C. Menon**

**T**he Pakistan-based Jaish-e-Mohammed (JeM) terrorist group bombing and killing of 40 Indian paramilitary soldiers in North Jammu and Kashmir on 14 February, followed by Indian air raids on alleged terrorist camps in Pakistan, the subsequent

downing of an Indian MiG-21 by the Pakistani Air Force (PAF) in an aerial battle, with the pilot being held captive and finally returned to India – all this brought to a close another phase of a long and complex proxy war to which India has been subjected since January 1990.

### Vintage Airframes

While it is admirable that an Indian MiG-21, a vintage airframe from the 1960s, challenges an advanced PAF F-16 in an aerial battle, it also points to a large inventory gap in the Indian Air Force (IAF).

With India-Pakistan tensions assuming an aerial dimension with the recent combat engagements between the IAF and the PAF, the disparity in air power quality could cost dearly for India, which looks to pursue a new security paradigm where it reserves the right to undertake pre-emptive strikes against Pakistan-based terror targets. The IAF's assessment is that it needs 45 fighter jet squadrons (a squadron comprises 18 aircraft). Given its depleted squadron strength, it is expected to dip below 30 this year against the sanctioned 42. Today the IAF, with barely 31 fighter squadrons, possesses around 650 aircraft. Compared to this, the PAF currently has 22 fighter aircraft squadrons which translates into about 410 aircraft. The PAF plans to acquire 250 aircraft to replace its MIRAGE IIIs and F-7s, besides its existing order for about 100 JF-17, a Chinese fourth-generation, multirole aircraft.

India is still finalising its operational requirements (Aerospace Supplier Quality System Requirements) for 114 fighters, and a total of six global firms have submitted their proposals. Although the process started in July 2018, the finalisation of contract details is expected for 2022. Apart from the 36 RAFALE jets from France ordered in 2015, and 40 homemade Light Combat Aircraft (LCA) TEJAS jets, IAF has also ordered the procurement of 83 additional LCA Mk-IIIs, which will be equipped with more lethal avionics and weaponry. Meanwhile, the IAF is also upgrading its existing fleet of MIRAGE 2000s, MiG-29s and JAGUARS to increase their operational capabilities.

### Indian Air Dominance

Ashley Tellis, an American expert on India and South Asia, whose counsel is sought by governments in both India and Pakistan,

argues that Indian air dominance is vital for deterrence stability in southern Asia and for preserving the strategic balance in the Indo-Pacific region.

According to Tellis, the IAF's desire for 42-45 squadrons by 2027 – some 750-800 aircraft – is compelling. "The goal is stymied by serious constraints on India's defence budget, the impediments imposed by the acquisition process, the meagre achievements of the country's domestic development organisations, the weaknesses of the higher defence management system, and India's inability to reconcile the need for self-sufficiency in defence production with the necessity of maintaining technological superiority over rivals," he says.

While defence acquisition in India remains mired in political controversies, budget constraints and a drawn-out acquisition process, arch rival Pakistan is collaborating with China to develop a fifth-generation fighter, besides strengthening its military capabilities.

The gaps in the IAF are best mirrored in a report of the Carnegie Endowment for International Peace: "Despite being a world-class combat arm, the IAF's falling end strength and problematic force structure, combined with its troubled acquisition and development programmes, threaten India's air superiority over its rapidly modernising rivals, China and Pakistan".

### Drawn-Out Procurements

Overall, the capital acquisition system, as it exists, is unlikely to effectively support the IAF in its operational preparedness and modernisation.

Every year the budget allocated falls far short of the money the IAF has committed to pay for purchasing aircraft and other equipment. The air force has committed liabilities in the 2019-2020 financial year – part payments due for procurements such as 36 RAFALE fighters that have already been made – to the tune of €6Bn. The IAF wanted €10Bn for capital acquisitions; against this, the air force has been allocated just over €5.6Bn billion in the interim budget presented on 1 February this year, which cannot cater for replacements unless there is a mid-year augmentation of funds.

The politically fraught nature of large defence acquisitions in India also has slowed the procurement process to a crawl. Defence procurement corruption has been assessed to be high, with a large mass of procurements shrouded in secrecy with low levels of accountability. Hence, bureaucrats are increasingly worried about having their name attached to any deals because they could later be answerable if the deals run into trouble at the political level. Thus, they would rather procrastinate decisions, leaving the choice to their successors rather than risk being caught up in political cross-fire.

All these aspects combined, the effect on India's defence preparedness is likely to be telling.

# Turkey–US Relations: The Turkish Side of the Rubik's Cube

**Andreea Stoian Karadeli**

Relations between Turkey and the United States have been the subject of many analyses. The transatlantic perspective has been presented in great detail. To restore balance, this article looks at the Turkish perspective to understand the reasons for Turkey's action as an important NATO member.



International relations can be symbolised by a Rubik's Cube game played simultaneously by several players each trying to win alone. The ideal situation would be that all involved work together and help each other to accomplish the task of the game: the unified arrangement of the Rubik's Cube. In order to help each other and thus help themselves, states must understand each other's perspective and see the cube as a whole. This is difficult and perhaps even a little idealistic, but in the end perhaps our only chance to survive. For the time being, however, we will concentrate on the Turkish side of the Rubik's Cube.

## Development of Turkey–US Relations

Located on the southern flank of NATO, Turkey has been a reliable partner of the West since the 1950s; it has contributed with military bases, facilities and a large,

well-trained army. With the collapse of the Soviet Union, Turkey's strategic importance changed, and has become a regional base from which the US can intervene in local crises in the region, as it did in Iraq and Syria. Marc Grossman, former US ambassador to Turkey, said: "Turkey lives in a neighbourhood that is a 360-degree challenge". Turkey's proximity to several global hotspots has made its territory important for stationing and transporting weapons, cargo and personnel for the US and NATO. From a Turkish perspective, NATO was to alleviate Turkish fears of aggression on the part of its neighbours. Turkey initially turned to the West in response to the Soviet Union's aggressive stance after the Second World War. In addition to the Incirlik airfield near the southern Turkish city of Adana, other important US/NATO sites such as missile defence radar in eastern Turkey and a NATO ground command in Izmir are important. Turkey has also controlled access

Photos: White House



*President Trump and President Erdoğan during a joint statement in the Roosevelt Room at the White House on 16 May 2017 in Washington, DC, following talks aimed at settling the crisis.*

## Author

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to the Black Sea across its straits since the 1936 Montreux Agreement – another Rubik's Cube game that, if renegotiated, would alter the regional balance of power. As recently analysed by the US Congressional Research Service, Turkish–American relations developed in six phases. The first phase took place between 1945 and 1962 and was characterised by the early partnership in the Cold War. In the face

the US continued to focus on regional developments in Turkey, but they declined. In 1991 and 1992, the US announced the closure of 8 of its 12 military bases in Turkey. US military aid to Turkey was stopped after the Cold War.

After 2003, in the fifth phase, which lasted until 2013, relations were marked by Turkey's growing economic and political weight in the Middle East, influenced by

world power, a clash of interests or perspectives is easy to understand. Turkey's actions and strategies are also inspired by the frustration of being seen as the "sick man of Europe" and not being treated as equal, and by the determination to prove itself once and for all.

Since the beginning of relations between Turkey and the USA, there have been many crises at every stage: the Cuba crisis (1962), the Turkish intervention in Cyprus (1963–1964), the Turkish occupation of Northern Cyprus (1974), followed by an arms embargo against Turkey (1975), the Iraq crisis (2003), the Turkey–Israel crisis (2010), the Syrian war (from 2011 until today), the failed coup attempt and the demands of the Turkish Government for the extradition of Fethullah Gülen from the USA (2016), the support of the USA for Kurdish armed forces in Syria, the visa crisis between the USA and Turkey (2017), the "Pastor Brunson crisis" (2018) and the purchase of S-400 from Russia (ongoing). Some of these issues have not been fully resolved and continue to hamper bilateral relations.

## The Kurds of Syria

Since 2014, the differences between Turkey and the USA over Syria have deepened because the US supports the Syrian Kurds and Turkey cooperates with Russia and Iran. At the same time, the international community blamed Turkey for the transit of foreign terrorist fighters and demanded strict border control measures to prevent the influx of Daesh terrorists. Following the terrorist attacks related to Daesh in Turkey, Turkey has agreed to allow coalition attacks from Incirlik. The coup attempt in July 2016 is another turning point in relations between Turkey and the US; the Turkish applications for extradition of the influential Turkish figure Fethullah Gülen to the US did not produce any results. At the same time, Turkey began military operations against Daesh and Kurdish-led forces in Syria. Turkey began to fight three different terrorist organisations simultaneously – FETO, PKK and their Syrian subsidiaries and Daesh – while the Turkish economy weakened. Continued US support for the Kurdish armed forces motivated Turkey to enter the diplomatic process with Russia and Iran over Syria. And other events have aggravated the crisis: Turkey arrested several US citizens and Turkish employees of American diplomatic institutions; both sides refused visas, but the diplomatic missions resumed their activities after a short time, just in time for another event: the



Photo: US Army

**A Kurdish Peshmerga soldier takes the lead during US-supported urban combat manoeuvres training held near Irbil, Iraq, on 29 October 2015. US backing of Kurdish armed forces has led to considerable discontent in Turkey.**

of Soviet pressure to allow free passage through the Turkish Strait and Soviet territorial claims in eastern Anatolia, the Turkish Government turned to the US; mutual resistance to Soviet expansion motivated relations in the decades to come. Important events took place during this phase: Turkey became a founding member of the UN in 1946 and a NATO member in 1952 after joining the UN forces in the Korean War. In 1954, the USA and Turkey agreed to share the Incirlik airfield, followed by an agreement on the status of the armed forces in 1955.

The second phase was between 1963 and 1978 and was marked by the Cyprus crisis. It also saw the rise of anti-Americanism among the Turkish population, which has steadily increased since then. The third stage between 1980 and 1991 was defined by a renewed military cooperation motivated by the common Soviet threat. The fourth phase between 1991 and 2002 reflects a reassessment of Turkey's relations and importance for US policy makers. Immediately after the Gulf War and the collapse of the Soviet Union,

the rule of the Justice and Development Party and by cooperation in the fight against terrorism.

The last and ongoing phase of Turkish–American relations began in 2013 and is marked by a number of challenges. The two countries have once again joined forces in a coalition led by the USA, which has carried out anti-Daesh operations from the Turkish airbases. Despite the cooperation, the priorities of Turkey and the USA today differ more than ever.

## History of Crisis in Turkey–US Relations

Although many observers are nostalgic for the past cooperation between Turkey and the USA, relations have not always been rosy. In fact, crises have occurred at all times, most of which have been resolved but have left scars and resentment, especially among the Turkish population. Given the fact that Turkey will continue to remember the glorious past of the Ottoman Empire and wants at least as great a position today, while the US is a

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Branson case. Shortly after the end of the Branson crisis, Trump announced that he would withdraw American troops from Syria and published several tweets in which he warned Turkey against taking action against the Kurds.

## The Trouble with the S-400s

The latest tensions result from the Turkish purchase of the Russian S-400 missile defence system from Russia. The Trump administration and Congress repeatedly warned that the purchase could stop the transfer of F-35 aircraft to Turkey. As a result, the government is trying to sell the MIM-104 PATRIOT to Turkey as an alternative to the S-400, but there has not yet been an agreement, and the Turkish Government wants to stick to its deal with Russia. In addition, Turkey is intervening against Syrian Kurdish forces in Afrin province and threatening additional measures in Syria since the US announces plans to withdraw its troops from Syria. However, the Trump administration's talks with Turkey, European allies and US-backed Kurdish fighters have not yet resulted in an agreement to create a security zone in the north-east of the country where Kurds will fight Dash terrorists.

The current situation seems more complicated than ever; it is determined by several factors that have already been highlighted: the Turkish acquisition of the S-400, the Syrian war and its impact on Turkey after the US pull-out, Turkish efforts to help Iran avoid sanctions, the Fethullah Gülen crisis and Turkish domestic and economic developments.

Complaints have been expressed on both sides of the Rubik's Cube: the US is concerned about Turkey's stubbornness in buying the S-400 air defence system from Russia, Ankara's aversion to Washington's Syrian Kurdish allies, Turkey's efforts to help Iran avoid sanctions, and Turkey's increasingly repressive policies. Turkey argues that similar weapon systems to the S-400 were already in place in other NATO countries, and accuses the US of aiding Syrian Kurdish forces in establishing an independent Kurdish state, which the Turkish Government considers a threat. In addition, Turkey accuses its long-standing ally of not cooperating in the Gülen case and of the duties imposed by the US on Turkish steel and aluminium.

The S-400 crisis will not end so quickly, and Turkey is now more confident about its decision than it was in the past when it cancelled a similar agreement with China under pressure from the US. The current situation is different. Turkey has stuck to the agreement with Russia since 2017 and the first delivery was announced for July 2019 – earlier than expected. While the US sees the S-400 as a threat to transatlantic security, Turkey sees the following advantages: According to the manufacturer and Turkish officials, the S-400 system is superior to the MIM-104 PATRIOT in almost every respect, from aircraft and missile detection to radar capacity; it is more economical and the S-400 agreement also provides for production cooperation and technology transfer (ToT) to Turkey. Turkey also believes that the agreement with Russia will bring political benefits: The S-400 will end Turkey's dependence on US arms supplies and add diversity to Turkey's arms stock, and the S-400 ToT would allow the Turks to build a domestic missile defence capability. Moreover, according to Turkish officials, the S-400 would not disrupt links with the US, as the Trump administration claims. On the contrary, it would create an equal and balanced relationship between Turkey and the US. As one of the founding partners of the F35, the US threatens Turkey with military, economic and political sanctions if Ankara continues with the S-400 agreement. But



for the Turkish Government there is also another side to the Rubik's Cube: with the F-35, the national logistics system would be under US control, increasing dependence on the US and also undermining the national aircraft project.

### "Turkey First"

The S-400 missile is important for Turkey because, according to official statements, it would make Turkey a partner in S-400 production. President Erdoğan stressed in several interviews the importance of technology transfer in this project. Turkey has invested a lot of money, technology and brains in the development of domestic military equipment, and further technology transfer is desired. Therefore, Russia made an attractive offer and Turkey has embraced it without hesitation. At the political level, the S-400 can also be seen as a symbol of Turkey's sovereignty and independence. Turkey has often been under foreign pressure. Therefore, the decision to buy the S-400 is proof to the Turkish Government that the security of its territory and its people is paramount to it. In a way, it is "Turkey first" rather than "America first". To Turkey, this project goes far beyond mere military necessity.

This entire current crisis is only the tip of an iceberg consisting of a number of lesser known but relevant factors, all pointing to Turkey's struggle to redefine its role on the international stage. For example, Turkey is building a military presence in the Red Sea intensifying tensions between Egypt and Turkey and between Egypt and Sudan. Ankara has also contributed to confrontations between Palestinians and the Israeli police in Jerusalem. Turkey routinely violates Greek airspace, thereby jeopardising the stability of the Aegean Sea. In addition, Turkey decided to play a more confident role in the regional energy game, particularly through the newly discovered oil and gas reserves in the Eastern Mediterranean; the recent "Blue Homeland" three seas exercise is related to Turkey's plans to play a stronger role in both the energy and military sectors.

Turkey has learnt many important lessons from its difficult past and two of them are of great value today. Firstly, Turkey has understood that its ally – the US – cannot always be there during times of need and in many cases is disappointing. That is why Turkey must have a fall-back option or a backup plan. Secondly, Turkey has recognised that it will achieve better results if it sticks to its position more strongly. Turkey has understood that today we are arguing about the S-400 and tomorrow we will certainly be arguing about something



Photo: TAF

**Located on the southern flank of NATO, Turkey has been a reliable partner of the West since the 1950s.**



Photo: DoD/US Air Force

**US soldiers standing by a PATRIOT missile battery in Gaziantep, Turkey, in February 2013. The USA has offered Turkey the PATRIOT system if Turkey cancels the procurement of the Russian S-400 system.**

else, and that there will always be pressure to give in and play by the rules of others. Nowadays Turkey wants to play by its own rules and at its own risk.

The Turkish leadership is striving for the status of a regional power, which allows Ankara to shape the immediate geopolitical environment and maximise Turkey's economic, political, diplomatic and military influence. To this end, over time it has resisted an international order that has facilitated the exercise of American power. Although it is Turkey's right to do so, it will continue to be at odds with the United States on a number of important issues.

### Conclusion

Political scientist Graham Fuller comments on the crisis in relations between Turkey and the US: "The old, predictable and loyal ally of the US, Turkey, is now a thing of the past." Thus he summarises the conflict between Turkey's national interests, such as the defence of territorial sovereignty, and the global and regional interests of the US, such as the control of global energy resources. When the interests of the two allied actors become incompatible, their relations deteriorate for lack of mutual trust. ■



## Viewpoint from Tbilisi



# Anaklia's Deep Sea Port: a Game-Changer in Eurasia

**Beka Kiria**

Director of the Gagra Institute

Anaklia in Georgia is Europe's easternmost seaport and strategically the most important deep-sea port on the east coast of the Black Sea; it has the potential to become a landmark port in Eurasia with a positive economic impact on the countries of the South Caucasus, Central Asia and the Middle East.

### The Project

Under the project name "Lazika", the Saakashvili government had announced the port and city concept that was to be completed in the first half of 2015. The 85-hectare port on the Georgian coast next to the second-largest city near the breakaway region of Abkhazia was to cost US\$131M. In addition to facilitating international trade, Lazika aimed to promote peaceful coexistence by involving people residing in conflict zones. An airport, tourist zones, business centres and residential areas were also part of the project planning.

The subsequent Ivanishvili government initially rejected the project, but soon considered it a promising plan to boost the Georgian economy. It was renamed from "Lazika" to "Anaklia" and slightly changed; since 2013 it has been part of China's One Belt One Road concept. The opening was postponed to 2020 and the total investment volume raised to US\$2.5Bn. In addition, 330 hectares of land and 225 hectares of marine land were earmarked for the deep-sea port of Anaklia. In short, Anaklia's main idea is to link Europe with Asia without building a new city around the port.

### Trade

The aim is for Anaklia to develop the port infrastructure in Georgia and thus significantly improve economic opportunities at home and abroad. In addition, there are plans to upgrade the ports of Batumi and Poti to accommodate large ships. If three port cities were integrated into a package of a future economic strategy, this would have a positive economic impact on the entire region. As a hub for international trade and logistics, Anaklia will strongly influence the countries of the South Caucasus, Central Asia and the Middle East. Anaklia has the potential to reach the population

of the three South Caucasus republics (17 million), over 150 million people in Central Asia and Iran (81 million), South Asia-Pakistan (197 million) with the Ghulam Khan border crossing to Afghanistan via the Lapis Lazuli trade route and Iraq (38 million).

The Anaklia Port will initially turn Georgia into a logistics centre in the Caucasus. In the medium term, the port will become a nucleus of a global value chain that will have a positive impact on Georgia's immediate neighbourhood and lead to irreversible change throughout the Eurasian region. The Global Infrastructure Leadership Forum sees Anaklia Port as a bedrock for global prosperity and one of the top five strategic infrastructure projects worldwide. In fact, Anaklia's global importance has increased after Russia failed to sign an agreement with China for the modernisation of the Trans-Siberian railway and the long-distance Baikal-Amur line. Anaklia is also part of the TRACECA (Transport Corridor Europe-Caucasus-Asia) programme, which aims to connect the European Union with Central Asia and the Caucasus and provide additional land transport capacity. Anaklia is a multi-dimensional trade axis in Eurasia, as are the Trans-Caspian trade route and the Baku-Tbilisi-Kars railway.

As regards the country's strategic positioning on bilateral trade agreements, Georgia is the only country in the region enjoying free trade agreements with both the EU and China. It is expected to sign a free trade deal with the UK. As a result, the EU regards Anaklia as a top priority project in Georgia bolstering the construction of its second phase with €233M. Also, development of a €100M new railroad will connect Anaklia with the central railroad system of Georgia.

### Security Implications

Georgia boasts a number of strategic bilateral trade agreements and infrastructural projects. A decade ago, the country was invaded by Russia and lost control over 20% of its territory for aspirations towards NATO and EU membership. Therefore, it is logical to ask what is the main priority of Anaklia deep-sea port project – addressing security concerns or facilitating business.



Photo: Anaklia Development Consortium

**Currently under construction: Anaklia Deep Sea Port**

The modern port is a vital node for China's Silk Road economic belt, essential for EU's strategy towards Central Asia and strategically crucial for the US interests. If in the past mainly the Euro-Atlantic institutions were engaged with Georgia, China with its weighty investment in the region has been added to the list. Thus, the construction of Anaklia's port could reshape not only the South Caucasus security environment but also diversify the security landscape of the landlocked Central Asian countries. Ultimately, the construction of Anaklia Port will gradually bolster security in the region.

Aside from the trade and economic opportunities for the broader region, Anaklia Port might also play a strategic role in helping the Euro-Atlantic institutions to expand their reach and boost their presence in Central Asia.

Because of their geographical location, the Central Asian countries are currently outside the reach of the Alliance. Compared to the Eastern European countries, the Central Asian countries have only two regional development options: cooperation with China or with Russia. Anaklia Port, together with the ports of Poti and Batumi and the transit routes and geographical location of Georgia, will be a decisive factor for the future security landscape in Central Asia.

At this moment, the reach of Euro-Atlantic institutions into Central Asia is rather weak. By connecting Europe and Asia, Anaklia Port will directly link Central Asian countries to the Euro-Atlantic institutions. Essentially, Anaklia might become a new "gate" for Euro-Atlantic institutions to strengthen their presence in the region, and connecting the Caucasus to Central Asia will significantly enhance integration in the region. Noticeably, it bears a promising potential to have diversity in strategic choice and freedom to orient towards alternative political pathways.

## The Central Asian States Union

Using Anaklia Port, the US and the EU could easily reach the landlocked Central Asian countries and enable actors to foster integration for the prosperous development of the whole region. In the long term, despite all the social, cultural, ethnic and religious differences in the region, the project opens up the possibility of creating a union of these countries. It is important that the EU supports the countries of

Central Asia in establishing the of Greater Central Asian States Union. In addition, an EU strategy for Central Asia is important, as China's Belt and Road initiative forces the EU to develop its own plan and improve relations with Asia on the basis of a rule-based approach. For example, the Central Asian Union was formed but appeared defunct. Georgia's ports could, however, revive the Greater Central Asian States Union and thus create a framework for a common economic policy and customs. Anaklia could be an effective channel for the EU to further support programmes to improve the business and investment climate in Central Asia. In addition to new ports being built on the Caspian coasts, Anaklia will enable the EU to develop human capital and human exchanges and to establish direct contacts with Central Asia.

In addition, Anaklia could play an important role in the USA's focus on Asia. The US needs new allies in Asia like never before. Since transatlantic relations have been marked by significant differences, Central Asia could become a place of cooperation for the US and the EU. A strong presence of Euro-Atlantic institutions in the region would undermine the Russian sphere of influence and eventually restore China's balance. In addition, the "sphere of influence" could be shifted from the South Caucasus to Central Asia, enabling Georgia and Ukraine to become NATO and EU members.



Photo: Anaklia Development Consortium

**Georgia wants to upgrade the ports of Batumi and Poti to accommodate large ships.**

Finally, Georgia's geographical location and unique access to the markets of Europe, Central Asia, East Asia and the Middle East will make it an important hub for trade between the EU and China. Anaklia Port will influence its neighbours and increase the bargaining power with Russia. Port infrastructure, land transport and transport infrastructure will bring tangible benefits to all participating states; it will foster the regional trade ecosystem along the international trade routes and enhance cooperation and integration in South Caucasus and Central Asia.



# Russia In Central Asia: A Hegemon in Decline

**Stephen Blank**

**The recent announcement of a US–Taliban agreement on a framework for peace in Afghanistan obliges us to look at Central Asia and the other contenders for influence there and in Afghanistan.**

**T**his announcement is even more of a “forcing” event, because it is difficult to believe that the Taliban will really desist from cross-border terrorism if they are in power. Neither is it certain that they will be able to keep Al-Qaida and ISIS out of the country as they attempt to impose their rule on Afghanistan, especially in the

context of what we can presume to be an ongoing rivalry among Asian players for influence there. In other words, this agreement suggests the US is looking to get out under a façade of dignity and has not thought through the implications for the Ghani government in Kabul and the more Westernised elements of Afghan society.

rather than later, rather than with Kabul. Therefore this agreement and the trends it generates will force other interested parties like Russia to accelerate their activity in and around Afghanistan and Central Asia.

## Dreams of Hegemony

Russia is a major contender for hegemony in Central Asia and to further its hopes of dominion there, it has supported the Taliban for several years, including transferring weapons and sharing intelligence with it, allegedly because it will not export terror to Central Asia and because doing so confounds the US. And once the US announced this framework agreement, Moscow has resumed its efforts to pose as the broker in Afghanistan by convening a meeting of Taliban and other opposition groups, notably excluding the Ghani government, in Moscow to discuss Afghanistan’s future. Moscow also supports the Taliban, because the supposed “harmony of interests” between them and Russia allows Moscow to continue entertaining dreams of hegemony in Central Asia. Evidently, Moscow approached the Taliban because it feared and is obsessed about the potential rise of ISIS in Afghanistan and Central Asia, even though it supports terrorism against Ukraine and in other parts of the Middle East, as noted below. Moscow is or was equally obsessed with the idea that Washington will install permanent bases in Afghanistan to threaten Russia and exclude it from any future peace treaty.

Thus Russia has employed its time-tested tactic of inserting itself into conflict situations in order to force everyone to reckon with its goals (none of which are connected with peace but rather with forcing such acknowledgment by the parties involved). Having forced itself into the equation, Moscow then seeks to perpetuate frozen conflicts abroad so that it can preserve leverage upon all the players indefinitely with



Photo: US Army

*A Tajik soldier covers a traffic checkpoint in a mountain training camp in Tajikistan on 24 April 2018. The training was part of an engagement between the Tajik and US military.*

## Author

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These considerations make Russia’s role even more interesting, as the likely outcome of the aforementioned trends is civil strife within Afghanistan in resistance to the Taliban, with domestic factions linking up with Russia, China, India, or Pakistan, who all have substantial equities there. Nor is it likely that the Taliban will abide by a coalition government with the Ghani government, as they have hitherto refused to negotiate with Kabul and this agreement is solely with Washington, which is clearly eager to leave sooner

no objective in sight other than preservation of that leverage. In Afghanistan's case, gaining permanent leverage there allows Moscow to continue to portray itself as the sole security manager for Central Asia. For as long as Afghanistan remains torn by conflict and by foreign rivalry, any effort by Central Asian states and India to invigorate their ties will face serious impediments. And the threat of terrorism from Afghanistan is the principal justification for Russia's military presence in Central Asia and the maintenance of the CSTO (Collective Security Treaty Organisation) structure that Russia dominates, giving it leverage over all Central Asian militaries.

Accordingly, Russia justifies its aspirations to hegemony there on the grounds that it alone has the resources to protect Central Asia from ISIS or other terrorists. In that context, the Taliban's willingness to announce that ISIS or Al-Qaida will not function in a future Afghanistan assuages Moscow's concern that it might actually have to fulfil that counter-terrorist mission with insufficient forces in Central Asia and expose the hollowness of its pretensions there. Certainly, the Russian leadership and military well remember what happened to them in Afghanistan in 1979-92 and show no signs of being eager to repeat that experience. Thus, its military claim to hegemony in Central Asia rests on a presumption that it dare not allow to be tested. Yet while it was

promoting the Taliban, Moscow was busy reinforcing its military ties with Central Asian states and strengthening its presence in Central Asia on the grounds of defending against terrorism.

### The Post-Soviet Area

Nevertheless Russian and many other writers continue to take for granted that a Moscow-driven "integration" will continue uninterruptedly and that Moscow can easily preserve some form of hegemonic status in Central Asia. Thus, an article in the Eurasian Integration Yearbook for 2010 stated, "Russian hegemony is an established fact in the post-Soviet area." Whatever the case in 2010 was, it simply is incomplete to make that assertion now. While Central Asian states may not have then viewed Russia only as a threat but as a resource for modernisation, their perception of a Russian threat has never disappeared. And this is true even though Russian writers today still blithely assume that, despite all the obstacles, integration under Russian auspices is still the trend of the times. Indeed, in 2017, Putin toured the area and strengthened Russia's military presence in Kyrgyzstan and Tajikistan and then offered an "updated version of the Brezhnev Doctrine" of the diminished sovereignty of post-Soviet states that Moscow would not allow colour revolutions throughout the former Soviet space.

Notwithstanding such assertions, the fact is that Russian capabilities to play a hegemonic role in Central Asia are fast and visibly slipping away. Moreover, this trend has long been noticeable. To be sure, Moscow still disposes of important and possibly formidable and lasting economic and military capabilities to obstruct what it deems to be centrifugal trends in Central Asia. It still is the only foreign military power with formal treaty rights and bases throughout the region as embodied in the Collective Security Treaty Organisation, CSTO, and it controls most energy pipelines to Europe and utilises some of the pipelines to China for shipping its hydrocarbons. There are still personal ties between leaders and Putin. And several Central Asian states, notably Tajikistan and Kyrgyzstan, and to a lesser degree Uzbekistan, depend on remittances from migrants in Russia. Finally there is the real, if overhyped threat of Afghan or locally based terrorism.

### Destabilising Terrorism

Nevertheless, internal and external trends in Russia, Central Asia, and further abroad like China and India increasingly point away from Russian hegemony even if Russia retains the formal responsibility for defence. Indeed, it is clear that Moscow is loathe to have to undertake a true counter-terrorist mission in Central Asia, and if a real terror-



Photo: Edgarp001

**Almati, the former capital of booming Kazakhstan, at night. Some Central Asian states are slowly moving away from Russia.**



ist threat materialised it is not likely Moscow could stop it. In practice, Moscow views terrorism as an instrument that can be used for or against Russian interests and assesses it on that basis. Thus, terrorists who destabilise states hostile to Moscow or work with its partners receive its support and vice versa. Moscow has supported terrorists in Afghanistan, for example the Taliban, Ukrainian separatists, Kurdish terrorism, the FARC in Colombia, and Hezbollah, not to mention its defence of Hamas as a legitimate politi-

to the Afghan Army, demonstrating Afghanistan's growing security importance to China as it moves forward on the Belt and Road Initiative (BRI). If we take into account the sheer size of China's BRI through Pakistan, Afghanistan, South Asia, into Central Asia and the Middle East it becomes clear that to defend its investment China is likely to increase its military capabilities along its peripheries that include Central Asia. Whatever we call this project, it is clear that any and all "silk roads" possess as

long-standing idea has gone nowhere due to Sino-Russian divisions on the subject, and in any case cannot substitute for Russia's exclusion from other schemes of Asian economic integration. Indeed, Putin suggested as much in his UNGA speech of September 2015 where he attacked the creation of regional economic blocs that exclude Russia, but then added that Russia not only supports integrating the Eurasian Economic Union (EurasEC) with China's BRI initiative but that it also wants to integrate EURASEC with the EU. Acceptance of integrating with the BRI acknowledges in fact China's dominance of Central Asian external trade and investment and that Moscow must now accommodate itself to Beijing. This is because Moscow hitherto opposed this idea lest it engender Chinese domination of Central Asia.

The Russian president's special representative to the SCO (Shanghai Cooperation Organisation), Ambassador Kirill Barskii, stated: "With regard to the SCO's regional economic cooperation... we will not consider it in the future. Integration of the Eurasian region should be that of forming a customs alliance/union under the leadership of the Eurasian Economic Union, which is currently being formed, and which could have cooperative relations with the SCO."

Photo: White House



**President Donald Trump and President Ashraf Ghani of Afghanistan at the UN General Assembly on 2 October 2017. The recent US agreement with the Taliban might cause considerable turmoil in the region.**

cal player. One doubts that Central Asian leaders are unaware of these facts. But as long as Moscow proclaims its willingness to shoulder the burden of leading the defence of Central Asia neither those states nor China will counteract it.

## China's Rising Star

Yet Central Asian states are in some cases developing their own military capabilities without relying exclusively on Russian help. At the same time, China has clearly shown its unease by beginning to build its own military capabilities and training programmes with Central Asian militaries. China may be proceeding with extreme caution, but its intention to be a power broker in Afghanistan and a major player in negotiations over a future Afghanistan are quite evident and make considerable sense in the present context. Already by 2016, Foreign Minister Wang Yi openly confirmed that China is looking to build "some infrastructural facilities and support abilities," meaning military bases. China is also now increasing its military assistance

much geopolitical significance as they have economic importance for their builders and users. Thus, for example, Kazakhstan has announced that it will build an offshore centre for the Yuan to serve all of Central Asia in anticipation of the huge rise in trade with and investment by China. Such centres allow foreign investors to convert these foreign currencies directly into Yuan and bypass the dollar, that is, internationalising the Yuan (or Renminbi) and creating a closed currency bloc, much as Nazi Germany and the USSR did. Since nobody has shown an interest from outside in stabilising the Yuan and given Kazakhstan's centrality to any Chinese vision for Central Asia, this centre prospectively assumes greater importance even as it represents another advance of Chinese power at Russia's expense in Central Asia.

Chinese ascendancy in economics, trade and investment at Russia's expense was already visible by 2015-16 and has grown since then. While Russia, China and four Central Asian states are discussing a free trade agreement for Central Asia, that

## Chinese Dominance

So Russia had and still has no alternative to Chinese dominance here. Consequently, writers who extol the BRI as a geoeconomic and geopolitical benefit to Russia almost explicitly accept Chinese dominance in Eurasian economics, an outcome that inevitably entails the distasteful advent of Chinese political hegemony as well. Therefore, Russia still advocates Central Asian or Eurasian trade zones as cardinal points of its integrationist rhetoric, since Moscow also wants to forge a linkup of EURASEC with ASEAN since it cannot effectuate this connection unilaterally.

Furthermore, Moscow's own regional economic bloc, EURASEC, faces formidable economic and political challenges. Russia's declining economy has dragged down all of Central Asia with it. Second, EURASEC also represents an effort to exclude China's trade from Central Asia and force local consumers to pay more for inferior Russian goods. Third, the EURASEC cannot compete with the BRI and has had to accept subordination to it. Fourth, EURASEC cannot compete with or substitute for other schemes of Asian economic integration. Fifth, recent Russian studies show that Russia actu-



ally benefits very little from EURASEC, and instead must subsidise some of the poorer members. Therefore EURASEC will largely be a geopolitical, not a geo-economic, project. Thus, barring major reform, it will have relatively little economic utility for Moscow. Lastly, despite major Kazakh efforts to slash its prices, Kazakhstan's exports to other members have fallen steadily and by a great deal since 2015 suggesting that EURASEC also offers little to Astana. Indeed, EURASEC now faces great difficulties because the devaluation of the rouble in 2014-16 has forced further devaluations across Central Asia and trade rows among its members that clearly have not benefited them. EURASEC has therefore not retrieved Russia's economic or political positions in either Central Asia or Asia. Indeed, members' share in Russia's trade only grew 0.5% from 2010-2016 while the dollar value fell from US\$64Bn to US\$39Bn.

Therefore, EURASEC cannot be the engine of genuine geoeconomic let alone geopolitical integration around Russia, which itself increasingly depends on Chinese investment and support. Nonetheless, Putin advanced just such proposals in 2015 and 2017 as a means of overcoming the economic crisis and the political isolation imposed upon Russia due to its aggression in Ukraine. But these remain tired proposals. Despite the emphasis on transportation infrastructure investment from 2001-2011 the actual share of investments in transport and infrastructure remained about 2.5% of GDP, not the targeted 4%. Despite plans to invest US\$43Bn in a Europe-Asia Transport Corridor through China and Europe where Russia plays a profitable but not directing role as a medium for intercontinental trade, many such projects have been announced and failed since 1991. Thus as many analysts have observed, the outcome of the BRI is that, "The conjugation of Eurasian integration and the BRI will lead to an even greater concentration of Eurasian economic activity on Beijing, which will be tempted to monopolise the influence on the EAEU (EURASEC) countries."

India, too, is playing a larger economic role to fill the void left by Russia's declining economic competence here. India has long been deeply involved in propping up the Afghan state and China has recently persuaded (more likely forced) Pakistan to recognise the legitimacy of its interests there. India has also joined with Central Asian states to support peace, security, stability, and development in Afghani-

stan. Even Kyrgyzstan, possibly the most pro-Russian state in Central Asia, is now upgrading business ties with India in the water, railway, hydroelectric, defence, energy, and other sectors.

### Centrifugal Forces

At the same time, Central Asian states are also leaving Russia's shadow. Not only China attracts them economically, but so does the United States, and they want and actively solicit increased US invest-

Mirziyoyev has reversed his predecessor's policies, thereby expanding cooperation with all of Uzbekistan's neighbours and all of the great powers, including Japan. The other Central Asian states have responded warmly and positively to his overtures and therefore we now see expanded cooperation in all these areas of national endeavour that can only increase regional cohesion, strengthen the independence of individual states, and limit the impact of Beijing and Moscow's policies upon them.



***The Eurasian Economic Union (EEU) led by Moscow is slowly losing ground to the competing Shanghai Cooperation Organisation. Depicted are the then EEU presidents (f.l.t.r.) Serzh Sargsyan (Armenia), Alexander Lukashenko (Belarus), Nursultan Nazarbayev (Kazakhstan), Vladimir Putin (Russia) and Almazbek Atambayev (Kyrgyzstan) in October 2015.***

ment, to which the Trump administration has responded positively. Central Asia's emergence is also occurring in demographic, political, and cultural areas. Russians' share in Central Asian populations is steadily falling, reducing the still potent possibility of a revanchist movement, particularly in Kazakhstan. As a result, Kazakhstan is taking an ever more overtly nationalist line, for example, latinising the Kazakh alphabet and severing a major instrument of past Russian cultural hegemony. This trend also manifests itself in the Kazakh Government's deliberate efforts to reduce Russian influence over the media there. Thus, the declining population translates into a loss of cultural power. We also now see enhanced regional cooperation in transportation, trade, hydroelectric programmes, and energy. While Kazakhstan has always championed such cooperation, the major impulse behind this trend is the fundamental transformation and reversal of Uzbek policy by the new Mirziyoyev government in Uzbekistan. Upon coming to power in 2016,

All these trends, taken together, show that Central Asia cannot and will not be easily dominated by anyone, certainly not by a declining power like Russia that cannot sustain its own domestic economic ambitions. Indeed, it is clear here, as elsewhere, that the dream of Russian hegemony is realisable only by perpetuating wars and conflicts, and even there Russia is increasingly hard-pressed to keep up. As we move further into the 2020s, it is clear that Central Asia will elude Russian, and probably Chinese, efforts to dominate it unless the great powers poised to play their eternal games in and around Afghanistan help bring about another war as Moscow appears to be doing. Indeed, only Russia, and even that is dubious, benefits from a new round of Afghanistan's forty-year war. But if that war continues and has the likely result of exporting terrorism abroad, that result will likely rebound upon a Russia that clearly is not prepared to deal with the Frankenstein's monster that it has helped create. ■



# If Peace Is under Threat: Sweden's Defence Policy

Tommy P. Christensen

**After the fall of the Soviet Empire, not everything would be calm and peaceful, and Swedish defence policy responded far too late to the threat of Russian aggression and aggressive behaviour towards most of its neighbours.**

In July 2017, the Justice and Interior Minister Anders Ygeman and Infrastructure Minister Anna Johansson, both Social Democrats (SAP), had to face the opposition's critical motions. The ministers were accused of having informed the government and par-

The issue resulted in a reshuffling of the government, and general elections were held in September 2018. The winner was the Social Democratic Party (SAP) with 28%, followed by the Conservatives (Moderaterna) and the right-wing party (SD) as the third-largest par-

On 10 April 2019, Minister of Finance Magdalena Andersson presented the government budget for the period 2019 to 2024 which approved the investment plans for procurement and maintenance of defence equipment. The budget foresees an increase of the annual defence procurement from SEK10.7Bn in 2018 to SEK18.6Bn in 2024 which is an increase of almost 73%. The budget for maintaining existing investments goes up from SEK7.2M in 2018 to SEK10.2M in 2024 or just over 41%.

Already in summer 2015, most parties had agreed on a defence draft for the years 2016 to 2020 which was based on two reports by the Parliamentary Defence Committee titled "Decisions in a Globalised World" (2013) and "Defence of Sweden - a Stronger Defence for an Uncertain Time" (2014). All political parties concluded that it is crucial that Swedish defence and security policy is based on a broad political consensus.

Photos: Forsvarsmakten



**A Swedish JAS 39 GRIPEN landing on a road strip. Sweden's air component is based on the idea of using ordinary highways as alternative runways.**

liament too late about the non-compliance with data protection regulations by the Swedish Transport Agency (Transportstyrelsen). In 2015, the Agency had outsourced its databases to a private IT company, and its employees in Eastern Europe weren't sufficiently vetted. According to the Swedish Security Service (SÄPO), there had been a misuse of the managed information, which included all civil and military vehicles and driving license holders in Sweden.

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ty. The liberal centre party (Centerpartiet), as well as the left-wing party (Vänsterpartiet), got around 8%, indicating that one quarter of the votes went to the political extremes. Finally, the former prime minister Stefan Löfven formed a new government consisting of two parties (SAP and Miljöpartiet de gröna) supported by two others (Centerpartiet and Liberalerna). The coalition agreement is based on a manifesto consisting of 73 items, and on 21 January 2019, Prime Minister Löfven presented his government. The 16-page document states, for example, that the reinforcement of the armed forces has been completed and procurement will take place step by step in accordance with the 2018 Riksdag budget decision. Compulsory military service will be strengthened and a new psychological defence agency will be established. The document also states that arms exports to undemocratic countries militarily involved in the Yemen conflict will not be allowed as long as the conflict continues.

## Sweden, CSDP and EDF

Sweden has been an active partner in the Common Security and Defence Policy (CSDP) as well as the Common Foreign and Security Policy (CFSP) since joining the EU in 1995. Sweden is one of the few EU member states that have participated in every EU civilian and military CSDP mission. CSDP has grown in complexity and geographical scope, and member states now share decision-making structures and operational planning facilities to implement it. Defence co-operation in the EU serves two purposes: to strengthen the EU and to use scarce resources to relieve the financial burden on nations. These are the advantages enjoyed by Sweden and other EU members which are not members of a military alliance (Austria, Finland, Ireland and Malta). Considering the wish to cooperate closely with neighbouring Finland, Sweden does not want to join NATO. However, like its Nordic allies, Sweden has gone back to believing in a strong military force. Back in



**A Swedish Army CV90 proving its capability, moving forward in up to one metre deep snow. In the coming years, Sweden will invest heavily in the procurement of defence equipment.**

the cold war, the Swedish Air Force was one of the five best air forces in the world, and the JAS 39 GRIPEN is leading on road base operations, which is quite unique. But the current 200 aircraft in total is far short of the old record of 1,000 aircraft. The GRIPEN E-model is still being tested by SAAB and should remain operationally relevant after 2025.

### European Defence Fund (EDF)

A study by the Sweden Institute of International Affairs in 2018 shows how important the European Defence Fund (EDF) for Sweden is. The EDF seeks to promote military-industrial cooperation in defence technologies and the joint development and acquisition of new capabilities. By co-financing this cooperation from the EU budget, the EDF is expected to increase investment in joint development and acquisition by up to €5Bn annually after 2020.

Nine EU-states, including neutral countries like Austria and Sweden, currently host the majority of SMEs and top companies in the defence sector in Europe. Due to its long history of neutrality, which requires a strategy of self-sufficiency, Sweden has a fairly large defence industry; it has a turnover of approximately SEK30Bn and employs 28,000. Ownership of national defence industries was relinquished by the Swedish government at the end of the 1990s and foreign ownership in the defence industry has gradually increased since then. Several of Sweden's large defence companies are now owned by corporations from outside the EU. This might have an impact on the Swedish defence industry since EDF regulations might make it difficult for companies owned by non-EU countries to collaborate on projects funded by the EDF. If a company in a country outside the EU owns more than 51% of the Swedish company it cannot participate in EDF tenders. This has been a concern to Swedish politicians.

### Sweden and its Nordic Neighbours

Defence partnerships with other countries are becoming increasingly important to enable Sweden to develop and maintain its military capabilities at home and abroad on international missions. Continued defence cooperation between the Nordic nations is seen as important, including support to meet future operational needs, improving security in the neighbourhood and enabling countries to share greater regional responsibility for regional security. While Norway and Denmark are members of NATO, Sweden and Finland have decided to remain outside the military alliance. To compensate for this lack of collective security, Sweden and Finland have strengthened their bilateral cooperation in recent years, notably through joint exercises and the mutual use of naval ports and airfields. Although all Nordic countries are members of NORDEFCO and the United Kingdom's Joint Expeditionary Force (JEF), they differ widely in their views on EU defence cooperation.

### NCU

The Swedish, Finnish, Norwegian and Danish armed forces

have agreed on a common uniform. The aim of the Nordic Combat Uniform (NCU) project is to provide soldiers with a uniform that offers good protection during exercises and operations at home and abroad. It is not only a unit that adapts well to different operating environments, but should also be developed for all defence sectors in all four countries.

In August 2018, the project started a new phase with prequalified applicants with negotiations and a test programme. Hopefully all will end with a successful supplier and signed contracts. The winner gets everything - the contract to equip all four countries with uniforms.

### Mutual Benefit

Finnish-Swedish defence cooperation has a long history dating back to the interwar period. The winter war exercise Nordvind 2019, which took place in March with a total of 10,000 participants from Sweden, Finland, Norway, Great Britain and the USA, was an integral part of the cooperation. The winter climate in northern Sweden provided the participating units with favourable conditions to improve their capabilities in the Winter War, and the Finnish armed forces crossed well-

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controlled border posts at Haparanda. A key objective of this exercise was to ensure that cross-border requirements were met.

After the exercise, both Lieutenant General Petri Hulkko, Commander of the Finnish Army, and Sweden's Chief of the Army Staff, Karl Engelbrektson, stated that this co-operation will be expanded. Karl Engelbrektson added, "We need to plan for the future and synchronise our exercises more clearly, so that we get a balance between the use of our troops for real tasks in the so-called grey zone phase and, at the same time, manage to develop our capabilities".

On 9 July 2018, the Swedish Defence Minister Peter Hultqvist and the Finnish Defence Minister Jussi Niinistö signed a Memorandum of Understanding (MoU) defining the areas in which cooperation should be developed: Dialogue with defence and security policy, exercises, training, monitoring and maintenance of territorial integrity. The Memorandum of Understanding even defined the need for both armed forces to have access to the territory of the other country and measures for joint military operations in times of war and peace. Accordingly, cooperation also includes the exchange of classified information.

In June 2014, the Swedish government instructed the armed forces to identify the conditions for closer cooperation between the army, navy and air force with Finland. Peter Hultqvist has repeatedly stressed the importance of close relations between Sweden's defence and Finland, which Swedish observers see as an attempt to reassure NATO supporters.

### Conscription: The Swedish Way

In contrast to the previous general conscription in Sweden, since a parliamentary decision in 2010, the compulsory defence applies to both men and women, and as the name suggests, to all aspects of national defence, not just military defence. So it can be anything, from carrying weapons in combat, to traditional military service, to cleaning up after serious accidents.

As a result of the Second World War, it was decided that neutral Sweden should extend military service to 360 days, and between 35,000 and 40,000 conscripts were trained each year. Due to the Cold War, the high level of readiness continued, with extensive armament of the armed forces. In 1960 there were about 50,000 men, until at the beginning of the sixties the military service comprised all men between 18 and 47 and the Swedish defence could mobilize 800,000 men if necessary.

Traditionally the year 1964 is seen as the Swedish Armed Forces' best year, which in case of war could mobilise the strongest and best-equipped force of 800,000 men, and the Swedish Air Force having close to 50 Flight Divisions ("flygdivisioner") with around 1,000 aircraft, which ranked Flygvapnet as the fourth largest in the world. The Swedish Armed Forces had nearly 1,500 combat vehicles in the years 1966 to 1972. But over time, conscription numbers gradually declined in all branches of the armed forces, except local defence and house guards. In 1972, basic training was reduced to 227 days and the Swedish conscription system was officially regarded as a phase-out project. Defence spending in the years 2000 to 2004 was the lowest and led to

defence duty which applies in a case of emergency (crisis or war).

For greater security at all levels of society, municipalities, counties, other authorities, the private sector and various organisations, including the Swedish Government, rely on the MSB (Swedish Civil Contingencies Agency). The Agency is responsible for disaster control, public safety, emergency management and civil protection when no other authority is in charge. Responsibility includes measures before, during and after an emergency or crisis, and on behalf of the Swedish government MSB published a leaflet in summer 2018 and distributed it to all Swedish households under the alarming title, "When the crisis or war comes". Addressing all resi-



**Soldiers and officers from Sodankylä in Finland train with a Swedish armoured battalion in Boden in the northern part of Sweden. Nordic Defence Cooperation with Finland is a cornerstone of Sweden's defence policy.**

the largest disbanding of military units in Swedish defence history since 1925; in spring 2005, only 10,169 Swedish men and women completed military service training; in 2008, the number fell to 6,804; two years later, the Swedish government finally decided that military service should be suspended in peacetime and replaced by the so-called Total Defence Duty (introduced in 1995), which applies to both men and women between the ages of 16 and 70. In 2017, the government reintroduced conscription, so that Sweden will now reapply all parts of the Act on Total Defence. As the law is now gender neutral, the obligation applies equally to men and women. The first cohort to fall under this change are young people born in 1999 and 3,700 Swedes have started military service.

### MSB and its Role in Swedish Defence Policy

Today Sweden has three types of total defence duty: traditional military service, a civil service within, for example, the emergency services, and the general total

defence duty which applies in a case of emergency (crisis or war). The Commander-in-Chief of the Swedish Armed Forces, Micael Bydén (\*1964), is demanding almost SEK6Bn more for defence over the next three years, including more conscripts. When Micael Bydén and the Swedish Armed Forces submit their budget demands for 2020-2022 to the government, they will also send the message that politicians should quickly provide information about the longer term future. Will it be necessary to double the size of total defence - and spending - in the near future? ■

### The Swedish Way?

After decades of cutting military spending, most political parties today accept the need for long-term growth for at least ten years and a defence budget that might well rise to 100 billion by 2035.

The Commander-in-Chief of the Swedish Armed Forces, Micael Bydén (\*1964), is demanding almost SEK6Bn more for defence over the next three years, including more conscripts. When Micael Bydén and the Swedish Armed Forces submit their budget demands for 2020-2022 to the government, they will also send the message that politicians should quickly provide information about the longer term future. Will it be necessary to double the size of total defence - and spending - in the near future? ■



# “What kind of soldier does Sweden need?”



Photo: Randeben

**General Micael Bydén**

I was asked this question in a letter from a 13-year-old who wished to become a soldier. It is a good question, pointing at our most valued asset: the individual. In a time of increasing security challenges, globally and regionally, every woman and man in the Swedish Armed Forces carries a responsibility to defend our country and the values upon which our society is founded – our freedom, our security, our peace. That requires skills, motivation and personal maturity.

The Swedish Armed Forces have embarked on a journey. I am pleased to say that we are doing well. We are strengthening our capabilities and we are growing. When visiting our military units, I meet with dedicated soldiers, sailors and airmen who believe in their job, their leadership and in their own capabilities. There is a renewed self-confidence in the organization, which bodes well for the future. In combination with a broad political consensus in favour of a strengthened national defence and increased popular support for the Armed Forces, we are well placed to handle the challenges we face.

Yet, the journey is far from over. It took off in its present form with Swedish defence policy that was adopted in 2015 in light of the deteriorating security situation in the Baltic Sea region. The policy entails a renewed focus on national and regional security in contrast to the earlier emphasis on international operations. After two decades of successive reductions, the new defence orientation called for strengthened capabilities and increased defence spend-

## **Swedish Defence Today and Tomorrow: An Essay by General Micael Bydén, Supreme Commander of the Swedish Armed Forces**

ing. We have intensified the development of a defence force with ready and flexible units, adequately trained and equipped and with a functioning system for mobilization. Such a defence force, together with a deep and broad international military cooperation, creates the threshold effect against a potential aggressor that we are seeking. In 2020, a new Defence Bill will be adopted by the Swedish Parliament, providing direction for Swedish defence development from 2021 to 2025. I have been clear about the need for long-term perspectives, a steady direction and the flexibility necessary to meet with the ‘challenges of tomorrow’. We need to grow to keep pace with

in a broad sense – from the Arctic region through the Baltic region to the Black Sea – will continue to be an area of friction.

It is clear that the strategic importance of the region has increased. In the past few years, we have seen a significant increase in military presence and activity by all actors in this region. The military positioning in the region is likely to remain and will have a direct impact on Swedish military capabilities.

The security development in this region is first and foremost defined by Russia’s political and military actions. The illegal annexation of Crimea in 2014 fundamentally changed the security architecture of Europe, and it has shaped our own secu-



Photo: FMV

**A Flygvapnet Leonardo AGUSTA A109**

partners and neighbours and in order to remain a relevant international partner. Why do we need strengthened capabilities? The answer lies in the security development in our immediate neighbourhood. Sweden’s geo-strategic position, in combination with a regional security situation that is complex, unpredictable and uncertain, defines what kind of capabilities we need. Without doubt, our neighbourhood

rity and defence policy. Sweden’s decision to re-establish a regiment on the island of Gotland should be seen in this perspective – as it is a strategic military interest.

I want to be clear here - the probability of an armed aggression towards Sweden is low. However, we also realise that any act of aggression in the region would inevitably affect Sweden. With the increased military activity in our region, the risk of in-



Photo: Marcus Nilsson/Försvarsmakten



**Swedish and Finnish soldiers during a joint exercise in Älvdalen prior to TRIDENT JUNCTURE**

cidents is higher than before. If not handled correctly the situation could escalate. Naturally, we are also affected by the global security situation beyond our region. China's strategic military ambitions, the future for the transatlantic link, increased military and trade interests in the Arctic region, and consequences of climate change, the global society is closely interlinked, and, therefore,

Sweden. Together with the Civil Contingencies Agency, the Swedish Armed Forces is working hard to further develop a holistic governmental approach to common challenges, which we would refer to as 'total defence concept'. We also need structures for cooperation to handle civilian crises, such as the ravaging forest fires that affected the country last summer.

Photo: Försvarsmakten



**The five VISBY Class corvettes are the largest surface combatants of the Royal Swedish Navy.**

we must be able to handle and adapt to new security contexts.

We know that the future operational environment will be complex. It comprises a wide spectrum of activities with significant elements of non-linear or hybrid warfare, including threats ranging from influence operations to conventional armed aggression. The boundaries between war and peace have become blurred. Society's resilience is constantly being tested. Consequently, there is an increasing need for a strengthened cooperation between the Armed Forces and civil agencies throughout

New challenges require new capabilities. As we build the Swedish Armed Forces to be ready to handle tomorrow's realities, we have identified three key capabilities:

- 1) Capability for sustained active operations to counter grey zone activities;
- 2) Capability to have an impact on an aggressor in all domains and in the full operational depth;
- 3) Capability for sustained defensive operations within our territory.

In our long-term planning, we envisage a defence force that has been recomposed, reinforced and adapted to shoulder a great-

er responsibility for peace and security in the Baltic Sea region.

How will we achieve these goals? Let me give a few examples.

## Human Resources

A strong defence force builds on human resources. We need to tap into the new generation of highly qualified young people, both to strengthen our capacities and to better reflect the population and thus increase public confidence. In 2017, the Swedish Government decided to reinstall the conscription system, this time gender neutral. Last year, some 3,800 young women and men began their basic military training. Next year, I would like to see that figure increase to 5,000 and later to 6,000. So far, the response has been very positive, both from the recruits and from the responsible military units. This generation of conscripts will constitute a base for a continued career in the Armed Forces, either as full-time soldiers, seamen and officers, or as a part-time force.

## Gender Equality

A better inclusion of women into our Armed Forces is a priority. I see it as a matter of operational effect in the sense that a defence based on gender equality is a stronger defence. Moreover, we want our recruitment base to be 100% of the population, not just 50%. There is a growing international awareness about the merits of a gender equality in military operations and I am proud that Sweden has become one of the leading partners in this area.

## Cyber Security

We must strengthen our capability to operate and to identify threats in the cyber environment. We need to protect our society from an aggressor who seeks to influence our society as a whole. Consequently, military skills requirements might look a little different than what we are used to. As from next year, the Armed Forces intend to recruit a number of qualified "cyber soldier" conscripts who will contribute to a sharper cyber capability, benefitting both the Armed Forces as well as other total defence agencies.

In order to reinforce our presence in the region, a regiment on the island of Gotland was re-established last year. Gotland has a geo-strategic significance that cannot be denied – the map speaks for itself. The battle-group on Gotland will receive additional surface-to-air capabilities.

Sweden's security is built in solidarity with others. We need our partners. We must have the ability to provide and receive mili-



tary support to stay relevant. Therefore, we have intensified international cooperation to unprecedented levels. Our Nordic and Baltic neighbours are natural partners. As this year's chair of the Nordic Defence Cooperation framework NORDEFCO, Sweden continues to explore areas for Nordic cooperation with a view to enable cooperation in peacetime, crisis and war.

With Finland, we have engaged in an operational partnership that goes beyond peacetime, pending political decisions. There is an extensive interaction on all levels, political and military. The Memorandum of Understanding, which was signed by the two Defence Ministers in July 2018, includes all branches of the Armed Forces – at a strategic, operational and tactical level. In October 2018, Swedish and Finnish army units participated as an integrated unit in the NATO exercise Trident Juncture and, in March 2019, Finnish troops participated in the Swedish national army exercise Northern Wind, under Swedish command.

Beyond Scandinavia, Europe is at the core of our security policy partnerships. Sweden attaches great importance to our cooperation with partners both inside and outside the European Union. Sweden follows the rapidly evolving security and defence cooperation in the European Union with great interest. The emergence of structures such as Permanent Structured Cooperation (PESCO) provides opportunities for synergies and strengthened collaboration on many levels. We look forward to working with our European partners on this process.

Sweden's bilateral partnership with the United States is broad and deep, based on a common awareness about the strategic importance of Baltic Sea security. It includes interoperability, training and exercises, armament, research and cooperation in multilateral operations. As partners or members of organisations such as NATO, OSCE and UN, we are better placed to handle regional and global security challenges as well as international military missions.

The focus on national defence does not imply that we have turned our backs on international missions. There is no contradiction between Sweden's longstanding engagement on peace and security, which will continue, and the ambition to strengthen national defence. Since 2015, Sweden has an intelligence, surveillance and reconnaissance (ISR) contingent in the United Nations peace-keeping force in Mali, MINUSMA. In 2018, Swedish Lieutenant General Dennis Gyllensporre took over as Force Commander for the entire MINUSMA mission. Sweden also contributes to the US-led Operation Inherent Resolve as part of the international coalition in Iraq, and to the NATO-led Resolute Support Mission in Afghanistan. Sweden has personnel in all three EU training missions on the African continent.

Back to the question from the 13-year-old youngster: What kind of soldier do we need? To answer that question, I will refer to my vision for the Swedish Armed Forces in 2025: A stronger defence, responding to every threat, overcoming every challenge.

Such a defence builds on a military capability that constitutes a strong deterrent to all types of threat and attack. It builds on the unique expertise and abilities of every employee and volunteer. It requires that every woman and man in the Armed Forces takes on an individual responsibility. Only together can we build a credible defence force, with available units, creating the deterrent effect needed to make any potential aggressor carefully consider the risks and costs of attacking our country.

I want the Swedish Armed Forces to be a modern, equal and inclusive organization. My reply to the 13-year-old was given: Sweden needs women and men who can cooperate and solve tasks together. But equally important is to never fail in respect for other people and for our internal differences. That is the kind of soldiers we need. ■

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- Nuclear emergencies: A challenge for science and society

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Photo: FMV



## “We expect an increase in investments.”

**Interview with Lieutenant General Göran Mårtensson, Director General, FMV**

The Försvarets materielverk (FMV) is the procurement authority in the subordinate structure of the Swedish Ministry of Defence and responsible for the supply of materiel to the Swedish defence organisation. It is located in Stockholm. Its 3,400 employees manage around 800 ongoing projects at 40 locations throughout Sweden. ESD had the opportunity to speak with LtGen. Göran Mårtensson, Director General of FMV.

**ESD:** You assumed your position as the Director General of the FMV defence procurement authority in February 2016. Today, three years later, what do you regard as your major achievements, and which objectives have yet to be achieved?

**Mårtensson:** Major achievements include the procurement and contract award for the PATRIOT system, new anti-ship missiles, a new light torpedo system and a new mortar version of the CV 90 armoured vehicle. Also, the continuous development of the type A26 submarine and GRIPEN E, with the first successful test flight in June 2017, are two highlights. I also want to mention some important deliveries to the armed forces during my time as Director General, such as the ARCHER artillery system, trucks and FOC of the METEOR missile.

The Swedish Parliament is working on a proposal for a revised plan for the development of the armed forces. The plan will be presented on 14 May 2019 and must of course be processed in Parliament prior to a decision, but we anticipate an increase in defence funding which will affect the armament sector. We expect an increase in investments both in existing systems and procurement of new capabilities. An increased ambition together with an increasingly complex and resource-intensive procurement process require FMV to expand our own capabilities and develop a more effective working method. This will be a crucial task in the coming years in order to successfully harness the fast-paced technological development and meet the needs of the armed forces.

**ESD:** In light of the current threat environment in Europe many western countries have again focussed the alignment of their

armed forces on territorial and national defence. Does that also apply for Sweden, and if so, what are the implications for the armament sector?

**Mårtensson:** As part of Sweden's new orientation for our defence and security policy, in support of which our Parliament decided to substantially increase defence spending and to refocus the Armed Forces towards national defence in June 2015, the number one priority is to increase the operational capability of the armed forces.

**Mårtensson:** Ongoing major programmes include the procurement of the next generation fighter, the GRIPEN, in the version 39E, and new submarines, the type A26. In addition, we upgrade our air defence capability by adding the PATRIOT system, we also procure new anti-ship missiles as well as a new light torpedo system. This will increase our capability within the naval area where we also upgrade existing vessels like the GÄVLE Class corvettes and GOTLAND

Picture: SAAB



**Named HSwMs SKÅNE and HSwMS BLEKINGE the two new Type A26 submarines for the Royal Swedish Navy are to enter service from 2022.**

**ESD:** What are the major defence procurement programmes for the Swedish armed forces - current and future? Are any of these programmes executed in cooperation with other countries?

Class submarines. For the ground forces, we make significant investments to extend the life time of our current fleet of combat vehicles. We have also procured a new mortar version of CV 90.

Some of these major defence programmes are executed in cooperation with other nations, e.g. procurement of trucks with Norway and the Nordic Combat Uniform system (NCU) which is a cooperation within the Nordic Defence Cooperation (NORDEFECO).

**ESD:** What does Sweden expect from the recent European CSDP initiatives PESCO, CARD and EDF? Are there current PESCO initiatives involving Sweden's participation?

**Mårtensson:** We are one of the member states most active in EDA groups and projects and welcome both CSDP initiatives, PESCO and CARD. The results from these initiatives must be a good balance between the member states' national needs and our common requirements.

We also welcome EDF within a modernised and reduced expenditure structure in the next MFF (multi annual financial framework). Sweden is pleased that the EDF proposal, as agreed by the member states in November, and hopefully by the Parliament after the trilogue, is inclusive to all active actors within the defence area in EU; industry, academia, research institutes and SMEs regardless of ownership. At the same time, we regret that the EDF proposal's provisions for cooperation with third state actors are strict, as cooperation with our strategic partners outside of the EU would support a competitive Europe with a strong technical and industrial knowledge base.

Sweden is pleased that the research activities in the EDF will be conducted with a focus on excellence, and that the selection of projects for the whole programme will be merit-based thereby enabling the best proposals to receive funding. This will further support a competitive knowledge base in the union.



Photo: SAAB

**Apart from Sweden, operators of the JAS 39 GRIPEN fighter aircraft include the Czech Republic, Hungary, South Africa, Thailand and – for pilot training – the United Kingdom. Among others the aircraft is a contender in the scope of the AIR2030 procurement effort in Switzerland.**

When it comes to PESCO, Sweden is involved in four projects:

- a) European Union Training Mission Competence Centre (EU TMCC);
- b) EU Test and Evaluation Centres;
- c) European Medical Command;
- d) Military Mobility.

**ESD:** In what areas can the materiel requirements of the Swedish armed forces be responded to by the national defence industrial base, and in what areas do you have to cooperate with foreign suppliers?

**Mårtensson:** The Swedish defence industrial base produces several major types of materiel systems, such as fighter aircraft, submarines, combat vehicles, radar systems and artillery systems, that have been exported to customer countries around the world. The CV90 combat vehicle, for example, has been delivered to several countries including Switzerland and the GRIPEN E is a candidate in the ongoing NFA procurement.

Large weapon systems are themselves a system of systems. In a competitive global market, some subsystems are sourced from

foreign suppliers in order to optimise the overall solution. To what degree the Swedish defence industry can independently produce all subsystems varies between the platforms. Some subsystems, e.g. weapons, can be replaced or included depending on the specific preference of the customer.

**ESD:** The Swedish defence industry is quite active on export markets, including e.g. Switzerland as a country with a requirement to replace its current fighter aircraft fleet. To what extent can FMV support export efforts of the Swedish industry?

**Mårtensson:** FMV, through its export office, acts as a focal point coordinating the needs of the Swedish defence industry for governmental support in export efforts. This could be in the form of e.g. government-to-government agreements, use of military personnel for demonstrations, visits to Swedish military premises and coordinating Swedish delegations at defence exhibitions. Such activities can involve or be carried out by different Swedish defence authorities and agencies, including the armed forces. As the Swedish Defence Materiel Administration FMV can also offer export customers cooperation in procurement, maintenance, logistics and development of the exported materiel. That way, the initial procurement will grow into a long-term partnership with mutual benefits.

**ESD:** Are there any offset and compensation requirements for foreign suppliers?

**Mårtensson:** The short answer is "no". Sweden used to have an offset policy but decided to abolish it while implementing the Defence Procurement Directive 2009/81 EC back in 2011.



Picture: BAE Systems

**Vehicles of the CV90 family have been exported to Denmark, Estonia, Finland, The Netherlands, Norway and Switzerland.**

**The questions were asked by Jürgen Hensel**



# When Cooperation Becomes Synergy

Photos: Navy Belgium



## Interview with Rear Admiral Wim Robberecht, Commander of the Belgian Navy

In March 2019, the first phase of the Belgian and Dutch navies' joint acquisition programme reached a milestone when the Belgian Government selected the Belgium Naval & Robotics consortium that brings together the French Naval Group and ECA Robotics for the construction of the twelve new mine countermeasure vessels, with each navy to receive six. "This collaboration is a good example of how nations can collaborate increasingly on procurement programmes," Rear Admiral Wim Robberecht, Commander of the Belgian Navy, told ESD. ESD then spoke with the Admiral about modernisation projects in his Navy and the challenges ahead.

**ESD:** Can you give us an overview of your Navy's two major projects and the timeframe for the start of construction, as well as the anticipated in-service dates?

**Robberecht:** Following the call for tenders in the summer of 2018 the Belgian Government announced the selection of the French consortium Naval Group / ECA Robotics for the construction of the new minecountermeasure vessels on 15 March 2019. The procurement process was conducted in a transparent manner, yielding the best ship design that meets both our navies' requirements. We opted for a 'stand-off' minecountermeasure (MCM) capability, with a 'mother-ship' of about 80 m and displacing a little less than 3000 tonnes, suited to embark a variety of unmanned remotely operated or autonomous subsurface, surface and aerial systems to perform mine detection, identification, classification, and disposal - the so-called 'MCM Toolbox'. The ships will also be able to act as command platform for a MCM task group and feature the flexibility to be retro-fitted with emerging technologies throughout their service lives. The final notification of the contract is anticipated for May 2019, with the delivery of the leadship in late 2023/early 2024 and our six MCMVs in service by 2030. ECA Robotics will deliver the MCM toolboxes in parallel to the delivery of the platforms.

As the lead nation for this project, we will put the 'first-of-class' (FoC) through her paces, e.g. conducting the harbour and sea acceptance tests and testing the MCM toolbox. These tests, scheduled to run well into 2024, will be carried out with a mixed Belgian/Netherlands crew. As such, only the first of the new platforms will have to undergo these tests, without the Dutch Navy having to repeat all these tests when its first

MCMV joins the fleet. In order to prepare the initial crew in the best possible way, we will start about 1½ year prior to the delivery of the leadship with their training - sending some of the crew to the shipyard, while others will go to ECA Robotics for 'on-the-spot' training with the 'toolbox' systems.

When it comes to the new multi-purpose frigates, the Dutch Navy is in charge of supervising this project. At the moment I am not in a position to give more details of what type of platform we will choose. Talks about our capability requirements with industry are ongoing and we are looking at several providers in order to see what is on offer within our requirements. But I can disclose that the Dutch Defence Materiel Organisation (DMO) is in contact with Damen Schelde Naval Shipbuilding (DSNS) and Thales Netherlands. The outlines for these frigates are a displacement in the 6000 and 7000 tonnes range, and they are to feature the latest generation anti-submarine warfare (ASW) and anti-surface warfare (ASuW) suites, as well as a limited air defence capability (ADC), and they need to be capable to embark a medium-sized helicopter. Design work is expected to be completed by the end of 2020 in the hope that the first-of-class can be delivered to the Netherlands Navy in 2024, and our first frigate may join the fleet by 2027. With the new frigates to feature a vertical launch system (VLS), we are also looking at possibilities to fit a Ballistic Missile Defence (BMD) 'shooter capacity' onboard our frigates.

Both these programmes can be an incentive to enhance cooperation with other navies



**The new MCM mother ship will displace around 3,000 tons and be 80 metres long.**

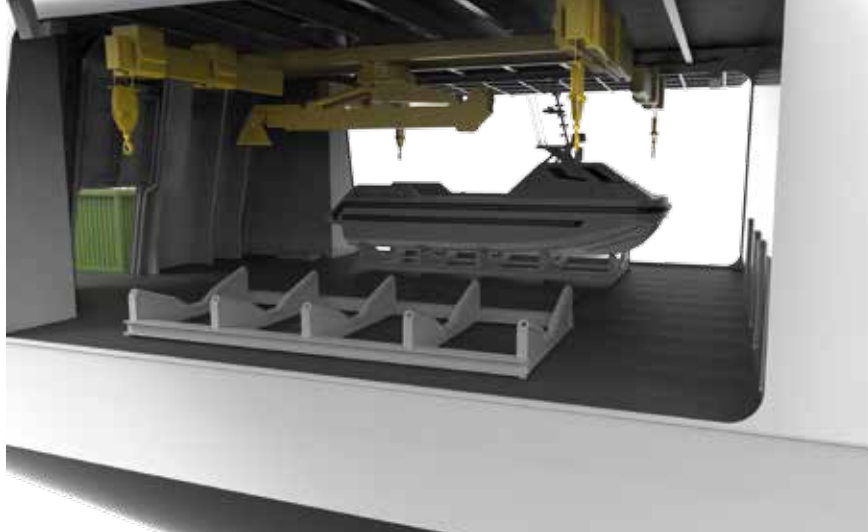
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**The Belgian Navy opted for a stand-off mine countermeasure capability, with a mothership suited to embark various unmanned vehicles to perform mine disposal.**

that are also looking into new platforms or capabilities and, as such, generating commercial export benefits.

**ESD:** Drones are major game changers in maritime surveillance. Are you looking into the procurement of unmanned aerial vehicles (UAVs)?

**Robberecht:** Indeed, we are looking into the acquisition of such systems, preferably rotary-winged type UAVs because these are easier to recover and can carry bigger payloads. Last year (2018) we tested a Schiebel CAMCOPTER 100 and this year we will put a Saab V200 SKELDAR UAV through the tests. So far, the results we have obtained from these trials have been satisfactory. It is worth noting that, in addition to the experience we have gained with the CAMCOPTER, we have also gained an insight into the procedures to be followed when operating these systems, for example, the legislation on flying over coastal waters, ports, and so forth, has some shortcomings. We expect to take a decision in 2020.

**ESD:** Are there other efforts besides these projects or is something else on the drawing board?

**Robberecht:** Another project underway is the replacement of our 34-year-old oceanographic research vessel BNS BELGICA. On 16 March 2018, the contract for the construction of a new multidisciplinary research vessel was awarded to the Freire Shipyards in Vigo, Spain. The keel was laid on 27 March 2019 and her launch is anticipated for February 2020, with the delivery expected in October of the same year. Displacement is going to be about 2000 tonnes; the 71 m long multidisciplinary research vessel will be fitted with equipment to operate in a variety of fields such as geology, sedimentology, fishery, biology, oceanography and hydrography. It will be built in accordance with the IMO polar code and will be capable of conducting missions in the North Sea, the Mediterranean and even northern waters.

In addition we plan to further enhance our coastal security and harbour protection assets. The two coastal patrol vessels BNS CASTOR and BNS POLLUX will be upgraded with a command and control (C<sup>2</sup>) suite. These relatively cheap platforms are well suited to deploy further afield, for instance going on expeditionary missions in support of the EU Border Security Control initiative. However, due to a lack of personnel, such deployments must currently be excluded. And, on a longer term – if the budgetary means allow – introduce new systems to improve the coastal security and a harbour protection capability that will focus on countering pierside threats.

**ESD:** What is the status of your NH90 NFH CAÏMAN helicopters?

**Robberecht:** Our four NHIndustries NFH 90 CAÏMAN helicopters are to be upgraded with ASW and ASuW suites, including dipping sonar, torpedoes, sonobuoys and/or air-to-surface missiles. The upgrades take somewhat longer than initially planned because, with the phasing out of the Belgian Air Component's Westland SEA KING Mk

48 SAR helicopters [on 21 March 2019], priority is given to get their NH90 maritime tactical transport/SAR helicopters in service first. Until our CAÏMANs are back from the retrofit, expected in 2021, we continue to operate our ALOUETTE III helicopters.

With Luxembourg having signed a Letter of Intent for the purchase of three NH90s - two Tactical Transport Helicopter (TTH) versions and one NATO Frigate Helicopter (NFH) version - the latter may possibly complement our seagoing capability.

**ESD:** I suppose that, until the new assets enter the fleet, you have to make compromises to optimise your resources?

**Robberecht:** Yes, occasionally I have to make compromises in order to optimise my resources. It is a matter of being selective in drawing up the ships' programmes and making careful decisions of our participation in exercises, deployments and operations. In 2018, we had a fairly busy agenda, seeing our ships being deployed to the Baltic, Atlantic, Mediterranean Sea and the Gulf of Guinea, and we here also in command of NATO's Standing Naval Mine Countermeasure Group 1 (SNMCMG1). Consequently, in order not to overstretch my crews, I choose to have 2019 slightly less busy. However, it goes without saying that we continue to be present in NATO's standing groups – SNMG1 and SNMCMG1 and support EU missions but, in some cases, reduce the duration of our assignments. After the summer break, our frigate BNS LEOPOLD I will join SNMCMG1 for approximately 4 months during which the group is scheduled to cross the Atlantic for some exercises with the US Navy along the US East coast. As for the minehunters, I will only assign them to SNMCMG1 during those periods when the crews can really enhance their MCM experience, such as for



**In response to its rotary wing UAV requirement the Belgian Navy is considering the Schiebel CAMCOPTER S100 and the UMS Skeldar V200.**



the mine clearance operations in the Baltic, the Historical Ordnance Disposal Operations (HODOPS) on the French side of the English Channel, or the Northern Coast exercise. And sometimes I deliberately skip our participation in exercises. Although a very interesting exercise with a high training value, I decided not to send any of my assets to Joint Warrior 1-2019.

**ESD:** Do you face challenges in recruiting the right people?

**Robberecht:** In the years ahead we will have to reckon with a massive outflow of our chief petty officers and petty officers. To deal with this high attrition, and with new ships underway, my focus is now on recruitment. We need a significant increase in the number of recruits. I am aware that this is a challenging recruitment environment. Many young people do not know that there are many civilian jobs available in our Navy, and their attitude to job hopping certainly does not help. That is why we have introduced a balanced plan that allows us to pause and ensure predictability. As for recruitment campaigns, we will go to schools and universities to explain what you can do in the Navy, and if we can show them the new platforms they will be working on, I am very confident that this will convince them that a job in our Navy is attractive.

**ESD:** Given Russia's posture in Europe and the resurgent Russian Navy, the North Atlantic is re-emerging as a contested space. Is the Belgian Navy affected by the security concerns due to deteriorating relations between the West and Moscow?

**Robberecht:** In the past decades, navies switched from a warfighting role to a maritime security role, forcing a decrease of the fleets' high-end capabilities and a loss of experience in conventional warfare. Today there is a renewed focus on the GIUK gap and the Atlantic Ocean with blue water operations, and ASW in particular is regaining importance. NATO not only established a new Joint Force Command headquarters in Norfolk, US, but introduced also its Defence Planning Process (NDPP) within which national and Alliance activities are harmonised in order to enable allies to provide the required assets to undertake NATO's missions. Obviously, this complex security context and NATO's new policy has an impact on our Navy. But I assure you that our procurement programmes prove to be very relevant and in accordance to this prevailing environment.

**ESD:** What do you think is needed for an effective approach to improve Maritime Situational Awareness (MSA) and Maritime Security (MS)?



*As the lead nation for the MCM project, Belgium will conduct the harbour and sea acceptance tests with a bilateral crew.*

**Robberecht:** Maritime security is paramount and is now one of the navies' core task. With maritime challenges becoming more complex and unpredictable, international cooperation is a necessity.

We support the initiatives taken by VADM Sir Clive Johnston (Commander of NATO's Allied Maritime Command - MARCOM). He advocates that NATO must have the knowledge of what is happening in the maritime domain and, therefore, develop a coherent, shared and sustainable maritime cooperative strategy and stay informed about the assets and capabilities the members can make available if need arises. These initiatives are the annual Maritime Operations Centre Directors Conferences and the Maritime Operational Commanders Conferences (MOCC) where the Chiefs of Navy can meet.

**ESD:** You also attend the Chiefs of European Navies (CHENS) meetings and the Regional Seapower Symposium (RSS) in Venice. How useful are these meetings?

**Robberecht:** Both events are excellent venues to meet colleagues and to exchange ideas, talk about issues of common interest and enhance awareness and knowledge of the maritime domain. As such, one sees that often regional cooperation agreements within the maritime world are equivocally linked and established from the bilateral or multilateral talks we have during these meetings.

**ESD:** You became the new Commander of the Belgian Navy in September 2016. Have you already achieved some of the goals you set yourself? What have been your most memorable achievements so far?

**Robberecht:** One of my main goals when I took command of the Belgian Navy was to try to raise the awareness of our Government and the general public about the relevance of our Navy. And, with the initial phases of the Navy's new projects in full swing, one of my other aims was to promote the interaction of the military lead-

ership with industry, the academic world and research and development companies in order to find mutual synergies. These institutes have the technological capabilities we possibly can translate into our requirements. Enhancing such partnerships has been a crucial element to successfully deliver the platforms we need.

**ESD:** What do you think will likely have an impact on your Navy in the coming years?

**Robberecht:** I expect that the upcoming technological innovations will transform the navies. The pace at which technologies are evolving creates a world where equipment and doctrines are constantly redefined. Virtual reality (VR) is the 'next big thing'. VR training and technologies will play an increasingly important role in the education and training of our sailors, as the inherent interactive nature of virtual technology makes training more interesting and also improves learning processes and enables capabilities to be freed up for operation.

**ESD:** What is the course ahead? How will you ensure that your Navy is ready to meet future challenges?

**Robberecht:** It is my responsibility to ensure that the Belgian Navy has a perspective for the next 30 to 40 years. Although I am very satisfied with the comprehensive renewal of the fleet, I must guarantee that the Navy remains relevant in the long term. I firmly believe that "numbers matter", for example, that our inventory should ideally include a third frigate and two more coastal patrol vessels. And we must also keep pace with the new technologies that are becoming available, such as robotics, unmanned systems, sensors, underwater drones and communications, and see how they can help us maintain our naval lead and be prepared for tomorrow's challenges.

**The interview was conducted by Guy Toremans.**

# Czeching Out: The Czech Air Force

Alan Warnes

On 12 March 2019, the Czech Republic celebrated the 20th anniversary of its NATO membership, and it is fair to say the air force has seen substantial benefits since then.

All the Czech Air Force (CzAF) bases have seen the infrastructure and facilities vastly improved, with the air traffic controls a great example of this. Today, there are three operational air

hosts the tactical helicopters and Kbely (24 Air Transportation Base – základna dopravního letectva, zdl) on the outskirts of Prague is where the tactical transport and VIP fixed wing aircraft are

ends in 2027, although there is the option of a two-year extension. Base Commander Brigadier General Petr Tomaňek told the author, “They provide the air defence for the Czech Republic. As a result, two jets are on 24/7/365 quick reaction alert (QRA) armed with the AIM-9M SIDEWINDER, a gun and fuel tanks.”

Tomaňek added, “Every day, we usually have two TANGO scrambles [for practice], and when we do experience real scrambles it’s normally because an aircraft is suffering from a Commloss [communications loss]. We don’t use the AIM-120 AMRAAMs for QRA, we use them for air policing and will be taking them to Estonia.”

On 28 March, the 21 ZTL deployed four JAS 39 GRIPENs alongside three L-159 Advanced Light Combat Aircraft (ALCA) to Vidsel in Sweden for live weapons training. They fired AIM-9M SIDEWINDERS, guns and dropped air-to-ground munitions. Up to 60 personnel supported the detachment. It’s all part of the work-up for the GRIPENs’ four-month Baltic Air Policing (BAP) deployment to Asmari in Estonia from the end of August. Another feature of the work-up will be air-to-air refuelling practice with a Nebraska ANG KC-135R and a Swedish Air Force C-130H tanker.

The large Vidsel range in northern Sweden has hosted the 212 Squadron and its ALCAs in the past for Exercise Northern Arrow. Most of the units were deployed to a very cold Vidsel airport inside the Arctic Circle for an experience the personnel will always remember, and the current commander, Lt.Col. Denis ‘Dubra’ Dúbravčík, is now looking forward to taking the unit back there again for Exercise Nordic Fires. “Air-to-air live firing is very unique for us as there is no range in the Czech Republic where we can train for this.” For the GRIPENs, it will be the third time they have been deployed to the Baltic States to defend their airspace against possible Russian intrusion. There are now discussions within the Czech Air Force about the future development of capabilities and requirements for 2030, which will cover the Army’s needs as well as air-land integration (ALI).

Photos: Alan Warnes



**The JAS 39 GRIPENs have all been upgraded with the latest MS20 software, which will allow the jets to fulfil an air-to-ground role. Link 16 will be operational by the end of the year.**

force bases serving the CzAF. Čáslav (21 Tactical Air Base – základny taktického letectva ‘Zvolenská’, 21.ztl), is home to all the fighters, Namest nad Oslavou (22 Tactical Helicopter Base – základna vrtulníkového letectva ‘Biskajská’, 22.zvl)

based alongside VIP helicopters. LOM Praha’s Flight Training Centre (Leteckého Výcviku, CLV) based at Pardubice has been providing all the CzAF’s pilot training requirements since 2004.

## Čáslav – Home of the Fighters

The CzAF was ushered into new era when the Saab JAS 39C/D GRIPENs took over the role of the ageing but hard working MiG-21MFNs. They had served the country well, but after 40+ years of service the CzAF needed a modern replacement. The first JAS-39C landed at Čáslav in April 2005, which led to the new modern jets being assigned to NATO on 1 July 2005. They are operated by 211 Tactical Squadron (taktického letka).

The CzAF is leasing 10 JAS 39C and two JAS 39D GRIPENs as part of an agreement that

## Author

**Alan Warnes** is a journalist specialising in military aviation and has travelled to over 60 countries researching articles and taking action photos for his work. For 12 years, he was the Editor of AirForces Monthly magazine in the UK, before opting to go freelance. He has also written several books, including two on the current Pakistan Air Force in 2008 and 2017, and the most recently on 100 years of Aero Vodochody.

"We will need to consider such things as, do we need a subsonic fleet or a mix of supersonic aircraft?", the Base Commander said. "Both the L-159s and GRIPENs are used in the ALI, and we have started the air-to-ground capability on the latter, within the new MS20 software upgrade."

A key element of the enhancement will be the integration of the electro-optical LITENING III targeting pod, not just for guiding missiles and bombs, but also aerial reconnaissance and combat. The upgrade also implements NATO's data link – Link 16 – as well as cryptomodules for covert communication. In a Saab press release, the Base Commander said last year, "Thanks to the modernisation of the Czech GRIPEN aircraft, the operational capabilities of the Czech Air Force will be significantly increased. Our staff has appreciated a close and fruitful cooperation with the Swedish side on this specific modernisation project during the 13 years that we have operated GRIPEN aircraft."

He told the author, "We have four LITENING pods in service, and implementation of Link 16 will lead to the first aircraft upgraded by the end of the year. We currently use the pods for identification during air intercepts, and if there is time we use them for training during flights."

The new software package was integrated into single- and double-seater versions of the Czech GRIPEN on 12 March 2018. After successful flight tests the remaining fighters were also upgraded.

The Aero L-159 Advanced Light Combat Aircraft (ALCA) was introduced into CzAF service in September 2000. Today, all 24 L-159s equip the 212th Tactical Squadron (212.tl). Like everything else at Čáslav, the 212th's main role is to protect the Czech airspace, although the unit is much more focused on the direct air support of the Czech Army's ground forces. No 212 also has a secondary



**After 18 years of service the L-159s require a much needed mid life update, which could see the avionics upgraded and a targeting pod fitted. The latter is the Jet's biggest need if it is to work seamlessly in the air to land integration role.**

national QRA role, which since 1 January, 2008 has included the so-called National Air Defence System (NaPoSy).

This means the jets have to be ready within 24 hours to ensure two L-159s are ready for a 15-minute emergency (known as RS-15) scramble. They would be armed with a 23mm PLAMEN PL-20 cannon, a pair of AIM-9L SIDEWINDER air-to-air missiles and two 350-gallon fuel tanks under the wings. This task is designed to protect high-value assets, such as nuclear power plants or buildings of importance. ALCAs only usually take on this role if there is an increased security risk, although the squadron regularly trains in the mission.

The unit also provides advanced combat training for pilots coming from LOM Praha. This involves much more complex missions, such as air-to-air combat up to 2v2. In the near future, this is set to be taken on by the

213 Training Squadron, in a bid to speed up the training of the pilots to the basic combat-ready standard.

A third unit is the 213th Training Squadron (213. výcviková letka) which was established on 1 December 2013 with L-39ZAs and five two-seater L-159T1s. These very basic T1s are currently being upgraded to the T1+ standard (also known in the CzAF as T1 Provision) equipped with a radar (although they are not switched on) ready for future T2 standard upgrade. These modernised trainers will help to support new plans to streamline training. The L-159T2s have two 5x7 MFDs in the rear and front cockpit, a GRIFO radar and are NVG capable.

Col. Petr Tomaňek, the Čáslav Base Commander, and a fighter pilot with 200 hours on the MiG-21MFN and another 1,200 hours on the L-39 and L-159, said in September 2018: "These T1+s are going through a general overhaul when the cockpits are provisioned for a new MFD." The Czech Air Force has also reviewed the current training setup and late last year signed a new seven-year contract with CLV that will allow 213 Sqn instructors taking part in the final two phases of combat training to teach updated tactics and speed the process up. It will ensure that the quality of the new pilots that come to Čáslav, destined for fast jets, is at the level that will allow them to fly tactical missions after type conversion. The plan is that every year there will be two or three instructors attached to CLV for three months or so. This should shrink the time needed to train pilots and see younger pilots qualify on the GRIPEN or ALCA.

Tomaňek added "At the moment, the system to get them to combat-ready on ALCA or GRIPEN is time-consuming and not



**With spares becoming scarce, the Russian Mi-24/35s are becoming increasingly difficult to keep airworthy.**



consistent for various reasons. Typically, an L-39ZA pilot in 213 Training Squadron might have flown 500 hours or so, which cannot be good for their morale or for the Czech Air Force."

The Base Commander continues, "It is not the best situation, but we hope the new system will improve this. It isn't good for the air force either, because we cannot afford to lose pilots when they get here because they are not up to the tactical effort, after years of flight training. We need to ensure that they are ready for tactical flying in the L-159 or GRIPEN when they get to 213 Sqn."

The L-39ZAs are being retired in May, and the airshow at Čáslav on 25 May will honour the old training jet. There are currently three L-39ZAs flying with 213 Sqn that are expected to be replaced by the three L-159T2s working alongside the five upgraded L-159T1+ aircraft.

"Some parts of the new training system will be ready by the end of the year; but we have to wait for L-39NG to be introduced [even if no contract has been signed for the acquisition yet]. Previously 212 Sqn trained pilots for the GRIPEN, but in the future that will be the job of 213 Sqn, and so we are selecting new experienced instructors for the unit. It will be more demanding, but the biggest challenge is human resources...making the air force an attractive proposition to the younger generation."



**LOM Praha's CLV operates a variety of aircraft to fulfil the CzAF's training needs.**



**Four Mi-171Shs are used by 221 Sqn and the Special Operations Air Tasking Unit.**

## The CzAF Air Advisory Team in Iraq

The Iraqi Air Force is operating 13 L-159s and its pilots are being tutored in the tactical role by instructor pilots from the Czech Air Force Air Advisory Team (AAT). Around 30 or so CzAF personnel are based at Balad to help the IQAF with learning the tactical capabilities of the Advanced Light Combat Aircraft (ALCA).

An AAT Commander, normally based at Čáslav, told the author when he visited Balad in September 2017, "We want to forge a friendship first and then mentor them, then progress the training and perhaps help them approach things a little differently than what they might normally do."

The Commander was one of three CzAF pilots among the 30-strong team. "We provide pilots with the tactical training they need to get the most out of the aircraft. Our mandate is only for training missions as we are not allowed to support them during combat sorties,"

The AAT started in mid-2016 and is expected to continue until the end of 2020. Captain 'M' from Čáslav-based 211 Sqn had just flown in a two-ship formation with an IQAF pilot on an air-to-ground training mission when I met him. "We always have a face-to-face briefing first on the target information. The missions usually last between 50 minutes and an hour, based on the sortie's profile. We will fly in mixed formations with the Iraqi pilots whenever it is required."

Major 'J' added: "We are training the IQAF pilots in how to deliver the weapons and then in air defence. We are used strictly for training and mentoring in non-combat missions. We hope to eventually to help them set up their training syllabus, squadron operations and standards."

## Tactical Helicopters

The CzAF tactical helicopter fleet is made up of six Russian-built Mi-24Vs and ten Mi-35P HINDs, alongside 17 Mi-17Sh helicopters. The HINDs serving 221 Helicopter Squadron (Vtelníková Letka, vl) are used predominantly for close air support, working with Czech joint air terminal controllers and for combat search and rescue. Four of the tactical Mi-17Sh transport helicopters have been designed to support Special Forces with 221 Sqn. The SOATU (Special Operations Air Task Unit) variant can be used for various tasks such as transportation of troops or cargo, hoisting in rescue operations, para drops, or reconnaissance with the use of a forward-looking infrared (FLIR) turret. Survivability has been enhanced by the installation of armour around the cockpit and cargo cabin and installing an Israeli BIRD Aerosystems missile weapon system (MWS). For self-defence, the rear of the helicopter can house a PKM machine gun or a M134D minigun. A SOATU Mi-17Sh crew is made up of a pilot, co-pilot, flight engineer and door gunners when required. The remaining 13 Mi-17Sh helicopters serve 222 Helicopter Sqn for tactical airlift. CzAF Mi-17 personnel are also working in the Kabul-based Air Advisory Team supporting the Afghan Air Force.

There are aspirations to replace the Mi-24/35 fleet over the coming years with 12 new helicopters. A longer-term plan is to acquire up to 35 helicopters to replace the whole Russian helicopter fleet. Acquiring spare parts is an issue now, and keeping the fleets in the air is becoming increasingly fraught.

Back in 2017, the Prague government short-listed the Bell UH-1Y and Leonardo Helicopters AW139 as a replacement. In June 2015, Bell even signed a Memorandum of Understanding with LOM Praha to provide maintenance and training support on the UH-1Y

helicopters. However, the tender was put on hold in December 2017 by an interim government, and on 18 June 2018 the Czech Chief of General Staff Lieutenant General Aleš Opatá said "the purchase of these multipurpose helicopters [to replace the Mi-24V/35] including armaments and ammunition, will allow the air force to progressively develop its capabilities. This will cover combat support of the ground and special forces in the Czech Republic and during foreign deployments, and protecting the air defence of the Czech Republic." Later in June, the new Prime Minister Andrej Babiš commented that the purchases should be made in a transparent way and that there should be no influences by lobbyist groups. He added, "It is a key defence contract and the transparency is crucial."

### Transport and VIP

The 24th Air Transportation Base (základna dopravního letectva, zdl) at Prague-Kbely is tasked with both tactical and VIP transport. As such, it operates a large variety of aircraft, with three squadrons covering all the requirements. One Yak-40 is still believed to serve the 241 Transport Squadron (dopravní letka, dl), which

has a detachment at the main Prague-Ruzyně international airport with one CL601 CHALLENGER and two Airbus A319CJs in the VIP role. No 242 Special Transport Squadron (transportní a speciální letka, tsl) operates four Airbus C295Ms and four LET L-410UVPs as well as two L-410FGs for flight calibration. The 243 Helicopter Squadron (vrtulníková letka, vl) flies a mix of four Mi-8/Mi-17s and ten W3A SOKOLS for both VIP and transportation.

### LOM Praha's Training

State-owned LOM Praha runs the CLV (Centrum leteckého výcviku – Flight Training Centre) at Pardubice. The CLV is responsible for training pilots fresh from the Brno-based University of Defence who are destined for the Czech Air Force. It's a role the company has been fulfilling since 2004. Generally, the students will have flown about 50-60 hours of initial flight screening training on CLV's seven ZLIN 142C-AFs while in their third semester of university, and then another 80 hours during the course of the university studies. In the screening period, their flying skill sets will have been observed and matched with one of the three aircraft categories: helicopters, transport aircraft or fast jets.

Until the summer of 2018, CLV operated a couple of Mi-2 HOPLITEs for initial helicopter training. Time caught up with them, and when it became obvious the overhaul of these old helicopters was more expensive than buying four Enstrom 480B-Gs, CLV opted for the latter.

After successfully overcoming the initial training, the student pilots will take on one of the six Mi-17s that CLV operates. Initially, they will fly as a co-pilot before being posted out to a tactical helicopter squadron at Náměšť nad Oslavou or Kbely.

If the new students are destined for transport aircraft, then they will fly one of the two LET 410UVPs before they progress to the tactical transport squadron at Kbely. If the pilot is destined to fly fighters, then they will start fast jet training on the L-39C ALBATROS. All seven flown by CLV are, not too surprisingly, ex-CzAF. CLV's Flight Training Director, Jaroslav Špaček, said about the setup: "LOM Praha is a state-owned enterprise established by the MoD, so we are all civilians flying with military licences governed by the Czech Military Aviation Authority." The former Mi-24/35 pilot who is an instructor flying Mi-17s when he is not sitting behind his desk, added, "98% of us pilots and technicians are ex-Czech Air Force."

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## MITTLER REPORT



# Czech Republic Army Modernisation Programmes

Edward Hobbs

**The Czech MoD is set to launch a tender for 210 tracked infantry fighting vehicles, 62 TITUS armoured personnel carriers, 20,000 pistols and 14,000 attack rifles, and eight mobile air defence radars in 2019.**

The defence budget hiked by 13% for 2019 as the Czech government seeks to increase annual spending to 1.4% of GDP in the short term. The General Staff of the Czech Armed Forces announced in June

the Czech government may prefer to order from domestic firms whenever possible. The Czech Republic is a NATO member, but years of declining investment and ageing hardware have led to a need for

and power transfers are peaceful, the Czech political environment has been unstable and the country has averaged a new government every two years since 1993.

The country's national debt rate is not problematic, remaining below EU Stability & Growth Pact rules. Prague has improved its budgetary situation, narrowing annual deficits but economic growth remains uneven. The local currency – the Koruna – has sagged in value versus the USD and the Euro.

## Force Structure

Since 1993, when the Czech Republic achieved independence, the transformation of the Army of the Czech Republic (ACR) has been profound. During its first year independent from the former Czechoslovak confederation with neighbouring Slovakia, the Czech armed forces consisted of five active divisions (two being armoured), seven brigades, and seven aircraft regiments. Today, there are only four brigades (two mechanised, two specialist), and only 37 combat aircraft and 23 armed helicopters remain.

Under the Defence Ministry's Concept 2025 and the Long-Term Outlook for 2030 plans, the Army of the Czech Republic will be reshaped. By 2026, the armed forces hope to total approximately 30,000 active-duty troops, with about 5,000 dedicated to technical specialties such as cyber warfare and robotics.

The Czech armed forces are completely professionalised; conscription officially ended on 31 December 2004. A return to conscription became a point of discussion for the Czech government in 2015.

The Czech Army has one rapid reaction brigade (the 4th, based at Zatec), deployable within 20 days. This force is the backbone of the Czech Republic's NATO, UN, and OSCE (Organisation for Security and Cooperation in Europe) peacekeeping forces. It consists of two mechanised battalions (41st and 42nd), the 43rd Airborne Battalion, and the 44th Light Motorised Battalion.

Photos: MoD Czech Republic



**In September 2018, the Czech contingent of the enhanced Forward Presence Battle Group in Lithuania took part in the Namejs exercise in Latvia alongside approximately ten thousand participants from 13 NATO countries.**

2018 plans to invest US\$4.5Bn on armaments through 2027 in what would constitute the largest military modernisation effort in the country's history.

Some elements of the country's defence industrial base remain intact following the post-Cold War downsizing and the split with Slovakia, but the sector has been insufficient to address many modernisation needs. Despite limited options on the home market,

an influx of newer materiel. The lack of an immediate strategic threat and the decreasing tempo of overseas missions reduced the need for large-scale modernisation.

## Reversing the Trend

Following years of utter neglect, the Czech government began reversing the downward trend in 2014; the goal is for defence spending to equal 1.4% of GDP by 2020 and 2% by 2025. Though defence budgets have finally begun rising, topline spending offers limited the ability to invest in expensive equipment on any scale.

Czech governments are generally supportive of NATO- and EU-led initiatives. Although free and fair democratic elections are held

## Author

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The Army's main territorial defence force is composed of the 7th Mechanised Brigade at Hranice (which itself is composed of the 71st and 72nd Mechanised Battalions, the 73rd Tank Battalion, and the 74th Light Motorised Battalion at Bučovice). In addition, the 13th Artillery Brigade is stationed at Jince (composed of the 131st and 132nd Artillery Battalions).

The land forces also include the Logistic Support Brigade (14th) based at Pardubice, the 15th Engineer Brigade based at Bečyni, the 31st NBC Defence Brigade based at Liberec, and the 53rd Passive Surveillance System Brigade based at Opava.

Air bases include the 21st Air Base at Caslav for tactical air assets, the 22nd Air Base at Sedlec-Vícenice (L-39 trainers and attack helicopters), the 23rd Air Base at Přerov (Mi-17/ Mi-171 helicopters), and the 24th Air Base at Praha-Kbely, where both fixed- and rotary-wing transport assets are stationed.

## UAVs

The ACR intends to greatly increase its UAV inventory through 2021, with the procurement of armed UAVs (UCAVs) a central part of its focus. The ACR also hopes to acquire additional SCANEAGLE drones, at a cost of CZK1Bn, by 2020.

The Czech Republic has also joined the multinational European Medium-Altitude Long Endurance Remotely Piloted Aircraft System (European MALE RPAS) project headed by Germany under the Permanent Structure Cooperation (PESCO) project mechanism. Prague entered the multinational team, which also includes France, Italy and Spain, on 19 November 2018.

## Helicopter Programmes

The Army of the Czech Republic intends to phase out much of its existing fleet and replace it with cheaper, more modern alternatives. The reshaping of the helicopter force will not be done on a one-for-one basis, as budget pressures preclude purchasing and maintaining a like quantity of helicopter platforms.

The six functioning PZL W-3 SOKOL aircraft (out of a total of 10) were slated for retirement by 2014, but instead the full 10-unit inventory will receive overhauls that will keep them operational.

The core helicopter programme on tap is the replacement of the ACR's remaining Mi-24/35 attack helicopters – slated for retirement in 2017 and 2018 but which remain in service – with up to 30-35 new light, multipurpose helicopters. The new utility-type helicopters would be procured in several batches through 2020 under ACR plans,

with a prospective first-batch procurement – a 12-unit buy – announced in May 2016. The government had hoped to select the winning platform for this initial purchase in 2017, with the requisite funds (CZK6Bn – CZK12Bn) already earmarked for the project. Once brought into service, the new helicopters will perform multiple roles, including armed combat support, light troop transport, medevac, and search and rescue. New helicopters specifically configured for the attack role to replace the Mi-24s and Mi-35s have been ruled out altogether.

The Czech Defence Ministry would also like to begin replacing the Soviet-legacy Mi-17 and Mi-171 transport helicopters. But this

an acquisition of fewer than 10 batteries costing roughly US\$246M is being pursued. The Czech MoD issued a Request for Information to five companies in the fall of 2016: Lockheed Martin, MBDA, Kongsberg, Rafael and Diehl.

Meanwhile, the Czech MoD's intention was to retain the SA-6 surface-to-air systems through 2018, which means their service lives will need to be extended because they were expected to expire between 2018 and 2020. Options such as replacing their 3M9 missiles on a one-for-one basis were being considered.

A potential FMS procurement may emerge in the form of Czech MoD request for 180 Raytheon GBU-12/GBU-16 PAVEWAY II pre-



**The Czech armed forces want to replace their Soviet-legacy fleet of ageing BMP-2 tracked AIFVs.**

requirement appears to have been merged with the aforementioned multipurpose helicopter requirement as a means of maximizing limited capitalisation funds.

## Missile Programmes

The Czech close-range air defence component is the Russian-made self-propelled STRELA-10M (SA-13 GOPHER). These were upgraded in the late 1990s. The Czech MoD received clearance by the government in July 2017 to procure 16 RBS70 NG man-portable air defence system launchers from Saab Dynamics to replace the ageing SA-13s. A contract worth US\$40.3M was signed with Saab on 18 December 2018. The new launchers are expected to arrive between 2020 and 2021.

The land-based air defence component is the 40+ year-old SA-6 GAINFUL (2K12 KUB) manufactured by Vypel. The Czech Republic aims to replace the SA-6 systems with more modern hardware by 2020. Under a first phase procurement programme,

cision-guided munitions intended to equip Czech Air Force GRIPENs and L-159 ALCA light attack/trainers.

## Electronics Programmes

Then Czech Defence Minister Karla Šlechťová announced in March 2018 that her ministry would not sign a contract for eight Israeli-made IAI Elta Systems EL/M-2084 multimission radars due to questions regarding their interoperability with the NATO air-defence network. The Czech National Cyber and Information Security Agency had not signed off on the documentation for the purchase of the 3-D radars, thus negating forward movement on the deal. Without the agency's certification, the radars cannot be integrated into NATO infrastructure.

A fresh procurement for eight medium air-defence mobile radars (MADR)s will be initiated in 2019 directly with the Israeli government, as per a statement by new Defence Minister Lubomír Metnar on 17 December 2018. This procurement is estimated at

US\$129M. The aim is for a final agreement by mid-2019 with delivery of the first radar system to commence within 22 months of contract signing.

## Ordnance Programmes

The Czech Army's artillery largely consists of the 122mm multiple launch rocket system (MLRS) RM-70 GRAD, plus the 152mm self-propelled M-77 DANA (ZUZA NA). Both of these were developed and brought into service in the former Czechoslovakia more than 30 years ago.



**The Soviet-legacy Mi-171 transport helicopter of the Czech Army**

A US\$55M upgrade for 33 of the 152mm DANA self-propelled howitzers was approved by the government in July 2017 and was expected to be finalised later in September, but instead was delayed until after the October elections. That project would also include the acquisition of 17 new 155mm self-propelled howitzers to be completed by 2020.

The (then) new defence minister, Karla Šlechťová, opted to go in a different direction, announcing in February 2018 that the MoD would instead acquire 50 new SPHs from a NATO ally at a cost of around US\$490M. This plan has, too, apparently been abandoned, leaving the MoD scrambling with how best to upgrade the ACR's artillery capability.

## Vehicle Programmes

Saddled with old Soviet- and Warsaw Pact-legacy materiel following independence and military missions in Afghanistan, the Czech MoD has been making its strongest procurement pushes in the area of armoured vehicles. Because of the type of threats Czech forces encountered in Afghanistan and the shortage of necessary kits, orders came in quickly.

Following an initial order for four Iveco 4x4 Light Multirole Vehicles (LMVs) placed in 2007, the Czech MoD placed an urgent operational requirement (UOR) order for 15 more in October 2008, bringing the total to 19.

The military then purchased 90 additional Iveco LMVs with a follow-up order for 30 LMVs made in January 2010. Another 80 LMVs were being procured in 2018-19 for delivery in 2020-2022. These will be used by the ACR's Chemical-Biological-Radiological-Nuclear (CBRN) battalion based in Liberec.

recommending the Nexter Systems TITUS 6x6 as the preferred model in October 2015. A total of CZK2.7Bn has been ring-fenced for the procurement, which involves local work as well, since the TITUS utilises the 6x6 chassis provided by local truck-maker Tatra. All the vehicles will be built and assembled at the Tatra Trucks production facility in Kopřivnice. Deliveries will run between 2019 and 2023.

Tatra Trucks was also the beneficiary of a US\$65.5M order from the MoD for 18 N3G-V trucks.

Also on the procurement docket are an extra 86 Tatra Defence T810 6x6 trucks in various configurations, including tankers and recovery models meant for the PANDUR 8x8 fleet, as well as 80 4x4 light armoured vehicles for the ACR's 31st Chemical, Biological, Radiological, and Nuclear (CBRN) Defence Regiment. The latter contract – estimated at US\$233M – will involve the MoD's Military Research Institute (VVU) based in Brno acting as prime contractor. The vehicles will be based on the Iveco LMV 4x4 chassis and delivered between 2020 and 2022.

The Czech MoD selected local defence contractor Eldis Pardubice, on 28 August 2018, to supply the ACR with 62 TITUS 6x6 light armoured infantry wheeled vehicles. The procurement falls under an urgent operational requirement (UOR) and was originally intended for local vehicle producer Tatra Trucks, which jointly developed the vehicle with France's Nexter Group.

When Tatra Export failed to obtain a relevant security clearance – including license from Nexter Systems – the Czech MoD opted to change the local contractor to Eldis Pardubice (also a part of industry conglomerate Czechoslovak Group). The TITUS is mounted on a Tatra Trucks chassis.

Earlier, the Czech government had considered a pooled acquisition of the vehicles with Poland before opting to pursue its procurement unilaterally.

The 62-unit purchase is estimated at US\$303M. The order involves 42 command-and-control models and 20 fire-control and coordination variants. A final contract will be inked with Eldis Pardubice in 2019. Deliveries will run from 2020 through 2025, according to the ministry.

## The BMP Replacement Programme

The Czech MoD began moving forward on a planned acquisition of 210 tracked armoured infantry fighting vehicles (AIFVs) in 2017. These are intended to replace the Soviet-legacy fleet of Russian-designed BMP-1 and BMP-2 tracked AIFVs, which date back to the early 1980s.



## The PANDUR II APCs

The ACR General Staff pushed for the procurement of the (now) General Dynamics European Land Systems - Steyr (GDELS-Steyr) PANDUR II in order to meet an outstanding requirement for new command-and-control and communications vehicle platforms, and the MoD announced in August 2015 plans to purchase 20 of these vehicles. However, funding pressures forced the MoD to delay the procurement until 30 January 2017, when a US\$82M contract was awarded to the Tatra Defence Vehicle company (which had obtained exclusive assembly and marketing rights from GDELS in 2015). Under the order, the ACR will receive 20 new PANDUR IIs in two variants: the aforementioned command and control vehicle (6) and a communications platform (14).

The General Staff prefers the PANDUR II option due to its protection and off-road capabilities, but more importantly because the vehicle is already operated by the ACR as an armoured infantry fighting vehicle. The new PANDURs will be assigned to the 4th Rapid Reaction Brigade. They are due to be delivered in 2019 and 2020. ■



**The Czech Army uses the Tatra 815 8x8 PRAM for mortar transport.**

The project, considered urgent by the MoD, was intended to run from October (issuance of tender) through December (downselection of winner) of 2017, but the electoral clock and political considerations disrupted the timeline.

Nonetheless, trials of five competing platforms got underway in mid-2017, shortly after the MoD announced its plans for the procurement. By November 2017 the MoD had announced that all five competing models – including two variants of the BAE Systems Hagglunds CV90 (one with a manned turret, the other with a remote weapon station), the General Dynamics European Land

Systems ASCOD, the Projekt System Management PUMA, and the Rheinmetall LYNX KF31 – had successfully completed field trials and passed all the minimum requirements. The four manufacturers who presented their platforms for trials will be invited to make firm bids in 2019 with the hopes of downselecting a type and inking a contract by August 2019. Deliveries would then run from 2020 through 2025.

The 210 new vehicles will be acquired in six variants: infantry fighting vehicle (IFV), command and control, communications, engineering, recovery, and armoured ambulance.



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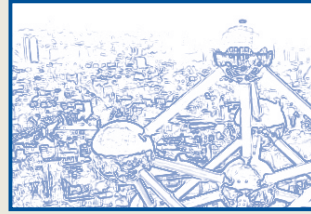
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# The Brussels Backdrop



## A New NATO Joint Support and Enabling Command in Ulm

**Joris Verbeurgt**

On 1 April, while 5 (!) peace activists were demonstrating outside, representatives of 16 NATO countries launched a new NATO Joint Force Command (JFC) at the Wilhelmsburg Barracks in Ulm, Germany. The week before, they had gathered there to map out the responsibilities and define the tasks of the newly created NATO Joint Support and Enabling Command (JSEC). The meeting followed a conference that was held earlier in January 2019 at the SHAPE Headquarters in Mons, a direct result of yet another meeting that was held at the NATO Headquarters in Brussels on 8 and 9 June 2018. At that summit, the NATO ministers of defence decided to create two more operational commands within the NATO force structure – one of them the JSEC. But the root cause of this far-reaching decision lies in events that took place five years ago.

The Russian annexation of the Crimea in 2014 profoundly changed the security architecture of Europe. For NATO, the speed and the ease at which the annexation had taken place, was a real eye-opener. It demonstrated that President Putin did not refrain from the use of military force outside Russia to obtain his goals, and that Russia was no longer deterred by the presence of NATO forces in Europe. It was clear that changes had to be made if NATO wanted to preserve a robust defensive posture and deter Russia. The capabilities for collective defence needed strengthening, including large-scale manoeuvres and troop movements in Central and Eastern Europe.

### Two New Joint Forces Commands

The Allied Command Transformation (ACT) was created in 2002 to improve the readiness and credibility of NATO's posture. It

evaluates trends, future threats, capability development, education, exercises and the implementation of lessons learned. ACT also contributes to allowing the NATO Command Structure (NCS) to efficiently command, control and support operations, both in crisis and in conflict modus.

NATO already disposes of two Joint Forces Commands, one in Brunssum (Netherlands) and one in Naples (Italy), which perform NATO's command and control functions for missions abroad, e.g. the mission in Afghanistan. In order to meet the altered needs of the Alliance's collective defence, the NATO ministers of defence decided to create two more operational commands within the NATO Force Structure at a meeting held in Brussels in June last year (already mentioned above). One JFC will be created in Norfolk, Virginia (USA) to ensure Alliance maritime security in the Atlantic. The other JFC will be based in Ulm, Germany. These changes will increase the NATO command structure by more than 1,200 personnel.

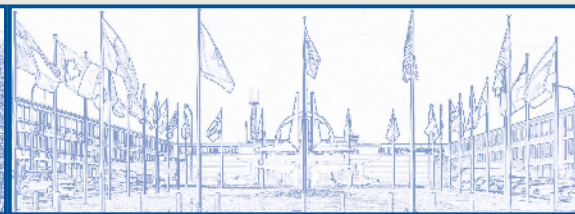
### A Joint Support and Enabling Command in Ulm

The JFC in Ulm will be a Joint Support and Enabling Command. It will coordinate all measures in Central and Western Europe with regard to ensuring the protection and operational freedom of NATO force contingents and to the functioning of various support processes. When ordered to, in case of a crisis or an attack, JSEC will centralise the planning and harmonise the protection of the troops before they set off and while they are en route to their theatres of operation. JSEC's area of responsibility overlaps with the AoR of SACEUR, the Supreme Allied Commander Europe.

Germany, as a strategic hub within Europe and seeking opportunities to boost its contribution to NATO after repeated harsh criticism from the US, assumed responsibility for establishing the JSEC on its territory. The German Government chose the city of Ulm, located in the Southwest of Germany in the state of Baden-Wuerttemberg, as the location for the new JSEC. The Germans had a good reason to do so: in Ulm, the JSEC does not have to be built up from scratch because the Joint Support Service of the Bundeswehr is already established there, fostering a wide range of core skills in the field of supporting capabilities. For command and control purposes, the JSEC can fall back on the Bundeswehr Multinational Joint Headquarters, also established in Ulm. Its main focus is to plan and exercise command and control of global crisis management operations as tasked by the UN, NATO or the EU. To this end, the Command has a multinational staff composed of Army, Air Force, Navy, Medical and Joint Support Service and Joint Support and enabling service forces, as well as of civilian subject matter experts.

### JSEC Tasks

Since the MN JHQ already undertakes tasks on behalf of NATO and the EU within the framework of host nation support, it is used to operate in a multinational manner. When setting up the NATO JSEC in Ulm, it will therefore have recourse to the Bundeswehr JSEC. It will also be able to draw from the experiences of the MN JHQ. With the core specialist capabilities already in place, Ulm was the best choice for a NATO JSEC. The Bundeswehr JSEC will thus fulfil national tasks for both the Bundeswehr and NATO, in keeping with the new NATO command's ap-



proach. It is responsible for the military police and for logistic processes involving the planning of military exercises and deployments in Germany. Another task consists of planning, controlling and securing all convoys, including transit movements through Germany. The Bundeswehr JSEC is also responsible for

frame that incorporates all necessary elements to constitute a military capability, e.g. command and control. Other NATO members (and, maybe in the future, even non-member states) are invited to join, with just a few elements or with all of their resources – it is up to the contribut-

## Timeline

No time was lost after the political decision had been taken to create a JSEC in Ulm in June 2018. Within a month, the organising staff, initially made up mostly of German personnel, got to work at the

MN JHQ in Ulm. Planning and consulting will continue until autumn 2019. By the end of the year, initial operational capability has to be achieved. Through intensive exercises, the plans and concepts that were developed, will be put to the test. Full operational capability has to follow by the end of 2021. In peacetime, JSEC will employ around 100 staff from various nations. When activated, the personnel level will rise to 500.



Photo: City of Ulm

**The new NATO Joint Support and Enabling Command (JSEC) was launched during a defence ministers meeting at the Wilhelmsburg Barracks in Ulm, Germany.**

making available the installations that provide essential training and accommodation facilities for the Bundeswehr. Substantial Allied troop movements within Europe will require Germany's support in the fields of multinational coordination and of planning with civilian service providers like the railways and ports. In short, all Europe-wide military, commercial and administrative measures will be coordinated and practiced by the JSEC.

## Framework Nation Concept

The synergies that will be created between the Bundeswehr JSEC and the NATO JSEC are unique in the history of NATO. They are made possible by the new Framework Nations Concept (FNC) that was introduced for the Alliance by Germany in 2014. One partner – the 'framework nation' (previously called the 'lead nation') – provides a

ing nation to decide, in full respect of its sovereignty. The capability in its entirety is provided by the framework nation, but it is enriched and enlarged by contributions from other nations. In doing so, the FNC offers flexible tools for the build-up and maintenance of multinational military capabilities. It was introduced with the specific aim of allowing European Allies to contribute to the development of military capabilities and the provision of operationally ready forces to NATO. Since European nations can combine their defence efforts, the FNC provides in strengthening NATO's European pillar. Within NATO, the FNC is currently one of the driving paradigms of multinational defence cooperation in which all nations retain full sovereignty. JSEC is the foremost example of the FNC and will serve as a model for future capability build-ups within NATO.

## Conclusion

With the creation of JSEC in Ulm, NATO has taken an important step as part of

the transformation of its command and control structure. The (renewed) focus on NATO's ability to conduct large-scale troop movements on the European continent refers to the heydays of the Cold War and to NATO's original purpose of collective defence against Moscow. From the perspective of deterrence, the establishment of JSEC is just the first step in a series of transformations more befitting the changed relationship with Russia and the consequences it has on the security situation in Europe. At the same time, Germany, as framework nation for the JSEC, presents itself as a reliable NATO member in the strategic heart of Europe. The result might be a unique partnership with other NATO members and non-member states, providing a blueprint for future NATO transformations and models for cooperation.



# Poland's Billion-Dollar Procurement Programmes

**Michał Jarocki**

The Polish Ministry of Defence published the new Technical Modernisation Plan. As part of the updated procurement strategy, which was announced with a two-year delay, Poland plans to spend nearly US\$50Bn on the procurement of new weapon systems to improve the combat readiness and operational capabilities of the Polish armed forces and make them more interoperable with NATO allies.

The new Technical Modernisation Plan is set to run until 2026 and includes a number of procurement programmes worth around US\$48Bn. However, as the publication was two years behind the original schedule, acquisitions already made in 2017-2018 have also been taken into account and the actual procurement budget will be reduced accordingly.

2019, US\$3.6Bn in 2020, US\$4.5Bn in 2021, US\$4.9Bn in 2022, US\$5.2Bn in 2023, US\$6.5Bn in 2024 and US\$6.7Bn in 2025. The predicted spending on technical modernisation in 2026 is to be determined in due course.

According to Polish Defence Minister Mariusz Blaszczak, the new Technical Modernisation Plan and all its procure-

Lieutenant General Rajmund Andrzejczak, Chief of General Staff, confirmed that the Technical Modernisation Plan should give the armed forces the capability to attack enemy targets and act as a powerful deterrent to prevent potential aggression or other hostile activities by third parties. For this reason, the decision had been taken to procure a range of advanced offensive weapon systems, which would, however, serve purely defensive purposes.

## WISLA on Top of the Agenda

The Technical Modernisation Plan is a composition of 16 priority acquisitions to modernise all branches of the Polish armed forces, with a special focus on the air and land forces. It is expected that all of the procurement programmes will be launched in the coming years and at least some of them finalised before 2026.

If the priority projects were to be ranked on a cost basis, the second phase of the WISLA programme would be the most important one. Under this project, Poland plans to procure eight batteries of the PATRIOT medium-range air-and-missile defence system. A first step covering the acquisition of the first two batteries in the initial, 3+ configuration with the Northrop Grumman-developed IAMD Battle Command System (IBCS) and 208 PAC-3 MSE missiles from Lockheed Martin was already finalised in form of the Letter of Acceptance (LoA) signed on 28 March 2018. Deliveries are expected by 2022 and Initial Operation Capability (IOC) between 2023-2024.

Since last year, a Polish MoD team has been conducting talks with US counterparts to put down all terms of the future agreement in order to finalise the implementation of the second phase of the WISLA programme. A few months ago, the MoD confirmed that negotiations are ongoing and that the second LoA would be signed later this year. In the negotiations, the final configuration of the Polish

Photo: Polish MoD



**Polish Minister of Defence, Mariusz Blaszczak (left) and Lieutenant General Rajmund Andrzejczak, Chief of the General Staff, presented the new Technical Modernisation Plan on 28 February 2019 in Warsaw. The plan envisages investing US\$48Bn in the modernisation of the Polish armed forces.**

Based on the MoD's announcement, in the period of 2019-2026 procurement spending will gradually increase with the planned appropriation for US\$2.8Bn in

ment programmes are the result of a change in the government's priorities; in light of the deteriorating security situation in Eastern Europe, Poland needs to significantly improve country's defence capabilities. For Minister Blaszczak, one of the greatest challenges is the expansion of the military presence in north-eastern Poland near the so-called Suwalki Gap region, which is why last year it was decided to form a fourth land division, the future 18th Mechanised Division, based in Siedlce east of Warsaw.

## Author

**Michał Jarocki** is an independent, Warsaw-based defence expert who has reported on security issues and developments from a qualified "insider" position for many years.



PATRIOT system will be determined, as the MoD will have to take a decision on the purchase of a new 360° AESA-GaN radar, also to be purchased by the US Army, or the current 90° sector scan radar from Raytheon, which would be a less likely but cheaper option. In addition, Poland will also have to decide on the final variant and manufacturer of the low-cost interceptor, which will complement the more expensive MSE missile system PAC-3. Until recently, Raytheon's SKYCEPOT was considered the most likely solution. However, there has recently been speculation about the possible acquisition of MBDA's Common Anti-Air Modular Missile-Extended Range (Camm-ER) interceptor. The first phase of the WISLA programme will cost approximately US\$4.75Bn. Therefore, the ongoing negotiations will determine not only the value of the acquisitions made in the second phase of the project, but also the cost of the entire program, currently estimated at US\$10-13Bn.

## NAREW Programme on the Rise

Another important milestone for Poland will be the procurement of a short-range air defence system under the NAREW programme, which will be the middle part of the integrated air and missile defence system complementing the WISLA and VSHORAD PILICA systems. The Polish armed forces will need at least 19 batteries of this system, which will be used, among other things, to protect the army units while on the move under battlefield conditions as well as stationary targets such as bases, command centres or other infrastructures of high importance.

## A Long List of Priorities

Other priority procurement programmes outlined in the new Technical Modernisation Plan relate to various requirements of the armed forces, including gaps in aerial observation and reconnaissance capabilities, which are to be filled by the acquisition of tactical, medium-range, unmanned aerial vehicles (GRYF programme), micro-class UAVs destined for use in urban terrain and equipped with day/night electrooptic observation systems (WAZKA) and multirole patrol/reconnaissance military aircraft with IMINT, SIGINT and RADINT capability (PŁOMYKOWKA). Additionally, the MoD wants to procure a series of new attack helicopters under the KRUK programme, to replace the currently operated Mi-24 platforms.

High on the list is also the acquisition of additional 120mm RAK wheeled mortars and Regina artillery squadrons armed with 155mm KRAB self-propelled tracked howitzers. Both artillery systems are manufactured by the local Huta Stalowa Wola under the multi-year field artillery modernisation programme. The same project calls for the procurement of the first HOMAR long-range rocket artillery squadron armed with American HIMARS systems. Under the new Technical Modernisation Plan, the Polish Army is also supposed to receive new guided anti-tank missile systems (PUSTELNIK), infantry fighting vehicles (BORSUK) which will replace the legacy BWP-1s, as well as a fleet of light multipurpose 4x4 vehicles (MUSTANG). The MoD also plans to invest in new cyber warfare and cryptographic capabilities under the Cyber.Mil programme.



**Under the WISLA programme, Poland will acquire eight PATRIOT medium-range range air and missile defence system batteries, each consisting of two firing units. Four launchers and one radar station will be provided per unit, as well as other components.**

NAREW is planned to utilise the IBCS command system to make it interoperable with PATRIOT batteries, creating an integrated medium/short-range air-and-missile defence system operating under one command structure. When commissioned, NAREW will replace legacy 2K12 KUB and 9K33 OSA air defence systems which have been in service for several decades.

To date, a number of companies have shown interest in offering their short-range air defence solutions to Poland. Lately, however, MBDA UK has been considered the most likely industry partner for the NAREW programme. The company's proposal is based on the Camm family of surface-to-air missiles integrated into the IBCS-based command systems and interoperable with Polish-manufactured observation, tracking and acquisition systems.

Since the beginning of the NAREW programme, Poland has had the ambition to

create a short-range air defence system based on as many domestic components as possible. This applies especially to the observation and tracking systems, as well as communication and training solutions, but most importantly, the local production of the interceptor under a Transfer of Technology (ToT) agreement.

MBDA UK has confirmed that in case of winning the NAREW tender, it would provide Poland with the technology required to establish a local production of Camm missile systems as well as all data necessary to preserve the independence of its use under wartime conditions. ToT would require considerable preparations and the company is understood to be well prepared to cooperate with domestic defence industry such as the state-run PGZ (Polska Grupa Zbrojeniowa) giant, and lay the foundations for further cooperation, for example, in the form of a joint venture.

Speculation about MBDA UK being the preferred industrial partner in the NAREW programme were confirmed early this year, when representatives of the British Government and defence industry and their Polish and US counterparts took part in a tripartite seminar held at the premises of the PGZ in Warsaw. A three-day event held between 22-24 January served as the ground for discussions about the planned integration of WISLA and NAREW air defence systems with the IBCS as well as a selection of preferable interceptors.

'Meetings on this level are the best proof that work on the creation of a multi-tier anti-aircraft and anti-missile defence system are progressing smoothly. For PGZ, these programmes are an opportunity to acquire a wide range of competencies with respect to products in this category and to include our companies in the supply chains of foreign corporations. The Group has high hopes for the completion of the NAREW programme,

and it is during meetings like this that we are able to demonstrate our readiness to commence the work on this project', said Sebastian Chwałek, vice-president of PGZ, in the Group's official press statement. MBDA UK winning the NAREW tender is even more likely if one takes the joint defence and security agreement into account, which was signed between the governments of Poland and the UK in late 2017. The document regulates the most important matters of cooperation in the fields of deterrence, training and industrial cooperation, and also lays foundations for the acquisition of each country's defence equipment.

## Poland's 5th-Gen Fighter

Although WISLA and NAREW are the most expensive programmes in the Technical Modernisation Plan, the most emotional project is the planned acquisition of 32 5th-generation multirole fighter jets under the HARPIA project. The procurement of new fighters was sped up late last year, when Minister Blaszcak ordered Lieutenant General Rajmund Andrzejczak to finish the analytical-conceptual phase of the venture and to set up discussions with particular manufacturers.

Until lately, the MoD kept pretty quiet about the HARPIA programme and the technical requirements for the new fighter. All that was known was that the aircraft should be able to assume air supremacy in enemy airspace and deal with enemy anti-access/area denial systems (A2/AD), including a highly intensified air and missile defence environment and advanced electronic warfare solutions.

It was previously expected that a number of companies would participate in the future call for tenders under the HARPIA programme. Local experts and the media



Photo: Michał Jaroński

**The procurement requirements of the Polish Navy have been ignored for years, and the continuous reduction of the fleet has resulted in a significant loss of capabilities to protect Polish maritime interests. Under the Technical Modernisation Plan, the MoD intends to procure new submarines and coastal defence vessels.**

were convinced that the Ministry of Defence would select the new fighter from platforms such as Boeing's F-15E STRIKE EAGLE, the F/A-18E/F SUPER HORNET or Lockheed Martin's F-16V and F-35A LIGHTNING II as well as the European Eurofighter TYPHOON, Dassault RAFALE or Saab's JAS-39E/F GRIPEN.

It was expected that such a vast number of bidders would provide for a tough competition and force the companies to make substantial concessions in order to increase their chances of winning the tender. However, when on 28 February Minister Blaszcak announced the new Technical Modernisation Plan, it became obvious that Polish authorities have already set their sights on Lockheed Martin's F-35A LIGHTNING II. The MoD chief said that "we want to procure 32 5th-generation multirole fighter jets", which means that only Lockheed Martin could be a potential manufacturer. In an official statement, the MoD confirmed that the future type of combat aircraft must be able to "co-

operate with air components of allied forces", which most commentators understood as the F-35A being the system of choice.

The new 5th-generation jets will replace legacy Soviet-era MiG-29 fighters and Su-22 fighter/bombers, which are still being operated by the Polish Air Force.

The HARPIA programme has been in the making for a couple of years, but a recent series of incidents involving MiG-29 fighters and resulting in the loss of at least four jets and one pilot forced the MoD to hasten the project. According to current estimates, a contract for 32 5th-generation fighters could be signed in the coming years, which seems likely, given that there is only one potential manufacturer capable of providing the Polish Air Force with the necessary platform, and the prospect of a competitive, protracted tender seems rather blurred.

The question is how Poland intends to finance the HARPIA programme, which, according to some estimates, could amount to US\$5.1bn, which would include not only the fighters themselves, but also weapon systems, pilot and maintenance training, spare parts and the adaptation of ground infrastructure to house the new jets.

On 5 March 2019, Polish President Andrzej Duda, at a meeting with Minister Blaszcak and senior military officials at the Warsaw Office of National Security, suggested that the HARPIA programme could be given a special status of national importance, meaning that it could be financed from a special budget, created separately from the MoD's budget.

The same procedure was used in early 2000 when Poland bought 48 F-16C/D Block 52+ fighters. Just a few days after the announcement of the Technical Modernisation Plan, Wojciech Skurkiewicz, Secretary of State at the Polish MoD, suggested in a radio interview that after 2026 Poland might acquire

Photo: USAF



**Under the HARPIA programme, the Polish Air Force will procure at least 32 5th-generation multirole fighters; contenders include the F-35. The new jets are to replace legacy Su-22 fighter/bombers and MiG-29 fighters.**



an additional 16 fighters, bringing the total number of Polish F-35s to 48, which would be then split between three fighter squadrons and complement the same number of F-16s.

### Saving the Navy's Fleet

The authors of the technical modernisation plan also considered two procurement programmes for the Polish Navy, the completion of which is crucial to maintaining and expanding the fleet's ability to conduct above-ground and underground combat operations on the modern naval battlefield. The first programme, ORKA, is a continuation of years of efforts to procure new modern submarines capable of launching cruise missiles.

Previous attempts to procure such platforms yielded no results, as the MoD failed to launch a tender for new submarines, despite marketing efforts of potential bidders. Three companies have shown interest in providing Poland with new capabilities for conducting combat operations at sea, including German thyssenkrupp Marine Systems offering its newest type 212CD (Common Design) subs, French Naval Group with its SCORPENE class submarines and

Swedish Saab bidding with its newly built A26 platform.

At the moment, the outcome of the re-launched ORKA programme or the details of the new procurement project are still unclear, including the number of submarines to be procured, the technical requirements, the weapons systems, the procurement budget or even the project's deadline. However, it seems as if the procurement of new submarines is not a priority for the MoD for years to come, and the first phase of the ORKA programme will focus on bridging the gap in the Polish Navy's submarine fleet in light of the planned decommissioning of legacy ex-Norwegian KOBLEN-class submarines and continuous technical problems with the sole KILÓ class ORP ORZEL. This has been partly confirmed by Minister Błaszczak, when he said during the presentation of the Technical Modernisation Plan that "We have prepared an interim solution for the submarine fleet", adding that "We don't give up on any of the programmes regarding improvement of the Navy".

Under the second naval procurement programme, MIECZNIK, Poland plans to procure an unspecified number of so-called coastal defence vessels to replace the ones being phased out in coming years and to provide the navy with the capability of oper-

ating with allied naval forces far from shore. Despite the MoD's specific terminology to name the new MIECZNIK class vessels, it is highly likely that new platforms will have the size and displacement of a corvette or a frigate. However, the final outcome in this matter will depend on months of analysing the expected operational requirements and provisioned procurement budget.

Regardless of the scale and pace of completion of the two naval procurement programmes, the MoD attaches great importance to involving local shipbuilding and defence companies in the construction of new ships, ideally by building them domestically through technology transfer and in partnership with international industry leaders. With regard to both programmes, companies interested in offering their designs for Poland declare their full commitment to cooperation with the Polish authorities and local industry.

Furthermore, manufacturers involved in the ORKA programme, like tkMS, Naval Group or Saab, have already shown interest in setting up long-lasting cooperation with the local shipbuilding industry, some of them even presenting plans of forming a joint venture with Polish partners and moving part of their global shipbuilding activity to Poland. ■



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# “We need a long-range artillery capability.”



Photo: Flickr

## Interview with General Francisco Javier Varela Salas, Chief of Staff, Spanish Army

General Francisco Javier Varela Salas is the head of the Spanish Army. He was appointed by the former conservative government and, like all chiefs of the Spanish military services, was confirmed by the current socialist government.

**ESD:** One of the future projects of the Spanish Army is "Brigade 2035". What is this?

**General Varela:** It is the spearhead of an exciting and innovative project and it has two milestones: the introduction of technologies such as artificial intelligence, robotics or "big data" for the weapon systems of the Spanish Army and the improvement of the leadership skills of the young officers of the units.

**ESD:** In the structure of the Spanish Army, a personnel strength of 64,000 is projected. Will the new technologies result in staff reductions in the Army?

**General Varela:** There is some confusion about this matter. The technologically advanced brigade will need fewer personnel, but that does not mean that the Army will need fewer personnel. We will shift personnel to other areas where we are short of staff. In keeping with our goal of maintaining the personnel strength in the long-term, the Army's strength will remain at the current level of 64,000 men and women.



Photo: GDELS

*According to current plans, a first batch of 348 PIRANHA 5 8x8 AFVs from GDELS will become subject to procurement by the end of the year.*



Photo: Pablo Lanza

*The Spanish Army's CH-47D CHINOOK transport helicopter fleet is subject to an upgrade programme from version D to F.*

**ESD:** The backbone of the future Spanish Army will be the PIRANHA 5 8x8 wheeled armoured fighting vehicle manufactured by General Dynamics European Land Systems (GDELS) and equipped by Indra and Sapa. The Spanish version will be called DRAGON. What is the current status of the programme?

**General Varela:** Our project "Brigade 2035" cannot proceed without the 8x8 wheeled armoured combat vehicles. The problem is that the Army should have received the demonstrators in November 2018. Now we hope to receive and test them in July 2019, but nobody will guarantee me that this is going to be the final date. This is a real problem for us. If we cannot test the 8x8 vehicle and its systems throughout the entire year, then it will be difficult to sign a contract at the end of 2019 as we had originally planned, with a first batch of 348 vehicles for €2.1Bn.

**ESD:** Are we right to assume that the tests are taking so much time because of the associated integration efforts?

**General Varela:** The vehicle platform produced by GDELS-Santa Bárbara is ex-



Photo: Copsadmirer

**A Spanish Army PIZZARO (programme name: ASCOD) fitted with ERA.**

cellent, but of course there is much more to it. We need to integrate various systems with the platform, such as the 30mm turret, a 12.7mm remote controlled weapon

station, SPIKE missile launchers, sensors, radios, command and control systems for small units, and so on. The tests are to show that all the systems work together

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**Latvia has requested that the number of Spanish LEOPARD 2A6 MBTs in country be increased.**

correctly and do not interfere with each other. This is what the tests are about. And then we must decide as quickly as possible in order to be able to sign the contract in due time.

**ESD:** Is there a feeling that the crisis of the Spanish Army has come to an end?

**General Varela:** Well, we still have some serious problems. It is true that there is a very positive spirit of hope, namely that we have had an increase in the budget this year; the budget has grown by 1.6%. However, we have been in a deep crisis for 10 years now, and it will be difficult to change this situation in the short term.

**ESD:** Which capabilities of the Spanish Army have been lost as a result of the crisis?

**General Varela:** Basically, we have lost three skills. The first is the preparation time of the forces. Processes and procedures that used to take a year now take three years; it takes more time to prepare our soldiers. Second, we have mothballed half of our equipment because we could not pay for its daily operation and we have obsolescence of systems related to mobility, protection, and long-range fire – we also lost a unit of rocket launchers. We also face problems when it comes to command and control. Thirdly, the standard of our military facilities has de-

teriorated in terms of quality of life due to very little investment in maintenance and upkeep over the last eight years. Now the MoD has a plan to solve this problem.

**ESD:** Apart from the 8x8 vehicle, what other resources should the Spanish Army acquire?

**General Varela:** After upgrading the CHINOOK helicopters from the D to the F version, it is necessary to modernise the ASCOD/PIZARRO armoured fighting vehicles as our Phase I. We should also launch a project for setting up four PIZARRO III battalions which would rely on the current ASCOD. We need immediately a long-range artillery capability (rockets and self-propelled artillery). And we need to decisively promote the command and control system under a plan we call MC3, with command and control at the brigade level being a priority.

**ESD:** Spain aspires to head the EU training mission in Mali in late 2019 and in 2020.

**General Varela:** The leadership of the mission is a proposal put on the table by the Ministry of Defence. Taking over this command would require increasing the Spanish contingent, which currently stands at around 300 troops, as we would have to provide staff and other capabilities. We are prepared for such a responsibility and I think it would be positive if Spain were to lead the mission.

**ESD:** Could the Spanish Army's NH-90 helicopters be deployed abroad for the first time?

**General Varela:** We are studying the deployment of the NH-90 in Iraq. It makes sense to deploy our best equipment items. We do not think this would be a problem but it is a political decision and must also be financed.

**ESD:** The Spanish Army has deployed 350 soldiers with six LEOPARD tanks and fourteen PIZARRO combat vehicles to Latvia. Could the deployment be reinforced by the use of more tanks?

**General Varela:** The Latvian authorities have asked us for more tanks because of their deterrence effect. We have looked into the matter and we could well deploy another section (six LEOPARD tanks) if the political level orders us to do so. We are also considering the possibility of deploying a 105mm and 155mm mixed artillery battery. Latvia has some training grounds that are very useful for testing 155mm extended-range field artillery ammunition.

**The interview was conducted by Esteban Villarejo.**

Photo: Jerome Deulin / Airbus Helicopters



**In September 2018, the Spanish Government approved the acquisition of an additional 23 NH90 helicopters. At present, Spain operates 45 of these aircraft, made up of 38 TTH versions and 7 MTT variants.**



# Ballistic Missile Defence in Eastern Europe

**Alexander Horobets**

Nowadays, developing modern missile defence systems require high investments and a research and development base to create them. A new challenge for missile and air defence is the need to combat unmanned aerial vehicles, hypersonic missiles as well as barely detectable aircraft.

Many Eastern European countries have accumulated a large number of Soviet-era devices, and when it comes to air defence, these are mostly different versions of the STRELA and S300 anti-aircraft missile systems.

In 2007, US plans for the deployment of missile defence systems in Eastern Europe - interceptor missiles in Poland and radars in the Czech Republic - were publicly announced and immediately led to heated discussions.

resist a wave of thousands of Russian intercontinental ballistic missiles.

Therefore, as neither side has changed its mind since 2007, the mutual concern of the US and Russia over the potential threat of ballistic missile proliferation has gradually increased.

## Primary Targets

The deployment of missile defence systems in Eastern Europe was heavily criticised. The main argument against this was that European countries would become primary targets as soon as missile defence systems were stationed on their territory. There was also no clear information regarding the effectiveness of interception. The discussions about the need to deploy missile defence systems in Eastern Europe were already a test of NATO allies' common policies. There were also questions about the feasibility of US missiles if there was no immediate threat. In January 2019, the US Department of Defence (DoD) published its Missile Defence Report - a roadmap for US missile defence policy, strategy and programmes. In comparison to previous editions, the Report spoke of a significant increase in the threat level, with DoD experts referring to NATO's progress in missile defence development in the period from the Bucharest Summit in 2008 to the 2018 Brussels Summit. In 2008, the Allies agreed that in light of an ongoing proliferation of ballistic missiles, NATO would develop missile defence capabilities for the sake of its collective defence.

## NATO Goals

At the 2010 Lisbon Summit, discussions on the development of missile defence capabilities continued. The ambitious goal was to protect the entire population, the territory and armed forces of NATO from possible missile attacks, especially from Iran. At the 2012 Chicago Summit, it was announced that the Alliance had completed its first step



Graphic: Lockheed Martin

**A ballistic missile defence system consists of several layers, including forward warning sensors and rear interceptors, all of which must interact across national borders to ensure protection.**

According to Russian experts, and as recent military exercises indicate, the Russian Federation is preparing for war in its immediate neighbourhood. The countries on NATO's eastern flank are most concerned about a possible Russian threat, and the events of 2014 in Ukraine made them upgrade their military equipment, including air defence systems, all the more obvious.

Some leaders have emerged in Eastern Europe in the field of missile defence devel-

The then US President George W. Bush declared the need to create such a system in order to protect NATO allies in Europe from a possible missile attack from the Middle East, especially Iran. However, the larger problem at the time was not so much the practical component of the issue as much as convincing the Europeans of the need for such a system.

Back then, Moscow formulated its position and claimed that the missile defence system was primarily directed against Russia, placing their strategic stability at risk. For fear of further NATO enlargement to the East, the Kremlin claimed that US interceptor missiles were directed against Russian missiles. The US insisted that 10 interceptor missiles would be unable to

## Author

**Alexander Horobets** is an analyst for international and Arctic affairs based in Kyiv, Ukraine.

under the Lisbon accords, which provided ultimate coverage within the framework of NATO funds in Europe for protection from a ballistic missile attack. The 2014 Wales Summit noted that the threat to NATO's population and armed forces was increasing due to the proliferation of ballistic missiles. Additional voluntary national contributions were proposed, while the success of individual allies in gaining additional missile defence capabilities was recognised.

At the 2016 Warsaw Summit, the Eastern European Allies voiced their concern. They saw no increase in the development of missile defence systems, in particular in updating and developing European air defence into an integrated air and missile defence network to protect the deployed spearhead forces, in deterring non-strategic Russian missile attacks and protecting freedom of movement across the territory of all NATO members. The problem with Russia was finally recognised and a decision was taken to strengthen the defence of NATO allies in Central and Eastern Europe.

At the 2018 Brussels Summit, in contrast to general statements on the proliferation of ballistic missiles, national NATO delegations spoke of Russian threats to strike the countries where NATO's missile defence systems had been deployed, stating that the combination of nuclear and anti-missile capabilities remained a reliable deterrent.

## Russian Threats

It should be noted that the new Missile Defence Report which is to guide the further development of the US missile programme compared to the last report in 2010, highlighted a number of new threats. In particular, the report noted a growing threat



Photo: Vitaly Kuzmin

**A Russian ISKANDER-M system. Russia has deployed several of these systems to its Kaliningrad exclave region close to the Polish border.**

from rogue states and revisionist countries. Hypersonic missiles have also been added to the list of ballistic and cruise missiles.

On 1 March 2018, Russian President Vladimir Putin stated that his country was in possession of hypersonic weapons. Although most questions about these weapons have not yet been answered, NATO has taken them into account. Compared to the 2010 Missile Defence Report, the 2019 issue, therefore, focuses on the uncertainty associated with future threats.

In addition to the remote threat posed by Russian hypersonic weapons (the US believes that Russian defence industry will only be able to make such missiles fully operable by 2020), the use of cruise missiles is more likely. Since 2015, Russia has carried out a number of successful long-range targeted strikes with these cruise missiles.

Russian threats against NATO missile defence in Eastern Europe came as a result of attempts by NATO to proceed in that direction. Russia first announced a possible deployment of missile systems in Kaliningrad in 2008 in response to US plans to deploy missile defence systems in the

Czech Republic and Poland. The US then decided to suspend its efforts in this direction.

In 2012, at a missile defence conference in Moscow, the Chief of the General Staff of the Armed Forces of Russia, Nikolai Makarov, stated that Moscow could decide on a pre-emptive strike against European missile defence targets. The deployment of strike weapons in Russia's South and North-West (including the deployment of ISKANDER missiles in the Kaliningrad region) was proposed as one option for the destruction of the European anti-missile infrastructure. In 2012, Makarov repeatedly said that the ISKANDER missile system in Kaliningrad region was a response to the modernisation of US missile defence facilities in Eastern Europe.

Russia's deployment of the ISKANDER and S-400 systems on European borders remains ongoing. In March 2019, a number of Russian media outlets reported that the ISKANDER-M operational-tactical systems were being deployed in the Kaliningrad region, as well as the S-400 Regiment, which was set to be put in a combat ready mode. In addition, media statements reported that the Russian army had transferred the S-300 missile systems from Gvardeisk to Baltiysk close to the Polish border.

## Poland's Contribution

The issue of Polish air defence is another issue that has been dragging on for years. In 2018, the construction of a US missile defence base in the Polish settlement of Redzikowo, equipped with the multi-purpose AEGIS ASHORE missile system, was continued.

Already in 2008 it was decided to build a US missile defence base in Poland. Over the years, the concept changed from the use of long-range missiles to the use of missiles for protection within Europe. However, the view in Moscow was that both options should be viewed as hostile.



Photo: DoD

**On 13 May 2016, US Deputy Secretary of Defense Bob Work and Polish government officials launched the AEGIS ASHORE missile defence system in Redzikowo, Poland.**



As the Polish site did not become operational in 2018, its launch was postponed until 2020 and Poland started to procure US-made PATRIOT missile defence systems in 2017. As part of the agreement with Lockheed and Raytheon, Poland intends to purchase both the PATRIOT PAC-3 missiles and radars worth US\$4.75Bn. The first supply will consist of two PATRIOT batteries consisting of 16 launchers and PAC-3 missiles. According to international media reports, the delivery of these systems to Poland is expected in 2022, with the first unit becoming operational in 2024. The deal was signed after Russia began deploying ISKANDERs to its exclave Kaliningrad region.

Plans for the deployment of US missile defence systems in Romania date back to 2010. The launch of a missile defence base in Romania (in Deveselu) in 2016 resonated in mass media while sparking a negative reaction in Russia. In February 2019, Russia demanded that the US would tear down its missile defence systems in Romania, in particular the MK-41 launch system. At the same time, Moscow called on the US to destroy the strike drones, a demand voiced in the context of the suspension of the Treaty on the Elimination of Intermediate-Range and Shorter-Range Missiles (INF Treaty).

However, while both Poland and Romania have experience in cooperating with the US in missile defence, similar processes in other Eastern European countries are less dynamic. In Hungary, for example, the MISTRAL short-range anti-aircraft missile systems are to be upgraded by MBDA, a European developer and manufacturer of missile systems. Romania earlier reported on the modernisation of existing HAWK medium-range anti-aircraft missile systems. Regarding Russia, in addition to the short-range Tor, S-300, S-400 air defence systems, and the Pantsir S-1 anti-aircraft missile-artillery system, the media has reported the completion of state tests of the S-350 Vityaz air defence system, and plans to deploy in 2019 in the Central Military District the Buk-M3 medium-range anti-aircraft missile systems. The S-500 air defence missile system is also being created, which over time is set to replace the S-400.

## The Case of Ukraine

Interesting processes are underway in Ukraine. When work began in 2011 on the deployment of anti-missile defence elements in Poland and Romania, Ukraine's course did not envisage participation in the development of such a system. Kyiv back then maintained a balance between the pro-Western course and cooperation with the Russian Federation, although at meetings with NATO officials, Ukraine's possible



Photo: US Army / Sgt. Paige Behringer

**Soldiers of the Polish 35th Air Defence Squadron demonstrate the W125 launcher SC anti-missile system's capabilities during an interoperability exercise with US forces in Poland on 14 January 2016.**

participation in the future development of missile defence was not ruled out. However, at that time, such a future scenario looked very unlikely from a practical perspective. The shifts began after 2014, as Ukraine began to modernise its existing missile systems, as well as develop new short-range and medium-range missile systems that met INF Treaty limitations. In 2015, Ukraine's National Defence and Security Council Secretary, Oleksandr Turchynov, announced the goal of restoring Ukraine's missile shield.

To underpin this goal, Turchynov cited a government order to develop and restore Ukraine's missile potential. One of the examples is the development by the state-owned design bureau Luch and Pivdenne design bureau of Neptune cruise missiles, Vilkha artillery rocket systems, and Hrim-2 operational-tactical complex. Another project by Pivdenne Design Bureau is the Korsun-2 subsonic cruise missile, which due to its design and use scheme, according to the Ukrainian Military Portal, should compete with the US Tomahawk or Russian Kalibr cruise missiles.

All of these developments, given sufficient funding, are a new 'breath of fresh air' in missile production in Ukraine, and above all, are an indicator that the country is beginning to restore the base for the construction of missiles.

## The INF Treaty

The situation has changed significantly at the beginning of 2019, due to the US withdrawal from the INF Treaty, as well as the signing of a decree on 4 March 2019 by Russian President Vladimir Putin to suspend Russia's implementation of the Treaty. As a result of lifting of restrictions on the range of missiles, the prospects are now being discussed for Ukrainian developments in the new international realities. Ukrainian President Petro Poroshenko made a strong statement about the fact that the country was not bound by any restrictions after Russia destroyed the Treaty. However, it will take

time to implement such programmes and balance the flow of the systems both for exports and for individual armed forces.

In the context of the suspension of the INF and formation of new challenges, an interesting statement was made during the 2019 Munich Security Conference. German MEP Manfred Weber stated that the EU should build a missile defence system with Ukraine's participation. He suggested that such an initiative should help overcome the division of Europe along the East-West line. Although this is unlikely at this moment, even a discussion in this direction is an important signal by European countries of their role in maintaining and preserving collective security.

As for the missile defence, Ukraine is updating its existing systems. In 2019, the Ukrainian Army is expected to receive reconditioned and modernised complexes of various modifications such as the BUK, S-300, S-125, while the Ukrainian air defence is mostly equipped with the S-300PT and S-300 PS, as well as BukM1. The consultancy Defence Express reported that Ukraine's military leadership had initiated efforts to repair short-range air defence systems, such as OSA-AKM, STRELA-10, the SHILKA self-propelled anti-aircraft missile system, and Tunguska air defence missile system, primarily to combat low-altitude targets such as UAVs. Another promising development is the medium-range Dnipro anti-aircraft missile system, which has a declared target detection range of 150 km and, which is already undergoing tests.

Therefore, for many reasons, Eastern Europe used to forget about the issue of anti-missile defences, even being aware that Russia was systemically modernising its armed forces, where the air defence takes an important place. While events in Ukraine during 2014 provoked a new round of development of missile and anti-missile defence systems in the country, this has not served as an example for other countries across in Eastern Europe, with the exception of Poland and Romania. ■



# “The conduct of the Russian military is characterised by criminal acts.”



Photos: Ukrainian Navy

**Admiral Ihor Voronchenko,**  
**Commander of the Ukrainian Navy**

## Interview with Admiral Ihor Voronchenko, Commander of the Ukrainian Navy

The commander of the Ukrainian Navy is planning an overhaul of the service. In view of the threat from the superior Russian Navy and repeated clashes in the Sea of Azov, the Ukrainian Navy is to become more capable.

**ESD:** When you took office as Navy Commander, did you set yourself any specific goals?

**Admiral Voronchenko:** My main objective was to create a balanced fleet, both in terms of personnel and capacity (in accordance with available resources), which would ensure deterrence against the aggressor state and the protection of our national interests at sea. To this end, it was considered necessary to improve the system of naval bases, to replenish the fleet and to increase the combat capabilities of coastal defence and seaports, and perhaps most importantly, to form a team of experts and ensure adequate social protection for our troops and transparent mechanisms for promotion.

**ESD:** With the annexation of the Crimea and the attempt to gain supremacy in the Sea of Azov by military force, will Russia continue to seek ways to deprive Ukraine of the status of a naval state?

**Admiral Voronchenko:** In 2014, after Russia had violated international agreements and standards through "hybrid" aggression, it established control over the Ukrainian Crimea. The aggressor has seized and actively exploited the population and territory of the peninsula, a significant part of our sovereign waters and objects of the Ukrainian economy. By building the Kerch

Sea Bridge, Russia has severely restricted the passage of ships and hindered navigation in the Sea of Azov. Russia has also significantly strengthened its military grouping in Crimea. Ukraine's defences are most vulnerable to possible attacks from the sea. Russia's aggressive ambitions at sea will continue to be a threat to Ukraine.

The events that unfolded on 25 November 2018 vividly confirm this suggestion. According to articles 17, 38 of the UN Convention on the Law of the Sea and Article 2 of the Treaty between Ukraine and the Russian Federation on cooperation in the Azov Sea and the Kerch Strait (2004), Ukrainian warships have the right to enjoy the freedom of navigation across the Kerch Strait and in the Sea of Azov. Meanwhile, on 25 November 2018, Russian ships, grossly violating international law, first rammed the Ukrainian Navy's YANA KAPU tugboat as it was sailing toward the Kerch Strait, deliberately blocked the shipping channel under a pretext of an "incident" they had set up, then used weapons and, greatly outnumbering the Ukrainian naval group, seized three Ukrainian naval vessels in international waters, along with 24 crew members. The conduct of the Russian military is characterised by criminal acts under the Criminal Code of Ukraine, also being a brazen violation of international law, for which the Russian Federation should be held accountable with all severity.

It is not only its own territory that Ukraine is defending but the whole world order. Russia is trying to establish and spread its dominance beyond the Black Sea, also targeting the Baltic region, the Arctic, and the Middle and Far East. It is critical for Russia to establish control over Ukraine because full

realisation of democratic and Euro-Atlantic transformations that have already begun in Ukraine will lead to the collapse of Russia's imperial ambitions and its authoritarian state machine.

**ESD:** Under these circumstances, what is the answer? What role do our international partners play?

**Admiral Voronchenko:** Ukraine, together with its strategic partners, is working hard to rebuild our naval potential. Reforms are based on NATO standards, principles, and values.

The management system is being developed and the structure of naval forces is being strengthened. Earlier this year, as part of the implementation of tasks set by the Strategic Defense Bulletin, two Operational Commands were formed: the Naval Command and Marine Command, both responsible for the planning and conduct of maritime and amphibious missions, and the use of naval groups and Marines.

Individual brigades, battalions of the Marine Corps, and artillery units of our fleet, stationed on the Azov Sea coast, became fully operational. We have already received six small armoured artillery boats from our defence companies, and we are preparing to receive two more assault boats. Two ISLAND type patrol boats provided by the United States already carry our national flag. Our Marines have already expanded to two brigades, an artillery brigade whose units are stationed in Odessa, Mykolayiv, Zaporizhia, and Donetsk regions. Marines are being deployed on rotational missions in the Joint Forces Operation zone in the East of Ukraine. Navy command and individual

units are being trained in line with NATO standards, especially during the Sea Breeze joint exercises and "ORBITAL", "UNIFIER" and other training projects, all with the help of our partners – the US, UK, Canada, and other Western powers.

The infrastructure of the naval bases along the coast of Azov and the Black Sea is currently being improved.

Further development of our Navy's combat potential will have a positive impact on protecting our economic interests, ensuring Ukraine's sovereignty and territorial integrity at sea, and facilitating the return of temporarily occupied territories.

The people of Ukraine and its future – human life and dignity, democratic values and conditions for the sustainable development of society, territorial integrity and inviolability of the state – must be protected from threats from the sea. The Navy will do everything possible to accomplish this task.



**Admiral Voronchenko wants to make the Ukrainian Navy more effective and attractive to existing and future staff.**

**ESD:** Please tell us about the Naval Strategy 2035 and its components.

**Admiral Voronchenko:** Naval Strategy 2035 is a first attempt to look into the future. It was worked out by the Naval Forces Command, together with a group of Ukrainian and foreign experts. The purpose of the Strategy is to create a vision for the Navy development until 2035. This should be a modern, rapid and innovative Navy force capable of protecting the people of Ukraine and national interests in the marine and coastal environment through asymmetric and resolute operations, involving well-motivated and professional personnel charged to win.

The strategy consists of five sections, which clearly define the aim, vision, and values of the national fleet, strategic challenges outlining the future of our naval forces, their capabilities, as well as ways and means of implementing the Strategy.



**The 2035 Marine Strategy aims to build an innovative Ukrainian Navy that can deter a superior adversary.**

In the course of operations (combat) at sea related to the defence of the state, the main purposes of the use of the Naval Forces should be Sea Denial (prevention of enemy action) and, subsequently, Sea Control over the designated area.

The Naval Strategy 2035 envisages three stages. At each stage, taking into account challenges and tasks, specific priorities have been identified for the capabilities of all types of Naval Forces: surface forces, Marines, and naval aviation.

**ESD:** Could you tell us more about these three stages?

**Admiral Voronchenko:** Stage 1, until 2025, is aimed at developing capabilities for the control of territorial waters and beyond, approximately 40 nautical miles off the Ukrainian coast. Sea control requires monitoring and taking proactive steps outside the 12-mile zone.

Stage 2, from 2025 to 2030, is aimed at restoring and developing capabilities to protect Ukraine's national interests at sea within the exclusive maritime economic zone of Ukraine, up to 200 nautical miles off the coast.

Stage 3, from 2030 to 2035, is aimed at further developing capacities of the first two stages and strengthening them to protect Ukraine's national interests at sea.

**ESD:** Does the Strategy lay out development of the Marines and naval aviation?

**Admiral Voronchenko:** Priority will be given to developing surface forces responsible for anti-submarine, anti-aircraft, anti-boat defence, mine action and demining, electronic warfare, missile and artillery strikes, naval landing, and specific actions at sea and on the rivers. Marines should return to fulfilling traditional tasks such as amphibious (landing) operations, protection of marine (river) infrastructure, and surveillance operations. Naval aviation will carry out anti-submarine, anti-aircraft, anti-boat defence, intelligence, reconnaissance, naval landing support, search and rescue, and specific actions at sea and on the rivers.

**ESD:** You have repeatedly pointed out the need to change the Navy staffing policy.

**Admiral Voronchenko:** The first stage of transformation in the HR management should consist of creating a military recruitment system that preserves existing naval personnel and builds up new personnel potential. Full support of a military career – from sailor to admiral – combined with higher social standards and financial incentives will make a Navy career more prestigious for our youths, to ensure that highly skilled personnel will stay in the military ranks and to tackle the problem of brain drain. The introduction of NATO principles, approaches, and values in the military education system should prepare a new generation of highly skilled, proactive servicemen with advanced leadership qualities.

The ultimate result of the Navy reform will be the rebuilding of Ukraine's naval capabilities, ensuring a reliable defence of our Homeland, and the ability to defeat a stronger adversary.

We predict that Russia will continue its creeping aggression against our state from sea. Under these circumstances, the Navy must clearly define its future strategy, tasks, and development priorities, and focus national resources and international assistance on developing certain naval capabilities that are most important.

This approach will gradually increase the ability to defeat a stronger adversary during the first stage, change the mentality of a military way of thinking from a template-type to the one welcoming creative initiative and involving decentralised decision-making through delegation of authority at all command levels, and create conditions for the supply of high-tech weapons.

The gradual development of capabilities should balance the forces that are part of the Navy and ensure their combat coordination to boost manoeuvrability and act rapidly and asymmetrically, primarily targeting the adversary's most vulnerable spots.

**The interview was conducted by Alexander Horobets.**



# The Invisible Spear, Sword and Shield

## Electronic Warfare in the Third Decade of the 21<sup>st</sup> Century

**John Antal**

In the ancient Roman Army, the throwing spear (pilum), sword, and shield were the primary tools for the Roman army's tactical success on the battlefield. Today, modern armies are armed with invisible spears (long range), swords (short range), and shields (defence) in the form of Electronic Warfare (EW). In

tions. The grey zone is defined by the US State Department in a 3 January 2017 report as the use of techniques to achieve a nation's goals and frustrate those of its rivals by employing instruments of power – often asymmetric and ambiguous in character – that are not the direct use of acknowledged regular military

### Russia's New EW Forces

The Russian way of war is predisposed to a scientific approach and puts important relevance into what the old Soviet military called the "correlation of forces". This concept is a metric that, in its most general definition, is described as the relative alignment of two opposing forces or groups of forces. Since the collapse of the Soviet Union, Russia has been trying to regain its footing as a regional power. The combined events of the US invasion of Iraq and the 2008 Russo-Georgian war drove Russia to reassess its military structures. Russia's assessment of its correlation of forces with the West is that the Russian Federation is dramatically outspent and outnumbered by the US and NATO and surrounded on all sides. Several key Russian leaders view Russian military forces as the means to return Russia's old glory as a significant, if not dominant, world power. Viewing the US and NATO as their most likely threat, the Russian military is constantly searching for a means to overcome its perceived weaknesses. No longer able to fight a long war against the US and NATO, Russia has adopted a gray zone operations concept (sometimes called the Gerasimov manoeuvre) and a short war mentality that is focused on their near-abroad – those areas that are close to Russia and were once part of the old Soviet Union. To win these shorter conflicts in the near-abroad, the Russian military is developing capabilities to leverage niche combat multipliers that will generate a relative advantage over their opponents. EW is one such combat multiplier and the Russians intend to use EW for electronic reconnaissance, deny US and NATO the use of their electronic systems, and protect their own systems in any future fight. The Russian military defines EW as the use of electronic means against an enemy's C4ISR to change the quality of the information and to change the conditions of the operational environment. The goal is to reduce the effectiveness of the enemy C4ISR and reduce the speed of the enemy's information and decision cycle. Russian EW includes the ability to gath-



Photo: Vitali Kuzmin

**The Russians have made a significant investment in creating a robust Electronic Warfare (EW) capability. The KRASUKHA-2 is a mobile, ground-based, EW jamming system that has been in service since 2014.**

the battlespace of the next decade, the side that controls the electrons wins the battle. EW is a cross-domain source of power that can dramatically impact the execution of multi-domain operations. In addition, EW can become a major player in conducting grey-zone opera-

forces. EW can become a significant tool of national power in the grey zone, as it is invisible and may or does not always generate kinetic effects. EW, therefore, is right on the threshold of military escalation. How would NATO respond, for instance, to a Russian EW attack on the Global Positioning Systems (GPS) service to Poland, Latvia, Lithuania, or Estonia (NATO members) for a specific period of time? What if that attack was only limited to the area around Ukraine? Although EW attacks can pose a higher escalation threshold than some cyber and CEMA (Cyber-Electromagnetic Activities) attacks, this distinction is becoming increasingly blurred. Let's review the latest EW threat to the US and NATO from Russia and see the state of EW with regard to Europe and NATO.

### Author

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er intelligence data, the suppression of enemy electronic systems, and the protection of friendly systems by electronic means. Russian EW, therefore, consists of three categories of action: electronic support (ES), electronic attack (EA), and electronic protection (EP).

Russian EW forces are organised as independent EW troops directly under the General Staff and EW forces are integrated into the cutting edge of Russian ground forces. Since 2008, Russian forces have been organised into a brigade-based system. Each Russian Motorised Rifle Brigade (MRB) or Tank Brigade (TB) contains an EW company, with ES, EA, and EP functions, organic to the brigade. In addition to these organic forces, the Russians have five EW brigades across its Military Districts, each with four EW battalions. There are additional EW units in the naval forces to protect strategic locations. This intensive build-up of EW forces is designed, according to Russia's Chief of EW Troops, General Major Yuriy Lastochkin – in an interview with *Krasnaya Zvezda* in April 2017 for "The Day of the Electronic Warfare Specialist", a national holiday in Russia – to be a decisive element on the battlefield and is as important as precision fires. "The increase in the role of EW is determined by the very mission of disorganising the command and control of enemy troops and weapons by means of electronic defeat," Lastochkin said. "We have to recognise distinctly that a new realm of confrontation has appeared – the information-telecommunications space. The spectrum of missions of EW Troops is broadening significantly. The effect of using developmental EW means is comparable to defeat by precision fire. Conceptual documents approved by the Russian Federation President (Vladimir Putin) in the realm of electronic warfare aim for this. The country's military-political leadership attaches great significance to the improvement of EW systems as one of the most important elements of guaranteeing national security. Today, electronic warfare is a most complex intellectual-technical component, particularly in hybrid conflicts. This in turn requires the development of principally new means capable of neutralising the enemy's technological and information advantage."

To support their EW concept, Russian military EW equipment includes a full spectrum of short-, medium- and long-range systems. According to Dmitry Gorenburg, in a report by CNA titled "Russia's Military Modernisation Plans: 2018–2027", Russia's EW capability is "superior to those of

its peers." A brief list of systems that was tabulated by the Estonian MoD in a 2017 report titled "Russia's Electronic Warfare Capabilities to 2025" is shown below:

EW System	Function
RB-341V LEER-3	GSM communications jamming
RB-301B BORISOGLEBSK-2	Automated jamming system (detection, direction finding, analysis and suppression of HF/VHF radio communications). Includes R-330KMV command post and several jamming stations
R-934UM	Radio jamming station (detection, direction-finding, analysis and suppression of VHF/UHF radio communications). Part of R-330M1P DIABAZOL automated jamming system
R-330Zh ZHITEL	SATCOM/GPS/GSM jamming station (detection, direction-finding, analysis and suppression of UHF radio signals). Part of R-330M1P DIABAZOL automated jamming system
SHIPOVNIK-AERO	UAV Interception System
TORN	Radio jamming station (unknown specifications; currently not in service)
Rtut-BM	Radio proximity fuse jamming station (protecting personnel and equipment from munitions using proximity fuses)
RB-636AM2 Svet-KU	Monitors airwaves and tracks various radio emitting sources
R-318T TARAN	COMINT system. Includes command post and several stations operating in the HF/VHF/UHF range
MKTK-1A DJUDIST	Radio control and information protection system (detection, direction finding and analysis of radio signals). Intended to assist with emission control

This catalogue of equipment is only a partial list of the top-of-the-line EW systems that Russia has already deployed. These systems are primarily made by the KRET (Radio-Electronic Technologies Concern) which consists of 76 Russian companies and organisations that develop and manufacture electronic products intended for the Russian military and civilian sector. KRET employs over 50,000 employees (in 2015) and supplies its products to 30 countries across the world, earning US\$1.6Bn from the sale of military goods in 2015, and is an increasingly important exporter for the Russian arms industry. KRET is aggressively pursuing newer EW weapons. In October 2018, the *Moscow Times* reported that KRET had developed and field-tested a new electromagnetic weapon for Russia's 6th-generation fighter planes that will use a powerful UHF (Ultra High Frequency) impulse to completely destroy the enemy's radio-electronic systems. A spokesman for KRET, Vladimir Mikheev, reported that research to develop radio-electronic weapons will also result in the development of "electromagnetic artillery shells, bombs and missiles, which carry a magnetic explosion generator." In

short, Russia has deployed an effective, world-class air–ground EW system that has also been tested and proven in combat in Syria and Ukraine.

## The US and NATO

After the Cold War, the US Army disbanded its electronic warfare corps. After nearly two decades of fighting counter-insurgency operations, the US and NATO forces have further neglected their EW capabilities, but at the same time rely heavily on the electromagnetic spectrum for the secure transmission of electronic signals for their superior C4ISR systems. Today, every system, nearly every piece of equipment, and every soldier is an electronic emitter. Being EMS-enabled is a major strength and gives US and NATO forces a significant edge in combat – but only when it works. Like all strengths, this can also be an Achilles heel if it is not protected.

The US and NATO define Electronic Warfare as "a military action that exploits electromagnetic energy, both actively and passively, to provide situational awareness and create offensive and defensive effects." The Alliance views EW operations in three categories: Electronic Attack (EA), Electronic Defence (ED) and Electronic Surveillance (ES). Since many of the US and NATO EW systems are airborne, the focus for EW is enabled by joint Electromagnetic Operations (EMO),

but the development and deployment of state-of-the-art EW systems lags far behind the Russian capability. In recent US war games, aggressive Red Team EW actions have shut down US networks and turned US military C4ISR screens blank. Robert Work, a former US Deputy Sec-

ble adversary focused on developing and deploying a vast array of EW systems as force enablers and multipliers." This EW capability is an integral part of Russia's anti-access/area denial (A2/AD) approach and is clearly tailored to target NATO's C4ISR.

bers are secret, but the best estimate is nearly 9,000 soldiers in the Russian ground forces, and these troops are in EW units integrated into Russian combat formations, where each Russian combat brigade has an organic EW company. Russia has also placed in charge of their EW effort, where, in contrast, the senior US Army EW offer is only a colonel. The US and NATO, therefore, must address the weakness in EW capability rapidly and decide how to turn this situation around. Chasing the Russians, system for system, and soldier-for-soldier is the wrong strategy. As the late General Don Starry once stated: "It must be the role of technology to provide weapons systems which render ineffective costly investment by our foes — not simply to try to match something the other fellow has just fielded...With new weapons, we should seek new dimensions of combat...Technology should seek to make battle outcome less, not more calculable. Instead of restoring some balance to the neat firepower score equation we should introduce new imponderables into the traditional calculus of battle." Starry recognised that the time it takes to build military capabilities generates a race against time in an action-reaction-counteraction cycle where advances by one side may be countered the other. The recent case of countering the F-35 with quantum or photonic radar is a case in point. If true, the photonic radar would degrade the stealth feature of the Lockheed Martin F-35 LIGHTNING II, and this would be a huge blow to the F-35 fighter programme. Information superiority is vital to modern war. He who controls the EMS, wins the war. Until recently, the US and NATO have enjoyed information dominance. When that dominance is contested, as we have seen in operations in Syria, the surprise comes to us as a terrific shock. During the first two decades of the 21st century, US and NATO military forces expected information dominance as a normal condition of combat and became complacent with regard to the invisible weapons of EW. The Russians are working tirelessly to create the possibility of employing EW as a vital combat multiplier. Russia is feeling more confident in their ability to use military force to achieve political objectives, and their EW prowess is a big part of that confidence. Russia may not be able to gain dominance in all domains, but it may be able to do so with surprise for a short period of time in efforts below the threshold of executing a major war. That may be all they need. ■

Photo: US Army



**The US Army is enhancing its EW and Cyber-Electromagnetic Activities (CEMA) capabilities. This new vehicle was developed to provide Army EW Teams with the ability to detect and attack in the electromagnetic spectrum from an operationally relevant range at the brigade combat team level.**

retary of Defence, reported in a 7 March 2018 article in "Breaking Defence": "Whenever we have an exercise and the red force really destroys our command and control, we stop the exercise." This bodes ill for the ability to fight and win in a contested EMS environment. It seems that the US and NATO have neither the number, nor quality of systems organised into the right organisations to answer this complex challenge.

In 2017, the Estonian MoD, well aware of the Russian EW challenge, published a study "Russia's Electronic Warfare Capabilities to 2025", dated September 2017, that emphasised that Russia's EW capability against the Alliance "will pose a serious challenge to the proper planning and execution of NATO's defence of the Baltic states, and NATO's entire Eastern Flank, in the event of a Russian assault. Russia's growing technological advances in EW will allow its forces to jam, disrupt and interfere with NATO communications, radar and other sensor systems, Unmanned Aerial Vehicles (UAVs) and other assets, thus negating advantages conferred on the Alliance by its technological edge. Be it in the air, maritime, land or cyber domains, NATO will encounter an increasingly capa-

To address the urgent crisis, the US and NATO are buying systems and fielding units. In a recent move, Gen. Curtis Scaparrotti, NATO's Supreme Allied Commander, sent an urgent request for EW systems and units and has just recently put his headquarters on 24 hour operations status. Scaparrotti understands that EW and Cyber are major contested areas and is changing the mindset to deal with the threat while US military planners are considering naming the EMS as a separate warfighting domain in order to focus energy and resources. He sent an urgent operational need statement to the Pentagon requesting EW forces to deploy to Europe. Nevertheless, the imbalance between US and Russian EW forces is stark. To give you an example of the magnitude of the difference in investment and focus between Russian and US personnel for EW units, the US Army increased the total number of EW troops in 2018 to 940 soldiers. Correspondingly, European NATO EW forces are minuscule and EW may be an area for many NATO members to answer their pledge to increase their defence spending to 2% of their GDP by 2024. The Russian Army num-



# The Turkish Air Force

## Current Status and Perspectives

**Georg Mader**

**The Turkish Air Force (Türk Hava Kuvvetleri, THK) is one of the world's larger air arms and among the largest in Europe. It was and still is in combat not only against Islamists and Kurds within Turkey, but also beyond the borders of this large Eurasian NATO nation.**

When it comes to modernisation and various upgrade programmes, the THK enjoys the support of an excellent state-run aerospace industry, but it suffers from the current geopolitical reorientation of its political leadership. Although it was once technically supported by Israel, the air force of the easternmost NATO outpost, which is slowly turning away from Europe and the United States and toward Russia and China, is still feeling the aftershocks of the mysterious 2016 military coup d'état, and especially in terms of the THK's human resources, the climate after the far-reaching layoffs and sentences undoubtedly has a negative impact on the feasibility and composition of various high-flying procurement programmes.

For lovers of military aviation, the current dispute between Turkey and the USA over the US administration's refusal to supply Turkey with up to 116 F-35 JSF aircraft because of the forthcoming Russian S-400 GBAD system reminds us of another historic air force episode involving Turkey and Germany. Only then it was the other way round. At that time, Turkey was put under pressure to scrap already imported ones, because they were of "wrong" origin. Turkey, neutral in the Second World War, had 72 ultra-modern FW-190Aa-3 (the small "a" was for foreign or foreign fighters) from the German Reich in mid-1942, all delivered between October 1942 and March 1943. When Turkey later also ordered British SPITFIRES and P-47s built in the US, there were demands to give up the "Nazi planes", which Turkey accepted. The FW-190Aa flew only four squadrons until 1948. Aviation enthusiasts from Turkey still claim that up to 50 of these German vintage

Photo: TuAF



***Turkish F-16Cs flying in formation***

aircraft are stored in boxes and wrapped in oil paper below the Kayseri airfield. But the THK and MoD label these people as nerds or simply don't respond to these rumours.

### The F-35 Dilemma

Nowadays, the Turkish side is very much unresponsive; at least this is the impression of those in US and NATO who are deeply hesitant and do not want to try out how a key adversary system invented to fight and kill Western stealth-aircraft might be operating alongside such a platform in one military. There are fears that this situation might lead to handing over the F-35's features to overcome that air defence system to the Russian makers. While several Turkish statements may be partly right that Western bullying is only building up pressure to force Turkey to buy Raytheon's PATRIOT GBAD, no one in the Turkish Air Force is able or willing to explain how these two key assets of two competing militaries should cooperate in one Integrated Air Defence System (IADS)

without compromising, minimising or damaging the capabilities of the F-35 as a growing cornerstone of Western air arms.

Many years ago, when all these procurements were still on paper, it was not planned to turn out like this and culminate in such a major rift between Turkey and the US. Maybe there is a way for a coexistence, as in Greece, Egypt or the UAE both Russian and Western systems are in operation. Sometimes elder Greek S-300s (once ordered by Cyprus but relocated to Crete after the Turkish threatening to destroy them) are a welcome "sparring partner" for the Israeli Air Force (IAF). But in this case, no side shows the will to bridge and discuss such Westernisation possibilities but only stubborn entrenching on both sides. Readers may consider how to weigh the worry about reducing or nullifying the operational value of a multi-multi-billion programme for 10 or 11 nations for decades to come, versus Turkey's alleged urgent need to defend its airspace with that big stick S-400, and, by the way, who in the region would be such

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Photo: TuAF

### **A line-up of Turkish F-16Cs and Fs**

a sophisticated Level-1 air/space opponent? When Turkey's President Erdogan recently shouted "Hey, we paid for them!", he reminded that Turkey still plans to procure as many as 116 F-35As conventional take-off and landing (CTOL) variants, of which 30 are under firm order, according to a statement released in July 2018 by the "Presidency for Defence Industries", the former SSM or Undersecretariat for Defence Industries. The THK wants to replace its ageing F-4Es (meanwhile already phased out), and the Israeli-modified F-4E 2020s and the early F-16C/D Block 30 and Block 40s. Additionally, Turkey had plans to procure up to 32 F-35Bs in the STOVL version for the Turkish Navy. The F-35 dispute between Ankara and Washington escalated when President Donald Trump signed the 2019 National Defense

Authorization Act (NDAA). The bill explicitly calls for the cancellation of the delivery of F-35s to the THK, despite Turkey being called a NATO ally and two decades ago one of the first international partners on the programme. Since 1999, Turkey has invested about US\$1.2Bn into the project. Following a fresh bipartisan bill by US senators to even block any storage in Turkey, on March 29th Turkey once again rejected any US pressure to abandon the S-400 procurement. After meeting Russian Foreign Minister Sergey Lavrov, Turkey's Minister for Foreign Affairs Mevlut Cavusoglu said, "We have signed a deal with Russia and this deal is valid. We are now discussing the process of delivery; the S-400's are expected for July of this year". Thus, at the moment it looks like the first four F-35s destined for Turkey will remain

sitting at Luke AFB and will not be delivered like planned. Originally, the plan was to get four from LRIP-11 in 2019, eight from LRIP-12 in 2020–21, eight from LRIP-13 in 2022 and eight from LRIP-14 in 2023. Ankara wanted to deploy the first 30 F-35s to the 7th Main Jet Base (MJB) located in Akçadağ, Malatya which has been undergoing modernisation since mid-2017 by Nurol İnşaat/Rönesans Holding under a contract valued at TL429.5M, with 88 buildings to be torn down and rebuilt, such as new Hardened Aircraft Shelters (HASs) and hangars, underground pens, squadron- and head-quarter buildings, mess halls, guest houses, maintenance facilities, depots and heating plant. In spite of all the squabble, two THK instructor pilots, 13 student pilots and over 300 mechanics continue training in the US; it remains to be seen if all that would have been in vain and a huge financial disaster or whether it remains in political limbo.

There is also the industrial side; Turkey is so far a single supplier for critical parts of an F-35, such as the missile remote interface unit and the good-looking panoramic cockpit display. So far, 10 Turkish armaments/aerospace companies (Alp Aviation, Ayesas, AYESAŞ, Fokker Elmo, Havelsan, Kale Aero, Kale Pratt & Whitney Engine Industries, Roketsan, TÜBITAK-SAGE and Turkish Aerospace) involved in the F-35 programme have contributed US\$700M in exports to the programme. And Turkey has received approval to build/assemble its own F135-PW-100 turbofan.

### **The Ambitious TF-X Programme**

Another milestone in the THK's future capabilities after 2030 is the TF-X, the National Stealth Combat Aircraft. It is Turkey's most ambitious defence programme, run by Milli Muharip Uçak/MMU as the TF-X Programme Management Office, staffed by the THK National Combatant Branch Office, SSB, TA and BAE Systems personnel. The large, 60,000-pound, twin-engine, double-shell stealth design was discussed in detail by Georg Mader in ESD 8/2018. Looking at the available financial resources, the Turkish economy and currency seem to have overcome the slump they fell into after the coup attempt in 2016 and the costly engagement in Syria, and the TF-X still seems to be on course. The only setback was that the British engine manufacturer Rolls-Royce scaled back its efforts to build the first high-performance jet fighter engine produced in Turkey with the Kale Group. Discussions between Kale and RR have encountered problems over the past year, allegedly due to a dispute over the sharing of intellectual



Photo: TuAF

### **An F-4F with POPEYE missiles**



## Turkey's Air Force

Measured against 2017, Turkey's defence budget for last year has increased by 50%, or from US\$7.9Bn to US\$11.5Bn, a good portion of which is allocated to the powerful THK, which currently operates around 270 combat aircraft. These are 238 F-16C/D (138 Block 30M and Block 40M, 71 Block 50M and 29 Block 50+) aircraft flying in 12 squadrons, deployed at seven different bases around Turkey. Turkey also operates 31 F-4E-2020 PHANTOM-II all-weather fighter-bombers armed with POPEYE missiles, and there are 180 trainers, including 68 T-38M jet trainers and 16 NF-5A/B-2000s (10 NF-5A-2000 and six NF-5B-2000 units in the "Turkish Stars" Acroteam), 40 KT-1T turboprop trainers and around 30 SF-260D and 25 T-41D aircraft. Around 100 transport/support aircraft include six A400M (plus three or four to be delivered), four E-7T AEW&C, 19 C-130B/E HERCULES (six -B and 13 -E are undergoing avionics upgrades under ERCİYES Project), 10 C-160Ds (five in transport, three in ISR-configuration GÖREN and two in MILKAR-2U EW-configuration), 49 CN235-100M (45 in Transport/MedEvac/Training role, three in SIGINT/ELINT configuration and one in 'Open Skies' configuration), and seven KC-135R STRATOTANKER aircraft.



Photo: TUSAŞ

**Turkish President Erdogan in a trainer cockpit**

property and the involvement of a Qatari-Turkish company.

On 22 June 2018, TA signed a cooperation agreement with Dassault for the implementation and maintenance of its "3DEXPERIENCE" as part of the TF-X programme. This tool provides seamless integration between data management and industry-leading design and process functions. TF-X is currently in a four-year Engineering Development & Preliminary Design phase, which is expected to cost approximately US\$1.3Bn, of which approximately US\$300M will be provided for infrastructure investments and approximately US\$1Bn for engineers. This will be followed by an 8-year planned Critical Design Review (CDR) and Prototype Production and Qualification phase, which will cost an additional US\$7.3Bn. After 12 years, it is expected that US\$8.6Bn will be spent on the first flight of a first prototype. But all these plans have already been abandoned. The first TF-X prototype should make its maiden flight in 2023 when Turkey celebrates the 100th anniversary of the founding of the

republic. This schedule was extended in March 2018, when the TA President & CEO announced that the first flight would take place in 2026, with engines from abroad such as the EUROJET EJ200, the GE F414-GE-400 or even a Russian UEC-SATURN AL-31F to be procured. It is planned to produce seven flying TF-X prototypes for testing, evaluation and qualification purposes. Last year, the TAI chief estimated that the TF-X programme would cost about US\$20Bn and create 11,200 jobs. Given such schedules and amounts, there will be enough time to provide the reader with multiple updates.

## The "Peace Onyx"

The Turkish Aircraft Industries Incorporated Company (TUSAŞ) was established in 1973, after the so-called "Cyprus Peace Operation", the Turkish seizure of Northern Cyprus in 1974. Economic and social problems prevented Turkey from building its own aircraft design on a larger scale. In the early 1980s, the THK did research to select its new com-

bat aircraft and for this purpose founded a committee in 1982. As a result of a comprehensive test and evaluation process, THK chose the General Dynamics F-16 FIGHTING FALCON (now VIPER) as the new combat fighter. For this purpose, Turkish Aerospace Industries (TAI) Company was founded on 15 May 1984 as a Joint Venture (JV). On 25 June 1985, the Turkish-American joint stock company TUSAŞ Engine Industries (TEI) was established to manufacture engine components and assemble F110-GE-100 engines for the THK F-16C/Ds. Its facility was officially opened on 10 June 1987. In several blocks under the term 'Peace Onyx', initially 160 F-16C/D Block-30 (34 Cs, 9 Ds) and Block 40 (102 Cs, 15 Ds) aircraft were purchased, with the first eight manufactured in the US and the remaining 152 assembled at TAI in Ankara. In March 1992, a follow-on order for two batches of 40 F-16C/D Block 50s each (68 Cs, 12 Ds) was placed. TAI also received a contract to build 46 F-16C/D Block 40s (34 Cs, 12 Ds) for the Egyptian Air Force under "Peace Vector"-IV and completed deliveries during 1993-1995. And in 2009, another FMS procurement of 30 F-16 Advanced Block 50+ (16 Ds and 14 Cs) was finalised to again be co-produced by TAI in Eskişehir. These deliveries were completed in December 2012, making the THK the world's third-largest operator of the VIPER behind the USAF and IAF. Additionally, from 1987 to 2012, TAI manufactured a total of 308 F-16C/Ds, while TEI assembled and tested a total of 313 F110-GE-100, F110-GE-129 IPE and F110-GE-129B turbofan engines from 1987 to 2010.

## A Myriad of Turkish VIPERs

Back in 2005, long before the latest versions were on the horizon, Turkey ordered the first US\$1.1Bn avionics upgrade based on the USAF's Common Configuration Implementation Program (CCIP). Up to 165 F-16s were upgraded to F-16 Block 50+ standards by TAI. Ever since 1990, TAI has also carried out a number of US-provided and local F-16 modernisations, including the F-16C/Ds EW-upgrade during 1993-1999 on 148 aircraft and the structural FALCON-UP on 134 F-16s in the same period. TAI also carried out an MLU upgrade of the Royal Jordanian Air Force's (RJAF) 17 F-16A/Bs during 2006-2009 and another one for the Pakistan Air Force's (PAF) 41 F-16A/Bs during 2009-2014. TAI also overhauled ex-RJAF F-16s for the PAF.

By 2015, the latest capability status of the THK's F-16s included the AN/APG-69(V)9 radar, coloured cockpit displays, the modular mission computer, new avionics processors, the joint JHMCS helmet-mounted



Photo: Tübitak SAGE



**The K GK-83 folding wing-set kit to extend the range of the F-16**

cueing system, Link 16 data link, new identification-friend-or-foe (IFF) transponders, AN/AVS-9 night-vision goggles, upgraded navigation systems and BAE Systems' AN/ALQ-178(V)5+ internal mounted EW system, with self-protecting radar-warning and jamming capabilities.

The ÖZGÜR programme, which was launched in December 2010, should also be emphasised. After a long break, it did not take off until 27 December 2016. Another prototype of the F-16C Block 30 carried out a flight test over the sky of Ankara in July 2018 with special permission of the Turkish president. During the test flight, the aircraft broke the sonic barrier at an altitude of

no agreement has yet been signed. An F-16 mission computer was procured directly from LM and national software running on this computer was developed for ÖZGÜR. When LM integrated a more developed MMC with a lighter and smaller architecture as part of the mentioned CCIP, the possibility of utilising the indigenous solution computer on earlier "Peace Onyx" (PO)-blocks was eliminated. The Flight Control Computer on board the F-16C Block 30 was not changed, so the existing computer is being used as part of the 2012-launched project covering the modernisation and certification of those Block 30s, which did not receive avionics upgrades under PO-III, with

the other hand, certain capabilities gained with the ÖZGÜR project do not exist even in the F-16C/D Block 50+ aircraft procured under the PO-IV Project.

In parallel, a structural upgrade project (SUP) for the Block-30s was launched in order to increase the service life of these 35 aircraft in THK's inventory from its original 8,000 to 12,000 flight hours. Most of them have clocked up well over 7,000 hours on average and are quite worn out.

And last but not least, on 24 March 2019, the Turkish State Secretariat for Defence officially confirmed that a further upgrade with ASELSAN for the modernisation of THK's entire F-16 fleet with a domestic AESA radar by 2021 had been signed. This also means that Turkey could soon sell 245 AN/APG-69(V)9 radars that are only four years old. This might well become another contentious issue between Turkey and the USA.

On 7 February 2018, it was announced that 22 THK F-16s have already been equipped with a new indigenous EW-self-protection suite (SPEWS-II) developed by Aselsan. It is tailored towards the Block-50 C single-seaters and features an integrated Radar Warning Receiver (RWR), an ECM-suite reportedly even against ballistic missile threats and which provides pilots with situational awareness and deceptive RF jamming. The AN/ALQ-178(V)5+ provides intelligent control of chaff/flare dispenser systems for enhanced/coordinated ECM response. So far, 22 F-16 fighters out of PO-IV have been equipped with the new set.

## New Ordnance

On 29 March, the Turkish MoD confirmed that the THK had bombed PKK camps in Hakurk in Northern Iraq; it also confirmed that Turkish F-16s were now using the so-called HGK PGM kits produced by Tübitak-Sage. HGK-84 (Precision Guidance Kit-84) is a GPS/INS-guided JDAM guidance kit that turns existing 2000 lb Mk-84 general purpose bombs and penetrator bombs into smart air-to-surface weapons. Added to them is K GK, a folding wing-set kit attached to HGK to extend range. A special feature of the kit is that it does not require access to the aircraft mission computer and software codes as it has been separately wired to independent dedicated systems on board the aircraft. However, THK Block 40s and 50s did get the CCIP upgrade which included NATO's UAI (Universal Armament Interface), and HGK is also UAI compatible. The Block 30s use indigenous mission computers, while the Blocks 40 and 50 have UAI interfaces to bring future ordnance to the front line.

Photo: Lockheed-Martin



**The first flight of a Turkish Air Force F-35A. The Trump administration has refused to hand these aircraft over to Turkey.**

30,000 feet and the sound boom could be heard in all of western Ankara. According to sources, although important steps towards the serial implementation phase of the "ÖZGÜR" have been achieved in these two years, Turkey's long-standing negotiations with the US Government on the joint use of the source codes running on the MMC 7000 mission computers have meant that

a national avionics suite solution that contains an indigenous mission computer with a national operational flight programme and an optional AESA radar. Not completed by December 2016, the project schedule was extended to 80 months as each software block had to be tested at the System Integration Laboratory (SIL) and then tested in a prototype during a certification flight. On

It needs to be mentioned that the next generation of indigenous PGM are already being tested. The 150+ NM air-launched cruise-missile (ALCM) "SOM-J" is flying on the F-16s, but was of course targeted to be integrated into the Turkish F-35 with the assistance of Roketsan and Tübitak-Sage by 2023 in the Block 4.2 software release package. For the reasons given above, however, this remains uncertain for the foreseeable future.

## TERMINATOR Soldiers

Ordnance also comes to mind when looking at the two remaining THK squadrons operating about 30 F-4E-2020 PHANTOMS in the upgraded TERMINATOR configuration. And that is because of the large and mighty AGM-142 POPEYE attack missiles, Turkey acquired previously from Israel. It was intended to use them on the F-16s as well, but so far they have been used only on the TERMINATOR. The weapon was first used on 16 December 2007 during "Operation Sun" – an incursion into Northern Iraq targeting Kurdish strongholds. More than 200 PHANTOMS were delivered to Turkey from 1974 on, of which 54 were upgraded to TERMINATOR standards by IAI, with new Elta EL/M-2032 multi-mode fire control radar, an upgraded avionics suite including a digital glass cockpit and a Kaiser El-OP 976 wide-angle HUD and HOTAS system. These fighters have had 20 km of internal wiring replaced by lighter and modern systems, reducing their weight by a phenomenal 750 kg, thereby significantly enhancing the aircraft's thrust/weight ratio making it more manoeuvrable and better suited to air-to-air engagements.

## Other Incoming Assets

In July 2018, Turkey's defence procurement agency SSB tweeted that the "Advanced Jet Trainer & Light Attack Aircraft" project HürJet had been signed between TA, SSB and THK Command. It was officially launched on 14 August 2017 as a company-funded project after receiving the go-ahead from TA's Board. The Conceptual Design Phase (CDP) of the HürJet project was completed in April 2018; currently, engineering and analysis studies as part of its Preliminary Design Review (PDR) are under way. That phase is expected to be completed in August 2019, to be followed by the Critical Design Review (CDR) phase, which is scheduled to be launched in late 2019. Powered by a single turbofan engine (F404-GE-102, 17,000 lb thrust with reheat), it is to replace 68 supersonic T-38M trainers. On the other hand, a Light Combat Aircraft is sought to perform close air support (CAS) to ease the

burden for the F-16C/Ds. With a max. speed of Mach 1.2 and a max. altitude of 45,000 ft, THK will also be able to employ the HürJet as a "Red Air" aggressor aircraft during exercises. HürJet's AJT is expected to perform its maiden flight in 2022 and to enter THK service in 2025.

On 15 March 2018, Turkey's Savunma Sanayii Bakanligi (SSB, Presidency of Defence Industries) announced that two green Bombardier GLOBAL 6000s had been delivered to the facilities of TA to undergo modification to the Hava SOJ (air stand-off jammer) configuration. ASELSAN was awarded the contract for four such aircraft on 9 August 2018, with the first to be delivered to THK

and other insurgent groups in Syria have kept the service at a high operational pitch. The Syrian civil war has provided plenty of opportunities to gain combat experience. On 16 September 2013, a Turkish Air Force F-16C shot down a Syrian Mi-17 that violated Turkish airspace, while on 23 March 2014 another F-16 downed a Syrian Arab Air Force MiG-23ML FLOGGER which intruded two miles into Turkish airspace. On 3 and 4 October 2015, newly arrived Russian Air Force (VKS) Su-30SM and Su-24 aircraft violated Turkish airspace in the Hatay region. Despite what the THK described as "clear, timely and repeated warnings", the Russian aircraft (maybe technically

Photo: THK



**A THK KC-135R refuelling F-16s**

in 2023. The aircraft is primarily intended to operate from stand-off range to suppress enemy air defences and protect tactical aircraft during operations. The conversion requires extensive airframe modifications to add large sensor fairings, enabling the aircraft to provide a remote electronic support/electronic attack (ED/ET in Turkish nomenclature) capability; it will also be equipped with a comprehensive electronic support measures suite to detect and locate hostile radar transmissions and communications and a powerful jamming suite to deceive and jam those emissions.

## THK in Combat

The Turkish Air Force has participated in multinational coalition operations in the Balkans, Afghanistan and the Middle East, gaining a great deal of operational experience in the process. In 2006, four Turkish F-16s were deployed to take part in NATO's Baltic Air Policing operation. Ongoing operations against the Kurdish Workers Party (PKK) in Northern Iraq and against Daesh

never hearing these) continued until F-16s on QRA (Quick Reaction Alert) were scrambled. During the incident on 3 October, the VKS Su-30SM maintained a radar lock on one or both the F-16s for more than five minutes, an unusual and provocative thing to do if not at war. After the incident, the Turkish Government declared that its pilots would shoot down all planes that violate its sovereign airspace. Accordingly, on 24 November 2015, a VKS Su-24M FENCER was shot down by a THK F-16C with AIM-120 AMRAAM when it briefly crossed the border from Syria, resulting in the death of one of the crew. Following the shoot-down, relations with Russia cooled for some months while Russian incursions continued. Russia responded by equipping aircraft flying in Syria with air-to-air self-defence missiles and routinely began sending Su-30SMs to escort Su-24M bombers and Su-25 fighter bombers, deployed an S-400 SAM missile system to its Hmeymin air base and sent the MOSKVA missile destroyer (equipped with S-300F SAMs) off Latakia to establish a Missile Engagement Zone (MEZ) over Syria. On



Photo: Georg Mader

### A Turkish A400M

29 January 2016, following yet another border violation – this time by a Su-34 FULLBACK striker – Turkey refrained from engaging the aircraft but summoned the Russian envoy for a formal 'dressing down'. Back then, the Turkish MFA commented that: "We are making a clear call to the Russian Federation not to violate Turkish airspace, which is also NATO airspace!"

At the beginning of March 2019, the Turkish secret service (MIT) confirmed that it had successfully carried out its first drone attack deep in Syria and against a senior PKK terrorist using ISR/ELINT U(C)AVs. The TAI ANKA and TB2 identified an operator through voice recognition applied to satellite phone conversations and then began tracking the target for several hours until the passenger's identity could be verified. THK F-16s with laser-guided bombs then quickly "eliminated" the target; it was Riza Altun, a close ally of Cemil Bayik, leader of the PKK and "top terrorist" from the Turkish point of view.

Not real combat missions, but close to it, were and are the THK incursions into Greek airspace. Due to Turkey's long-standing disagreements regarding what is internationally known as the Athens Flight Information Area, Greece has been filing for decades deliberate and dangerous Turkish intrusions over the Aegean Sea, sometimes dozens a week. Several jets of both air forces have fallen into the sea following hot pursuits in which the pilots have been lost. On 26 March 2019, the General Staff of the Greek National Defence declared that Turkish F-16s had violated Greek airspace 47 times in only one Monday, using eight aircraft. Even Greek Prime Minister Alexis Tsipras accused Turkey of harassing his helicopter with fighter planes as he travelled to an Independence Day celebration. He said his helicopter was forced into low manoeuvres when Turkish jets invaded Greek airspace, and he called

the Turkish actions "foolish acts that have no adult meaning". Turkey, of course, rejected the accusations and insisted that the jets were conducting routine missions.

### U(C)AV

The Turkish MoD disclosed that it has added 151 TB2 BAYRAKTAR tactical UAVs (75 of which are armed) to its inventory since their introduction in 2015. Twenty-five armed ANKA MALE UAVs were delivered to Turkish security forces. And since six weaponised TB2s were delivered to Ukraine in March 2019, the Ukrainian company Ivchenko-Progress and an unnamed Turkish company in turn formed a joint venture to develop turbine jet engines for the Turkish MIUS UCAV programme. The stealthy flying wing MIUS is the last of the large family of drones that Turkey wants to develop for THK, other security agencies and exports. With the series launch of ANKA, ANKA-2, BAYRAKTAR, TB2 and AKINCI for THK, the Turkish aerospace industry is now turning its attention to MIUS.

### Aftershocks of the Coup

In addition to THK's ambitious acquisition and modernisation projects, the coup attempt in July 2016 and its consequences are at least as important a topic: Who will fly all these aircraft and whom does the AKP government trust?

On 15 July 2016, members of various branches of the Turkish military are said to have launched a coup to overthrow the AKP Islamist government of President Recep Tayyip Erdogan; the secular Kemalist Turkish military has launched four successful coups between 1960 and 1997 to overthrow civilian governments. Some observers describe the botched 2016 coup as ridiculous: soldiers tried to isolate Istanbul by

erecting roadblocks on the Bosphorus Bridge, blocking the lanes only in one direction, and videos showed soldiers with LEOPARD tanks surrendering to the police and civil society. When a rotor-backed rebel team missed Mr Erdogan returning to Istanbul from his Marmara vacation, two rebel-led THK F-16s tracked his GULFSTREAM IV (TC-ATA) but failed to identify or shoot it; his captain used a callsign from Turkish Airlines. Thousands of senior officers were subsequently purged. More than 300 F-16 pilots were dismissed and charged, including the one who shot down the Russian Su-24. With the war in Syria and the Turkish armed forces conquering parts of the north and suffering surprising losses against the Syrian Kurdish YPG, the Turkish military is overburdened. This is hardly a good time to decimate your pilot cadre, each member of which has received millions in investment.

It appears that the Turkish authorities are now looking overseas to make up for the apparent deficit; Washington, however, has refused to send US flight instructors. Turkey has also asked Pakistan for support to fly F-16s, although training Turkish pilots on F-16s may contravene US rules. In May 2018, more than 200 retired pilots "suddenly" returned to THK, including Turkey's first female F-16 fighter jet pilot Berna Şen (now aged 42). The retired THK personnel are to close the gap caused by the purge. In the meantime, it seems that these retired pilots have not only been "called" but were also blackmailed; out of sheer desperation, the Erdogan government had issued a decree threatening 330 former pilots with the withdrawal of their civil professional pilot licence, unless they return to THK service for four years. It is easy to imagine how the decision to force a return to service will affect the morale of the units. The Turkish analyst Verda Ozer recently claimed that "the drastic and harmful reduction in the number of F-16 pilots has created an urgent need to eliminate the holes in our air defence – and this is the reason for the stubborn purchase of S-400". But even the S-400 would not completely fill the gaps in Turkish air defence. "Since the Russian S-400 system cannot be integrated into NATO's infrastructure, it cannot be used for higher-level missile defence," says Ozer. Turkey then needs two systems: The S-400 to defend against all enemy aircraft, but also a Western system capable of intercepting ballistic missiles. In fact, at the beginning of 2018, Turkey awarded EUROSAM, ASELSAN and Roketsan an 18-month contract for a definition study for the future Turkish long-range air and missile defence system. The contract was awarded between President Recep Tayyip Erdogan and President Emmanuel Macron at Elysée Palace. ■



# A New Generation of Submarine Combat Management Systems

Luca Peruzzi

**Conventional submarines with diesel-electric propulsion and increasingly with air-independent propulsion (AIP) are highly potent sea denial and intelligence-gathering assets which, with a competent crew managing a networked combat system and advanced weapon systems, can become a challenging adversary even for highly equipped anti-submarine warfare (ASW) forces.**

In addition to the fact that the platforms are becoming quieter and more flexible, recent developments in the capabilities of the combat system are a key element in addressing current and future operational areas and threats. The improved sensitivity and significant processing power of modern sensors produce much more data for the command team to absorb. In particular, the latest generation fully integrated multi-array sonar suite and submarine-launched weapon system (including heavyweight torpedoes and anti-ship and land-strike cruise missiles) allows for more operational options that have to be managed by a reduced crew. The new generation (or the latest versions) of submarine combat systems analysed here in terms of their overall capabilities show a trend toward a scalable COTS-based open system architecture that enables avoiding proprietary products, managing obsolescence, rapidly introducing new technologies such as a common network and server infrastructure, and cyber attack protection. The introduction of multi-function consoles (with a trend towards single vertical colour displays) allows the operator to manage any application from each of them, while a simplified human machine interface (HMI) reduces operator workload and further optimises procedures and information workflow.

## The Norwegian and German Approach

Following the Norwegian Government's decision in February 2017 to pursue strategic co-operation with Germany covering the joint procurement of six new submarines (four for the Norwegian Navy and two for the German Navy), together with joint training and exercises, a shared spare parts inventory and co-operative maintenance and lifetime management, Kongsberg and thyssenkrupp, together with the latter's

subsidiary ATLAS ELEKTRONIK, formally established a new Norwegian-German combat system joint venture.

With its headquarters in Kongsberg (Norway) and a German branch office in

and India, the current main focus is the two-nations' programme for the new joint 212 Common Design (CD) submarine procurement and life-cycle support. Both nations' procurement agencies have re-

Photo: NATO



***The Royal Norwegian and German navies will procure the 212CD class submarine combining the U212A's low signature with extended range, speed and endurance.***

Bremen (Germany) and equally owned by the Norwegian and German groups, the kta Naval Systems is exclusive supplier to thyssenkrupp Marine Systems (tkMS) and will design, integrate and deliver the complete Combat Systems for all future tkMS submarines in addition to midlife upgrades or renewal programmes. At present, the tkMS and kta are working together in several procurement processes for worldwide new building and upgrade programmes. In addition to the export markets, namely Poland, the Netherlands

received a bidding offer from the main supplier in late 2018 and, after a joint evaluation, negotiations remain on-going with the aim of reaching a signed agreement by the close of 2019. The new submarines will be based on the 212A class and specifically tailored to the requirements of both nations. According to formal statements, the 212CD class will combine the low signature of the 212A class with extended range, speed and endurance to allow for international operations. The commission of a first platform for the Royal Norwegian

Photo: Luca Peruzzi



**The U212A first batch's control room equipped with Kongsberg's MSI90U combat management system.**

Navy is set for completion by 2026. The kta will design and deliver the new submarine combat system (CS). While other systems come from third suppliers, in the case of both the command management system (CMS) and the sonar suite, kta relies on the experience of Kongsberg Defence & Aerospace and ATLAS ELEKTRONIK as a supplier and strategic partner to kta. Both have developed CMS, which is in service worldwide as well as sonar suites, mainly by ATLAS ELEKTRONIK. Although no details have been unveiled as to the exact submarine configuration, according to earlier

feasibility studies, the 212CD class submarine can embody a number of upgrades, a potentially improved fuel cell technology, a new engine, possibility for new-generation batteries, improved quietening, reduced target echo strength, enhanced sensors and enhanced Command and Control systems. Overall, the integrated CS will allow for more flexibility regarding arrangement and working inside the submarine control room, and it also has additional advantages regarding the CS security and its sub-systems. According to kta documentation, the combat system infrastructure will feature a common and integrated approach where each operator will be able to access any application from any multi-function console (MFC), while the system will run on a common network and server infrastructure and provide support for virtualised processing and red/black separation. The

CMS will support the following functions: situation awareness, track management, target motion analysis, combat system overview, classification and recording/replay. It will be capable of interfacing and managing a whole range of underwater and above water sensors, the integrated communications and navigations suites, in

addition to weapon control – including torpedo countermeasures, mine laying, medium and long-range missiles (as a possible option). As a supplier and integrator of modern Combat Systems, in its latest projects, kta is working on optimising shareable resources and services. This is available via a multi-domain capable common infrastructure and can seamlessly integrate sub-systems by highly flexible and (therefore) scalable means. Kta has highlighted that 'State-of-the-art' technologies such as Big Data, artificial intelligence, etc., may be utilised where applicable. During the Balt Military Expo 2018, the new JV has displayed two notional consoles and demonstrated human-machine interface (HMI) for the first time. Even if kta stressed the showed MFC could not be the end-product, the latter featured a single large touchscreen placed vertically with keyboard and integrated mouse. The kta brochure envisaged a control room with lateral MFCs, control station with rotating chair and integrated screens as well as large wall-mounted displays. The new technologies and platform enhancements could also be applied for the already in-service U212A with the German and potentially Italian Navies mid-life upgrading programmes.

## A Shared Solution

In December 2018, the first SCORPENE class RIACHUELO submarine (S-BR) for the Brazilian Navy was launched by ICN (Itaguaí Construções Navais) joint venture between Odebrecht (59%) and Naval Group (41%) at the Itaguaí facility in Brazil. The four SCORPENES for the Brazilian Navy are the latest export platforms to be equipped with Naval Group's SUBTICS (Submarine Tactical Integrated Combat System) combat system. Capitalising on more than 30 years of French Navy operational feedback in various crisis theatres as well as the shared underwater equipment experience of what are today Naval Group and Thales, the SUBTICS modular and open architecture relies on a common shared infrastructure that is fully compliant with international standards for data, video and audio distribution and is based on COTS hardware components. The system infrastructure is based on a dual-redundant large bandwidth Ethernet databus to integrate all acoustic and non-acoustic sensor inputs, weapons, navigation systems, and command and weapon control functions on twin-screen multifunction consoles. Command and weapon-control functions are divided into three main areas: situation elaboration (for track association and fusion, TMA and track management); command and decision (threat evaluation, plus attack

Photo: kta naval systems



**The kta naval systems' new generation vertical single-screen-equipped multi-function consoles.**



and escape-manoeuve planning); and engagement control and weapon launch.

Extensive use is made of the COTS hardware and software standards. The SUBTICS architecture has substantially evolved over time to exploit innovation in open standards, processing, networking and graphical user interface techniques. According to the French shipbuilder, the infrastructure integrates Naval Group's cybersecurity by design and allows cyber maintenance services. SUBTICS is interfaced with the Integrated Platform Management System (IPMS) and steering console and proposes an innovative operation-room arrangement to optimise operations. Naval Group said that thanks to user friendly HMI, young submariners will quickly become efficient operators during complex missions, reducing the need of long specialist training courses. The system's non-intrusive HMI and standardised web technology opens new opportunities, including extensions to mobile devices (such as touchpads, third-party view integration and the integration of legacy systems for modernisations). Naval Group is working on a new-generation tactical table that will be able to fuse and display the tactical picture while looking to further enhance HMI through the possible introduction of a new-generation console, with a single large-area vertical touch-screen multifunction colour display instead of the current-two screens configuration.

The SUBTICS saw first application on Pakistan Navy's AGOSTA 90B followed by the Chilean, Malaysian, Indian and Brazilian Navies on their respective different SCORPENE-type submarines. SUBTICS has been applied for modernisation programmes, including the Singapore Navy's A12 and A17 submarines as well as the Chilean (Type 209/1400) and Ecuadorian (Type 209/1300) Navies' platforms.

Naval Group is currently proposing its SCORPENE and SHORTFIN BARRACUDA conventional designs in different international tenders, including Poland, India and the Netherlands with a combat system capable of managing a range of weapons (including cruise missiles and offering net centric-oriented operations). Technological transfer agree-

ments, involvement and partnerships with local industries are key drivers of international success, such as the Brazilian and Indian programmes. Today Naval Group has developed a customised and evolved SUBTICS-based combat system version for the French Navy called SYCOBS (Système Commun BARRACUDA Snle-ng) to equip the current LE TRIOMPHANT class SSBN (SNLE, Sous-marines Nucléaires Lanceurs d'Engins) as well as the new BARRACUDA-type SSN. The last boat of the LE TRIOMPHANT class SSBN was the first French platform to receive the SYCOBS while the remaining class boats followed during overhauls, the last being the TÉMÉRAIRE. To be delivered in

2020, the BARRACUDA SSN-type will be the first SYCOBS-equipped platform with Safran full non-penetrating masts allowing to optimise the boat control room location, as well as new weapon systems including the MBDA NCM (Naval Cruise Missile) and Naval Group F21 Heavyweight Torpedo.

## Advance in Capabilities

The new generation Swedish Navy's Saab Kockums-developed and built A26 as well as the upgraded A19 under the MLU (Mid-Life Upgrade) programme are equipped with a new generation combat system developed by Saab Group under

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Photo: Naval Group



**The Naval Group SUBTICS CMS has been installed on different submarine platforms.**

the supervision of the Swedish Navy. The Swedes are, however, proposing the new submarine design in three iterations (Pelagic, Ocean and Ocean Extended Range) for export, including to the Dutch, Polish and Indian markets. In order to facilitate system integration, future upgrading and expansion, as well as to reduce costs, all applicable management and control system of the new-generation A26 submarines are interconnected through the vessel's General Management Services System (GMSS) and operated from common multifunctional consoles (MFCs). Based on an open architecture distributed system, which utilises COTS products, technologies and standards, adapted and/or applied to na-

val military applications, the GMSS access points throughout the submarine enable easy connection for a large number of additional MFCs, workstations and laptops. Saab's latest SESUB 960C command management system (CMS) is at the 'heart' of the A26 combat system. According to them, instead of being a central system, which all other systems are integrated, the CMS functions as a subsystem linked to the GMSS that communicates using open standards. According to Saab, this allows integrated systems, including the CMS, to be individually upgraded or exchanged, thereby greatly reducing project risks typically found with complex and highly integrated systems. The A26's CMS can per-

form tactical picture compilation based on on-board sensors and systems and information received via data links, target motion analysis (TMA), weapon control, and tactical data exchange via the Royal Swedish Navy's Alfa/Link 8000 tactical datalink. The CMS allows high-performance data exchange via the GMSS with other systems like sonar suite, Electronic Support Measures (ESM), weapon interface systems and vessel control system. Like all other systems connected to the GMSS, the CMS can be operated from any MFC in the submarine. As the CMS's MFCs are used by the majority of the combat system's subsystems, the latter have dedicated computers that run a graphical operator console software providing a framework for integration of the subsystems HMIs and enabling access to any subsystem from any console. As a result of the Safran-selected mast-mounted optronic sensors, which technology eliminates a hull-penetrating periscope, an efficient arrangement is achieved with the control room located in the bow, equipped with a total of eleven MFCs in a U-shaped configuration (including a centrally-mounted console for the officer of the watch), large screen display and navigation platform control and SCMS consoles. The A26 open-platform's comprehensive and advanced network-centric communication suite is managed from the control room MFCs (instead from a separate room as in earlier RSwN's platforms) due to the Saab-provided TACTICALL integrated system (ICS) managing all platform's internal and external communications. The TACTICALL collects all communication media and simplifies communication tasks in daily operations as well as in critical situations.

## A Technological Frontrunner

The third ASTUTE class SSN HMS ARTFUL commissioned in 2016 has been the first platform to feature the latest submarine Common Combat System (CCS) in the Royal Navy. The latter has been developed in a partnership between the UK MoD's Equipment and Support (DE&S) organisation, BAE Systems and other first- and second-tier suppliers - including Thales UK in 14 months using COTS technology and open systems architecture. The joint team produced a common open architecture, which removed functional duplication where possible and used COTS and open standards to produce a design that is significantly cheaper than if it was designed in the 'traditional manner'. According to DE&S, the key to the design methodology used was to separate the hardware from

Photo: Naval Group



**To be delivered in 2020, the SUFFREN SSN will be the first SYCOBS-equipped platform with Safran non-penetrating masts allowing to optimise the location of the control room.**

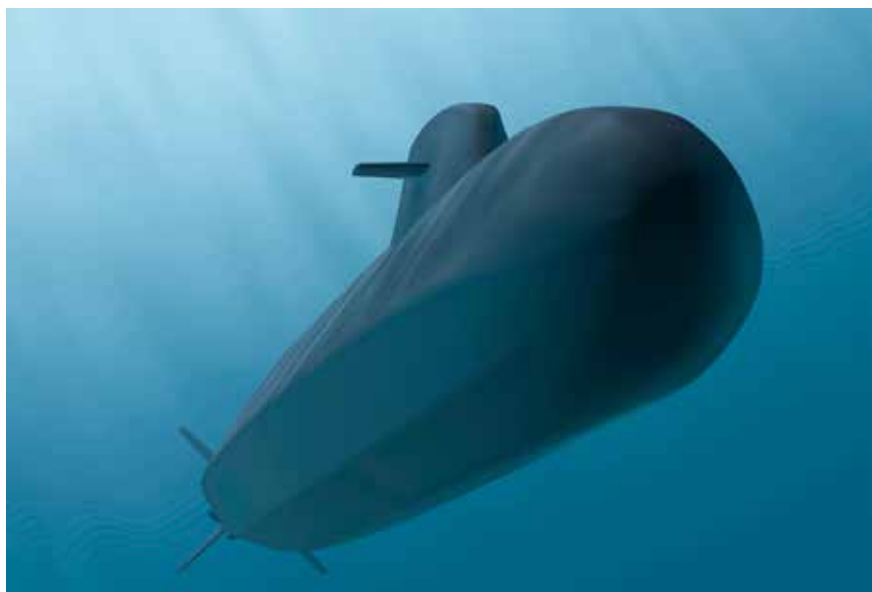


Photo: tkMS

**Commission of first 212CD platform for the Royal Norwegian Navy is set for 2026.**

the software, thus avoiding expensive upgrades as hardware becomes obsolete. Previous activities and programmes were unified into the Common Combat System (CCS) design evolution programme. Initially developed for the final ASTUTE class boat, the CCS version 3 (CCSv3) has been brought forward in the programme due to the early success of the prototype system. The core of CCSv3 is a bank of COTS servers in a Shared Computing Environment (SCE). According to DE & S, due to the processing power available through these servers, fewer units were needed to support application software, meaning less space was required for the legacy systems. In addition to introducing COTS, the team also addressed the challenge of migrating the combat system to a more open architecture to reduce whole-life costs of ownership. A key element of the new system was the introduction of a virtualised environment that would enable software developed for various different operating systems and hardware to all be run in the same shared computing environment. The CCSv3 was developed by DE&S and BAE Systems as system designers and Babcock Marine as the support integrator. Dell provided the hardware based on Power-Edge COTS server technology while Aish Technologies developed and provided the 'Common Enclosure' cabinet designed to protect the shared computing equipment in harsh environments and also save space on-board. The VMWare company provides the virtualisation product. A further development was the introduction of MFCs, boosting operational versatility as the latter are capable of being utilised for any sub-systems. Following on from the ARTFUL

platform, the CCSv3 was refitted to earlier in-service, introduced to the new-build ASTUTE class submarines and are planned to equip the VANGUARD class SSBNs during the life-extension programme and future replacement platforms under the Dreadnought Programme.

### Joint Development at the Heart

In April 2016, Naval Group was selected as Platform Systems Integrator for the Australian MoD's SEA 1000 Future Submarine Programme to design the platform for the Australian Navy's ATTACK class, offering the conventional SHORTFIN BARRACUDA variant. The Submarine Design Contract for the SEA 1000 Programme for 12 new platforms and life-management support for more than US\$50Bn was signed in March 2019. Key strategic requirements



Photo: Saab Kockums

**The Saab Kockums A26 submarine control room**



Photo: Saab Kockums

**Saab Kockums A26 submarine in the Oceanic Extended Range version is being proposed with Damen for The Netherlands submarine procurement programme.**



for the Future Submarine have been indicated in a range and endurance similar to the COLLINS class platforms in-service with the Royal Australian Navy (RAN), stealth and sensor performance superior to the COLLINS class and a combat system based on upgraded versions of AN/BYG-1 combat system and the Mk 48 heavy-weight torpedo, both already installed on board the COLLINS class platforms.

This programme seeks to ensure that the Australian industrial capability necessary to support the build and operation of the future submarine is established. This will involve maximising the involvement of Australian industry in all phases of the programme without compromising capability, cost or time frame. The design of the future submarine has already commenced, with construction due to begin in 2022-23 at the Submarine Construction Yard, Osborne, South Australia. The first future submarine named HMAS ATTACK is expected to enter service in the early 2030's with construction of the last submarine anticipated in the 2050s with sustainment continuing until the 2080s. Lockheed Martin Australia (LMA) was selected as the Future Submarine Combat System Integrator in September 2016 and the Design Build and Integration Contract was signed in January 2018. LMA will supply the AN/BYG-1 combat control system (CCS), which provides an open-architecture submarine combat control system for analysing and tracking submarine and surface-ship contacts, providing situational awareness as well as the capability to target and employ unspecified missiles and Mk 48 torpedoes. Both the latter and the AN/BYG-1 combat control system are two Armaments Cooperative Programmes (ACP) between the Australian and the US Departments of Defence, and renegotiations for follow-on Memorandums of Understanding are ongoing for the fiscal period 2020-34. According to the US



Photo: BAE Systems

**A new iteration of Common Combat System (CCS) is planned to equip the VANGUARD SSBN during the life-extension programme.**



Photo: UK MoD

**The future VANGUARD replacement under the DREADNOUGHT programme**

Photo: Australian MoD



**The COLLINS class submarine control room before AN/BYG-1 installation**

Navy, the AN/BYG-1 CCS ACP agreement provides significant R&D, production and sustained savings for both the RAN and the US Navy. The US Navy added that the joint development of AN/BYG-1 has produced rapid innovation and increased capability for both navies, while allowing for better cooperation and strengthened alliances in support of National Maritime Defence. Cooperation extends to both in-service modernisations and the common development of new construction platform combat systems. Currently, the AN/BYG-1 and CBASS (Common Broadband Advanced Sonar System) Mk 48 torpedoes are on all six RAN COLLINS class submarines, all US Navy attack (SSN) and guided missile submarines (SSGN) and are being installed on fleet ballistic missile submarines (SSBN). Lockheed Martin has also been technological partner of Navantia group for the S-80 Plus Core Combat System Programme involving mainly SAES company.



# The Royal Netherlands Navy's Submarine Replacement Programme

Jaime Karremann

Six years after the Netherlands' Ministry of Defence first announced plans to replace the WALRUS Class submarines of the Royal Netherlands Navy (RNLN), a replacement programme seems to be coming into view. At least, on paper.

It is expected that, at the time this issue is going to print, the Dutch MoD will have provided more clarity about which shipyard or shipyards will proceed to the next round. While this article is being written, there is still fierce competition going on. Four international shipbuilders are competing, and at least one of the contenders will be eliminated in the coming weeks. However, it is also possible that the decision will be postponed again, because even though the replacement of the WALRUS Class is still in its early stages, its course has known many plot twists already.

Photo: Naval Group



## Replacement of Ageing Submarines

The RNLN has four diesel-electric submarines. They were designed by the Royal Netherlands Navy in collaboration with Nevesbu and built by the Rotterdamsche Droogdok Maatschappij (RDM). Construction started in the late 1970s, with the first commissioned in 1989. That delay was partly due to a major fire aboard the WALRUS during its construction, but was mainly caused by delays due to the high degree of automation and changing demands of the Navy.

In 2013, the much needed replacement of the four submarines was mentioned in public for the first time. Despite the upkeep programme they are currently undergoing, the WALRUS class boats are approaching the end of their service life.

## The Four

The RDM, builder of the three generations of Dutch submarines and builder of

***The French bid from Naval Group is believed to be based on the 5,300 t SUFFREN Class nuclear submarines, six of which are currently building for the French Navy. The class is frequently referred to as BARRACUDA Class, but BARRACUDA is the designation of the development programme comprising the French and the (conventional) Australian ATTACK Class.***

the Taiwanese HAI LUNG Class, has gone bankrupt due to the absence of orders from the Dutch Government. For the first time in Dutch history, new Dutch submarines are being developed and built in collaboration with foreign shipyards. Four shipyards (or combinations of those) have shown interest in the development of new Dutch submarines. These are Naval Group from France, Navantia from Spain, the Swedish-Dutch combination Saab-Damen and tkMS from Germany. Those four have been involved in the tender since 2016, although Navantia did not publicly announce its participation through a press release until March 2019. Several journalists were surprised, but Navantia's participation is not a strange move. Despite its great successes with the sale of LHDs and frigates to Australia and an LHD to Turkey, Navantia is not known for its submarine achievements. The new Spanish submarine, the S-80, turned out to be too

heavy to submerge without restrictions. That, and problems with the development of the new Air-Independent Propulsion (AIP) system, resulted in a delay of eleven years and a huge increase in costs.

According to Navantia, however, the problems have been resolved and the shipyard says it has learned valuable lessons that will benefit future customers. Participation in the Dutch programme is not surprising, because the S-80 PLUS has similarities to the WALRUS Class in terms of size and range (as far as known). Navantia also claims it is the only shipyard that is already building a submarine that meets the Dutch requirements. Therefore, it offers an S-80 PLUS Batch II, which, although adapted to Dutch requirements, offers many similarities. This allows Spain to quickly offer the Netherlands an affordable submarine and to form a family with a total of eight submarines. There are also great opportunities for Spain itself, as it turned out during a visit to Navan-

## Author

**Jaime Karremann** is the Editor-in-Chief of the Dutch naval website [marineschepen.nl](http://marineschepen.nl).

tia in Cartagena in December 2018. Taking advantage of export achievements it might become possible to start the development of the S-90 Class submarines.

The other shipyards offer custom designs, if not new designs. Together with Nor-

the design, so there is more room for fuel and crew members, for example. It is known that the Dutch Submarine Service prefers a submarine with at least two compartments and sufficient comfort for crew members during long deployments.

It also wants to take additional crew on board, like special forces and personnel from the operational

The concept submarine from Saab-Damen has a displacement of 2900 tons and a length of 73 metres, with room for 34 to 42 crew members.

Naval Group wants to build a submarine based on the new French nuclear submarines of the Barracuda class, a little sister of the Shortfin Barracuda for Australia. Little is known about the plans of the French.



**The "Expeditionary Submarine" design constitutes the joint bid from Damen Schelde Naval Shipbuilding (DSNS) and Saab Kockums, featuring an air-independent propulsion system based on the Stirling engine technology.**

way, tkMS is currently developing the Type 212CD for the German and Norwegian navies.

The Type 212CD followed the Type 212NG (Next Generation), a design by tkMS for the German Navy. In turn, the NG was derived from the Type 212A and the Type 214. When Norway joined the programme, the requirements were merged into a new design: Type 212 Common Design. Not much has been disclosed about these submarines, ex-

branch, to analyse information on board. Saab-Damen has to enlarge an existing design as well. The basis is formed by the A26 submarine, of which Saab Kockums is currently building two for Sweden. Since 2015, the Swedish shipyard has been working on submarines with the Dutch shipyard Damen Schelde Naval Shipbuilding. De Schelde built submarines for the Dutch Navy from 1906 to 1940, but has been focused on surface ships since 1945. In 2000, De Schelde

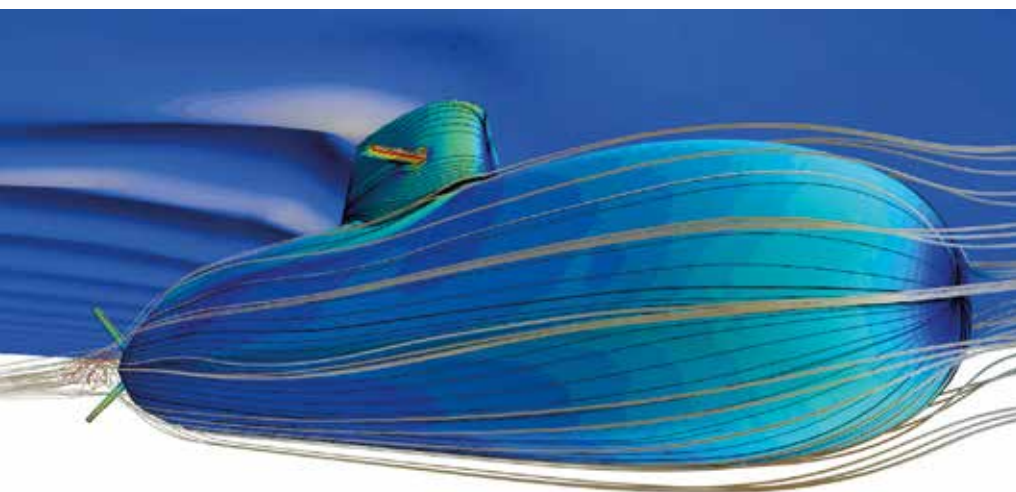
## Operations in Remote Theatres

The fact that the Netherlands itself can no longer build submarines does not mean that all submarine expertise in the Netherlands has disappeared. Dutch companies which have worked on submarines are united in the Dutch Underwater Knowledge Center (DUKC). They even have recent experience with designing and testing of foreign submarines.

The Royal Netherlands Navy attaches great value to that knowledge and experience, since the Dutch way of operating is different from that of many countries with diesel-electric submarines. Just like Australia and Canada, the Dutch submarine service often operates far away from home.

As the book *In Deepest Secrecy: Dutch Submarine Espionage Operations from 1968 to 1991*, made public, Dutch submarines were mainly active in the Norwegian Sea and the Mediterranean Sea during the Cold War. Those patrols often lasted for six weeks. The experience with long-distance patrols, which arose from the need for submarines in the former Dutch East Indies and later the need for diesel-electric submarines in European waters after the Second World War, is cherished by the RNLN.

Less is known about the deployment of Dutch submarines after the Cold War, but it is certain that the WALRUS Class was deployed quite frequently. Those deployments also took place in areas many thousands of kilometres from the Den Helder home port. For example, a WALRUS Class submarine was tasked with gathering intelligence about the Iranian Navy in the Persian Gulf, another one with intelligence collection about pirates in the Indian Ocean and during another deployment included an intelligence mission about drug transports in the Caribbean.



**With the Type 212CD (Common Design) Norway and Germany have decided on the joint development and procurement of their next generation submarines. Compared to the Type 212A innovations include a significantly longer range, the use of lithium-ion batteries in combination with a fuel cell AIP and, subject to confirmation, the integration of the IDAS submarine-launched missile system against surface, land and air targets.**

cept that their displacement is 2400 tons and their hulls are made of amagnetic steel. However, the Type 212CD does not meet the maximum requirements and tkMS says it is prepared to enlarge

was taken over by the largest shipyard in the Netherlands and when the replacement of the submarines came in sight, founder Kommer Damen said he also wanted to build submarines.

## Plot Twists

Despite frequent deployments of WALRUS Class submarines, their replacement was uncertain for a long time. Around the year 2000, several Dutch govern-



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ments were about to abolish the submarine service, since critics, like the current Vice-President of the European Commission Frans Timmermans, thought submarines were a relic from the Cold War. Considering the submarines' planned maximum service life of between 25 and 30

and it was clear what she wanted:

1. New submarines and
2. Submarines able to perform the same tasks as the WALRUS class.

The submarine replacement project started very slowly. Nothing was made public about plans to buy submarines together



Picture: Navantia

**Navantia is proposing a modified S80 PLUS design with local Dutch content. With a displacement of about 3,000 tonnes, similar to that of the WALRUS Class, the shipyard asserts that the reference design is already fully compliant with Dutch requirements, including growth potential.**

years, the Dutch Government should have started the replacement around 2004, but those were times of unprecedented cut-backs. In 2013, for the first time and very carefully, the Government talked openly about replacing the WALRUS Class.

At the time, cooperation with other countries turned out to be necessary. Among other things, the Submarine Service preferred to see a WALRUS 2.0, in other words, a modern variant of the current submarine. Others already talked about a collaboration with Germany, but in 2014, the Minister of Defence Jeanine Hennis excluded that option.

Not much later, it became known that Damen and Saab were going to work together on submarines. That was a big surprise for the Ministry of Defence, which was not amused, since Minister Hennis had planned to link Damen to the most suitable foreign candidate.

The talks with Germany were resumed and behind the scenes the idea of one type of submarine for Germany, Norway and the Netherlands arose. In the meantime, Hennis had been asked by the Lower House to write a vision for the future of the Submarine Service. Hennis finished it in June 2015

with Germany and Norway. A year after Hennis' vision for the future of the submarine service, the A-letter from the project was published. That happened at the end of the first phase of the replacement, the A-Phase. The last phase in Dutch military projects is the D-Phase.

The A-Letter was sent in July 2016, but the minister was no longer as clear in that letter as she had been in earlier publications. She introduced four options: a replacement either by similar submarines, drones, systems other than submarines (such as the F-35), or smaller submarines. Many were surprised, because the Lower House was already supportive of a replacement by similar submarines.

Nevertheless, Hennis wanted the four options to be examined and so the B-Phase, the research phase, started. RFIs from shipyards were also part of that phase. By the end of 2018, the B-Phase was completed with the B-Letter.

Meanwhile, the talks between Norway, Germany and the Netherlands continued and during that autumn, there were rumours in the Netherlands that the German submarine design was selected: the Type 212CD from tkMS. But, the formal

tender was also continued and after the House of Representatives approved the replacement in the spring of 2017, companies were invited for the first time to present themselves.

Behind the scenes there was much discussion between Germany and Norway. The Dutch Type 212CD was almost there, but it was not possible to get all parties on the same wavelength. In March 2018, the negotiations came to a standstill.

Until that time, tkMS had been the preferred contender, supported by the desire of German and Dutch politicians to operate submarines together. After negotiations came to a standstill, it was Saab-Damen that became number one on the list, especially after the Defence Industry Strategy was published in November, which stated that the Ministry of Defence would from now on prefer Dutch industry.

## B-Letter

The shipyard or shipyards shortlisted by the MoD were to be announced in the B-Letter. However, the publication of that letter was postponed a few times. First, the letter was expected at the end of 2018, then mid-February, then March and now April.

As time went on, the contenders increased pressure on Saab-Damen. Only Navantia was still convinced of its participation in the next round at the end of 2018. Naval Group and tkMS made themselves heard.

The German shipyard tkMS did so by announcing that it wanted to fully adapt the Type 212CD to Dutch requirements, at the expense of the commonality with the German and Norwegian submarines. It also offered to build the submarines at the maintenance site of the Royal Netherlands Navy in Den Helder and to fully transfer the intellectual property for the Dutch submarines.

Naval Group publicly announced a collaboration with Royal IHC, a Dutch shipyard that specialises in dredging vessels.

## The Winner

In the meantime, the MoD really took its time to make the choice for the B-Letter. The objective was not to compare the contenders from a technical perspective, since it is expected that the Dutch Defence Material Organization (DMO) already had a preference on technical grounds back in the autumn of 2018. Rather, it was mainly a political issue, the result of the political and diplomatic pressure on The Hague.



This became even more difficult after the Netherlands had bought shares from Air France - KLM, unannounced. Since the Dutch airline had been taken over by Air France, France had more shares than the Netherlands. However, for a while, there had been a disagreement between the Netherlands and France about the airline and when the Netherlands bought shares, so it would have the same number as France, Paris was not pleased. According to sources, the resulting diplomatic pressure benefited Naval Group in this phase of the WALRUS replacement. Although it is expected that the Dutch MoD has a preference for Saab-Damen's offer, such events may still have an effect on the outcome. After all, none of the parties has the perfect offer.

As the contenders often point out, Saab-Damen is the least experienced candidate. Kockums built the COLLINS class for Australia in the 90s, but was only involved in modernisation projects until the construction of the new A26 started. Damen has no recent submarine experience at all. The problems with the COLLINS class are not a good advertisement for Saab Kockums, either. A big advantage of this combination, though, is that Damen is well acquainted with the Dutch

Navy, its culture and its way of operating. Damen has brought in many experienced Dutch submariners and Saab and Damen have already had four years to get to know each other.

Submarines are continually built by tkMS, either in Germany or in the customer's country. Nevertheless, without the support of the German-Norwegian-Dutch deal, it is very difficult for tkMS to win. The Dutch submarine service does not want the 212CD, and tkMS does not have much experience with what the Dutch actually want. Insiders know that tkMS builds decent submarines, but they fear their bureaucracy and their sometimes rigid attitude during the design phase. Also, the German Navy itself is not experienced in operating at a great distance from its home port; the German submarine service operates the Type 212A, which is designed for the Baltic. The fact that the new submarines of the German Navy recently faced problems is not in support of tkMS' bid, either.

The collaboration with the large Naval Group is feared as well, certainly because the Dutch submarines are much less important to Naval Group than to the other parties. The expectation is that the small Dutch DMO will not be able to leave

its mark on the design. Nobody worries about the quality of the submarines, but people do worry about the price.

A cooperation between Spanish Navantia and the Netherlands would work just fine. In the 1990s, both countries jointly designed an LPD and a replenishment ship, after which the ships were built in Spain and the Netherlands. The design of the S-80 PLUS, however, seems to be limiting and not fitting with the way the Netherlands operates its submarines.

Yet, a strong cooperation is important, because none of the shipbuilders have a submarine design which is ready to be used without modification. Eventually, a new design will have to be made.

This also leads to criticism from the shipyards. Although the Netherlands has apparently abandoned its past demand for a military off-the-shelf submarine and has accepted new designs, more information about the requirements has not yet been released.

Still, the Netherlands already wants a new submarine to replace the WALRUS class in 2027. That seems unfeasible. In any case, it starts with the B-Letter, which hopefully will have been published by the time this issue has.



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# The Norwegian 'One-Stop Shop' Support Ship: the HNoMS MAUD

**Guy Toremans**

**The Norwegian fleet has commissioned one of the most modern supply vessels to date.**

With a length of 183 metres and a full load displacement of some 27,500 tonnes, HNoMS MAUD is the largest warship yet in the Royal Norwegian Navy (RNoN). The vessel is divided into 14 water- and gastight compartments and features

NATO, such as the NH90, EH-101 MERLIN and even CH-47 CHINOOK or CH-53D SEA STALLION helicopters, while the 180 sqm hangar can house an NH90 and provide full Level 2 maintenance for the embarked helicopters.

As for her cargo capacity, HNoMS MAUD is able to transport 7,125 tonnes of F-75/F-76 diesel fuel for ships, 317 tonnes of F-44 AVCAT, 48 tonnes of lubrication oil, 273 tonnes of fresh water, 15 tonnes of cargo gear oil, 216 tonnes of ballast water/fuel, 200 tonnes of ammunition in dedicated cargo magazines and 70.5 cubic metres of food supplies, spare parts, and there are also tanks for the disposal of sewage and waste (15 tonnes of cargo gear oil, 77 tonnes of cargo sludge, 53 tonnes cargo waste oil, 34 tonnes black water, 117 tonnes of grey water) and up to 216 tonnes ballast water/fuel. The HNoMS MAUD also comes with an anti-pollution capability with oil-spill preparedness with a tank capacity for up to 77 tons of sludge. Additionally, she can embark up to 40 twenty-foot equivalent unit (TEU) containers and features 450 lane metres on her weather decks for up to 30 large trucks or main battle tanks. For the transfer of all these liquid and solid materials at sea, the ship mounts two Bosch Rexroth replenishment-at-sea (RAS) rigs featuring heavy and light jackstays and a stern-to-bow station for transfer of liquids/fuel. Vertical replenishment (VERTREP) can be conducted by helicopters. This layout allows the transfer of two different liquids with two vessels simultaneously and being ready for astern refuelling or helicopter-in-flight refuelling. It is noteworthy that almost all RAS units are installed below deck to be protected from the weather, and both the RAS areas and the units are equipped with de-icing systems. For the support of the RNoN's NANSEN class frigates it was necessary to step up the revolution in stores management, with a palletised cargo handling system and a method of quickly transferring heavier loads of liquid and stores. The amount of stores that can be transferred per single load varies between 2 and 5 tonnes, with a rate of 25 loads per hour. The ship's medical facilities and functionality were also subjected to a lot of design effort: HNoMS MAUD accommodates an extensive hospital infrastructure, allowing her

Photos: RNoN



**Signing the handover of HNoMS MAUD.**

four damage control zones and three damage control stations. Fire fighting systems an automatic water spraying and sprinkling systems, carbon dioxide and foam extinguishing systems as well as an NBC-system. The ship is monitored and controlled by a ServoWatch Systems Ltd. integrated platform management system (IPMS), and it is equipped with an L-3 VALMARINE integrated bridge system (IBS) and an integrated communications suite (ICS).

The ship's flight deck is designed to operate all naval helicopters currently in service with

HNoMS MAUD's propulsion consists of a combined diesel electric or diesel (COD-LOD) hybrid system, made up of two Wärtsilä 6L46F diesel engines, two GE Power Conversion VDM25000 generator sets, a GE secondary generator, two gearboxes, two shafts, two four-bladed controllable pitch propellers (CPP), one azimuthing bow thruster and two Simplex Compact S400 retractable stabiliser fins. This configuration, giving the ship a speed of 18 kn and a range of 10,000 NM at 16 kn, offers a high degree of flexibility to match the wide range of modes and environments within which the ship is expected to operate. She will be able to operate in seas up to Sea State 9 and conduct unrestricted replenishment-at-sea (RAS) evolutions and helicopter operations up to Sea State 5.

## Author

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to act in NATO Role 1, extendable to Role 2, and to carry out lifesaving surgery. Medical facilities include two operating theatres, a six-bed intensive care unit, a sick-bay with 48 beds, several treatment rooms, a CT-scanner, a dental surgery, a laboratory and a diving recompression chamber. The hospital facilities are designed for easy flow of patients from flight deck to the triage room. The flight deck and triage area are on the same deck and located just above the hospital. The patients descend from there by lift to the operating room or CT room before moving to intensive care or to the wards. An interesting feature is the dual role of the ship's aft end. During normal operations, it houses the officers' lounge and spare officers' cabins. When needed, this lounge converts into a high-dependency ward. All beds and equipment are stored ready behind screens in the lounge.

Operated by a core crew of 50, HNoMS MAUD can accommodate an additional 116 persons. Berthing arrangements include 46 single cabins, 20 twin-bedded cabins for enlisted personnel and 10 four-bedded cabins for conscripts. As soon as Project 2513 was approved, the RNoN appointed the core crew, made up of officers, petty officers and enlisted personnel, all coming from the former HNoMS VALKYRIEN, HORTEN and TYR auxiliary vessels; they were then sent for on-the-job training on board the French oiler FS SOMME, the Dutch HNLMS AMSTERDAM, the RFA WAVEKNIGHT, the USNS ROBERT E. PEARY land-based as well as to the Royal Navy's land-based replenishment-at-sea training facility at HMS RALEIGH in Plymouth. The navy is also exploring how the similarity between HNoMS MAUD and the RFA's TIDE class tankers may offer scope for



*HNoMS MAUD during her sea trials in South Korean waters.*

cooperation with regard to in-service support and training HNoMS MAUD's crew at the shore-based RAS rigs at HMS RALEIGH in Cornwall.

Prior to sailing to the DSME Shipyard in Okpo, HNoMS MAUD is being subjected to a comprehensive set of harbour acceptance trials (HATs) and sea acceptance trials (SATs) to be sure she complies with the 2,300 technical specifications outlined by NDLO. Once pierside testing is completed, the ship undergoes a four-week SAT period covering all aspects of the propulsion system, basic hull and machinery issues, as well as the platform's stability in order to be sure that she is ready for the long voyage home. Upon her arrival in Norway, HNoMS MAUD will be outfitted with her military equipment, understood to be four 12.7mm Kongsberg SEA PROTECTOR guns, and a Saab

military communications suite that covers VLF, LF, HF, VHF, UHF, SHF, UHF/SHF Satcom, Inmarsat and GMDSS (Global Maritime Distress and Safety System) and Link-11 in order to offer an extensive communication capability for worldwide and joint operations and to act as a command platform. Once outfitting is finished, the ship will commence her Norwegian Navy sea acceptance trials (NORSATS); validating the communication and weapon systems as well as her RAS equipment is crucial. Once these SATs are completed, the crew will then take the ship through an intensive work-up period culminating with a five-week FOST period.

HNoMS MAUD will then be able to deploy on worldwide operations and remain on station for up to 30 days without replenishment. Her primary role will be to provide logistic support to the Norwegian Navy's Task Group. Thanks to her adequate logistic support capabilities and long endurance, the ship will prolong the NANSEN class frigates' endurance from about 21 days to approximately 45 days. Asked to compare HNoMS MAUD with the Royal Fleet Auxiliary's TIDE class and the German Navy's BERLIN class, the ship's commanding officer Commander Thorvald Dahll said that "whereas the RFA's 37,000-tonne TIDE class units will be primarily used as tankers to resupply the Royal Navy's new carriers, we will use HNoMS MAUD as a multifunctional support ship. As for the German BERLIN class units, they are quite comparable to our ship as they also carry fuel, provisions, ammunition, as well as provide medical services. HNoMS MAUD is an example of a single platform capable of undertaking a multitude of missions, even missions that have not yet been thought of." ■



*An officer's cabin.*



# Beefing Up NATO's Artillery

**Tim Guest**

**Upgraded systems, the latest ammunition technologies and bolstering neglected battalions with the 'newest' artillery assets they've had in years is the order of the day across an Alliance chasing to catch up in the face of an increasingly unpredictable geopolitical status quo – both in Europe and globally.**

NATO is facing perhaps the most challenging period in its existence following a protracted period of seeming good will since the first Cold War ended. Distracted by the war on terror – one, it seemed,

to produce latest systems and thinking capable of defending Alliance eastern flanks and members, should the need arise. The following article takes a brief look at some of the developments going on beyond

take steps necessary to ensure the credibility and effectiveness of the NATO's overall deterrence and defence posture. Well, the 9M729 is just the tip of a military industrial complex output that's been busy bolstering and delivering quantity and quality into the armed forces of NATO's old adversary.

End 2018 announcements from the Russian MoD that 2019 would see upgrades to several artillery systems in its inventory are just some of the latest moves from the east that need NATO's attention. Russian airborne forces are reported to be expecting to take delivery of the 2S42 LOTOS 120mm self-propelled (SP) gun and the ZAVET-D artillery fire control vehicle (replacing the 1B119 RHEOSTAT), once final state trials have been completed of these new systems later this year. The ZAVET-D is said to be a comprehensive redesign that will phase out the 1B119 and replace it as the force's standard fire control vehicle for the foreseeable future. All of this is in line with the Russian airborne forces' continued expansion of its artillery resources.

The core of the ZAVET-D is based on the BTR-MD RAKUSHA transport vehicle. High-performance, digital technologies and the latest communications and radar systems are said to make the vehicle ideal for detecting camouflaged enemy armour, including counter-battery targets, and directing own artillery assets onto such positions. Onboard systems can also control drones used for forward reconnaissance. The new fire control vehicle and its fullest capabilities are aimed at optimising the punch delivered from Russia's latest artillery systems, including the LOTOS 120mm. The latter is a spin-off of the ZAURALETS-D 152mm, which, using a latest BMD-4 chassis, was a replacement for the earlier lightweight, SP and air-droppable 2S9 NONA 120mm gun-mortar, which entered service in the former Soviet Union in 1981. The new LOTOS is expected to have greater range than the ZAURALETS-D and use precision-guided ammunition. These two systems are expected to be deployed into both high- and low-intensity scenarios and follow recent Russian artillery developments including the 1B75 PENICILLIN ad-



Photo: KMW

**The German-made PzH 2000 has a range of some 40 km and high rate of fire.**

with which its old adversary to the east was also preoccupied – the Alliance let its guard down, while it appears our 'friends' in the east didn't. Now, with many of its pre-war-on-terror assets, including much artillery, ageing, scrapped or in mothballs and traditional massed battlefield tactics little taught in recent years, the time is well overdue for most NATO members to bolster and upgrade their artillery resources and in-

NATO's borders, along with moves by various Alliance members to bring their artillery assets up to speed.

## Threatening Developments

If the Crimean and Ukrainian crises are not enough of an incentive to bolster and update Alliance forces, then the continuing failure of Russia to comply with the Intermediate-Range Nuclear Forces (INF) Treaty underpins the need without doubt. NATO and its allies stated last December that Russia had developed and fielded the 9M729 cruise missile system, that it violates the INF Treaty and poses "significant risks to Euro-Atlantic security". Then, at the start of February this year, the Alliance said Russia was continuing "to deny its INF Treaty violation" and refused to provide any credible response, or take any demonstrable steps toward returning to full and verifiable compliance. In a statement, the Alliance added that it would continue to

## Author

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vanced artillery recon system and the 2S41 DROK 82mm self-propelled mortar carrier. The 1B75 uses acoustic waves and thermal imaging to detect active enemy artillery, which it is reported to be able to do in as little as five seconds. Trials of the PENICILLIN system completed late last year and the first units are slated for delivery in 2020.

This is just the tip of a resurgent Russian defence materiel iceberg in which tube and rocket artillery upgrades and new developments lend urgency to the Alliance's moves to bolster and upgrade its systems and forces.

erability with NATO allies so that Bulgarian artillery can be employed to maximum effect and efficiency as part of 'Team NATO'. Interoperability is also on the agenda for the Czech Army, which is also currently undertaking an artillery modernisation programme that will include the procurement of 155mm self-propelled howitzers interoperable within the Alliance, as well as 120mm turreted SP mortar systems. The latter is expected to be up for tender in 2021. At Eurosatory 2018, a prototype of the upgraded BM-21 GRAD system was shown as part of the Czech company Excalibur Army;

along with its armoured cab that supports a crew of three, the new BM-21 MT multiple rocket launcher (MRL) sits on a 4x4 Tatra chassis that replaces the previous Ural Truck chassis. Volley or single-round missions can be conducted either from the confines of the cab, or from a remote firing position, with the fully operational system able to fire 40 HE 122mm rockets in 20 seconds out to a range of approximately 40 km. With the Czech defence ministry considering an MRL procurement beyond 2025, this is certainly a contender. As for the procurement of 155mm SP guns, this is expected in the

## Overall Strategies

Across the Alliance, interoperability is one of the crucial needs being addressed; with regards to artillery, many legacy artillery systems of differing calibres and technologies still exist, but are unsuited to sharing full logistics and ammunition. Being able to operate together and deploy artillery fire support systems against an enemy in a multinational environment are key to the future security of Europe and are high on the agenda of Alliance members, which are bolstering and upgrading their artillery resources at this time. "NATO-compliant" is terminology now firmly entrenched in any discussions of upgrade, whether in relation to howitzers, munitions, counter-battery radar, or UAS solutions for forward observation/target identification. In terms of munitions, precision fire support is an area of focus – members must be able to continue delivering precision fires even in GPS-denied environments, and the adoption and use of non-GPS-reliant precision-guided smart munitions will enable this to happen. Members considering new systems and system upgrades are also addressing the need to shorten the decision-making circle and kill-chain using networked, software-intensive fire control systems and system upgrades.

## Upgrades around the Alliance

The Bulgarian Land Forces are currently looking at planned indirect fires capabilities and how best to achieve full operational interoperability



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Photo: US DoD / Gertrud Zach



**The US Army PALADIN SP gun will receive the new M109A7 chassis and an upgraded turret with an increased bore length of 29 feet instead of 20 to be able to fire extended-range ammo.**

2020–2022 timeframe; this will equip two artillery regiments of potentially six batteries of eight guns each, though an overall total of 52 systems is likely. Contenders are likely to be 8x8 wheeled SP systems that have automatic or semi-automatic loading systems to enable high rates of fire, as well as platforms that are able to carry 30+ round payloads.

Finland is also considering revitalising its SP rocket artillery, with the FDF looking to equip all its truck-mounted BM-21 SP systems with smart munitions. The FDF is currently working with the US exploring a potential 500 km-range, rocket-launched capability. The force sees cost sharing within NATO and its allies as essential in ensuring that MLRS users across the Alliance all have precision munitions such as EXCALIBUR; this would help bolster the effectiveness of the Alliance as a cohesive force.

## Made in Germany

Lithuania has had the upgrade and modernisation of its artillery in its sights for some time. Under the Land Combat Vehicles Support Partnership of the NATO Support and Procurement Agency (NSPA) it joined the 155mm 52-calibre SP PzH (Panzerhaubitze) 2000 howitzer user project in October 2016. The Lithuanian Government had already signed a €58.3M contract with the German armament procurement organisation, the Bundesamt für Ausrüstung, Informationstechnik und Nutzung der Bundeswehr (BAAINBw) a year earlier, in September 2015, for the procurement of a total of 21 PzH 2000s. These were previously used by the German Army and as well as having a

range of some 40 km and high rates of fire; ammunition is fully compatible with NATO standard 155mm shells and charges.

The first two guns arrived in Lithuania direct from the German Army in mid-2016 to enable training on the howitzers to begin. Then in early 2017, the NSPA awarded a €10.5M contract to Krauss-Maffei Wegmann (KMW) on behalf of the Lithuanian Ministry of National Defence to upgrade the whole of Lithuania's latest SP guns. That work has been undertaken under the German Army's retrofit programme for the PzH 2000, which includes the installation of a Wideband Intercom & Secure Packet Radio (WiSPR) intercommunication system, as well as modernisation of the

electronics and ventilation system. In addition, an automatic ammunition loading system will be installed as part of this mid-life update, allowing the high rates of fire mentioned earlier. The newly upgraded 155mm gun will enable the Lithuanian artillery to surpass the previously restricted ranges of the M101 towed 105mm gun, which has a maximum range of 11.25 km. Improvements in armour and sensors, including night vision equipment, are also understood to be part of the upgrade. Delivery of the first two upgraded guns took place in early December last year and were delivered to the General Romualdas Giedraitis Artillery Battalion of Lithuania's Iron Wolf Mechanised Infantry Brigade, based in Rukla. Eventually, 16 upgraded guns will be used operationally, with two for training and three of the original 21 kept for spares.

Relevant to the upgrade of Lithuania's artillery capability and also announced in December 2018, Lithuania's Ministry of National Defence said that Germany's Flensburg Fahrzeugbau Gesellschaft (FFG) had won a further tender from the NSPA for 22 upgraded M577 (M113 variant) armoured personnel carriers. These are to be used as command posts in support of the army's new and upgraded PzH2000s. Part of the upgrade work on the APCs is underway in Lithuania, sub-contracted by FFG to UAB Autokurtas. These are slated to be delivered to the General Romualdas Giedraitis Artillery Battalion in later 2019. In December 2018, Hungary ordered 24 newly built PzH 2000s from KMW to equip and modernise its artillery forces and deliver a degree of compatibility and interoperability with other NATO nations that will

Photo: US DoD / Staff Sgt. Alexander C Hemminger



**The range of the towed 155mm M777 has been doubled using an XM1113 rocket-assisted projectile (RAP).**



only strengthen the cohesive capabilities of 'Team NATO' in the uncertain years ahead.

## When the Thunder Comes

Another 155mm SP system being adopted by a number of NATO/allied countries to upgrade their forces' artillery assets is the South Korean K9 THUNDER. Estonia, Finland, Norway, Poland and Turkey have signed deals to adopt the system that will update their respective artillery battalions and deliver another helping of NATO-compatible consistency to the Alliance. The 155mm/52-calibre SP howitzer is expected to be in production for at least the next few years with maker Hanwha Land Systems (originally developed by Samsung Techwin). Of the five NATO and allied nations mentioned, Estonia and Finland will be taking delivery of 12 and 48 upgraded and refurbished systems, respectively, while Norway's Norwegian Defence Materiel Agency (NDMA), updating the country's artillery capabilities for the first time in some 50 years, has purchased 24 brand new systems. Poland, on the other hand, has purchased some 120 K9 hulls to support its KRAB 155mm/52-calibre turret, and Turkey has signed an agreement enabling it to build its own K9 version locally,



Photo: Tim Guest

**Nammo's ramjet round concept was unveiled at Eurosatory 2018.**

which is named the FIRTINA; 300 systems are expected to be built in Turkey.

While developed originally to increase the range and firepower of the South Korean artillery, which continued to be underpinned by M109A2 SP systems, the adoption of the K9 THUNDER by these

European/NATO players is for the exact same reasoning. Not only that, but the system's 155mm/52 calibre ordnance will update all these allied artilleries with a NATO-compatible 23-litre chamber. Once delivered, the new and upgraded systems will include onboard fire control

## Poland

As part of its US\$48.9bn army upgrade and modernisation plans, Poland signed a deal in February to acquire 20 Lockheed Martin HIMARS M142 launchers costing US\$414M. The Polish Armaments Group, with approval from the Ministry of National Defence, is working with Lockheed Martin to meet the full HIMARS requirement. 18 systems will be combat-ready and two used for training. Deliveries will complete in 2023. In late 2017, the US approved sales of related munitions to Poland, including 25 GMLRS missiles, 61 ATACMS missiles together with additional ancillary equipment. The new HIMARS will help bolster NATO's eastern flank defences.

The Polish Army also plans to upgrade its wheeled, SP 152mm DANA wz 77 howitzers to improve effectiveness and extend the systems' lifetime a further 25 years; work will be undertaken by the Polish PGZ Group. The changes are modular in concept and will include an upgraded drivetrain and cabin design and the possibility of an automated gun control system; this will compute firing solutions from target data from the existing FCS. Automation may also extend to ammunition selection and firing, with new inertial navigation and positioning systems directly located along the axis of the gun barrel to ensure accuracy. A new 7.5 kW auxiliary power unit for the turret is expected to replace reliance on the main engine that not only enable silent running operations, but will also reduce thermal signature and reduce wear and tear on the main engine systems. Engine upgrade and modifications will also deliver more power and an overall range improvement to 650 km. The gun's new cabin will improve crew ergonomics and situational awareness, with improvements including new seats, hatches and 360-degree observation system that includes exterior cameras. Electronic control modifications to the hydraulic system will see deployment times for the external hydraulic support drop from 70 seconds to just 27 for both deployment and retraction, speeding up both into-action and bugging-out timings to less than 30 seconds. Protection will be enhanced with the installation of a smoke grenade launcher.



Photo: US DoD

(further upgrades to the FCS may form part of a future improvement process) and terrestrial navigation capabilities. These will enable the SP gun to deploy to a firing position, carry out a fire mission and then bug out before enemy target-detection assets have a chance to locate and direct counter-battery fire onto the, already, empty position. Another future upgrade to the system that will enable onboard systems such as the FCS to run even when the main diesel engine is switched off, will be the installation of an auxiliary power unit.

The latest new, upgraded and variant K9s received by these armies will also have the ability to deliver multiple-round, simultaneous-impact fire missions for all these players. The upgraded system's automated loading mechanism will enable a three-round burst rate of fire in under 15 seconds, with a maximum sustained rate of fire of 6-8 rounds/minute for three minutes. Some Extended-Range Projectiles (ERPs) enable the K9 to reach a maximum range of 50 km; trials of the system with Nammo 155mm High-Explosive Extended Range (HE-ER) base-bleed projectiles fitted with a Northrop Grumman Armament Systems Precision Guidance Kit (PGK), took place in late 2018 at Yuma Proving Ground in the US. The round enables a 40 km range to be achieved. This is part of the US Army's intention to demonstrate projectiles that use ramjet technology; internal propellant ignites in flight, to deliver additional accel-

Photo: Nammo



**Nammo's new 155mm projectiles were tested in late 2018 at Yuma Proving Ground in the US.**

eration, and Nammo's base-bleed technology and rocket-assist projectiles are seen as the relevant solutions to meet this need. For Norway, upgrading its artillery has long been awaited; its still-in-service M109A3s have been in service since 1969, though upgraded during that time to the A3 variant. The K9 deal for US\$380M includes a variety of ammunition and also has a reserved option for a further 24 brand new K9 THUNDER systems. Initial trials are expected to begin this year once the first trial guns have arrived; deliveries of the bulk of the order are expected during 2020. The first of the Finnish K9 THUNDERS were delivered in early 2018. A total of 48 ex-Re-

public of Korea Army K9s were ordered by the Finnish Defence Forces (FDF); the deal included an option for further systems. As part of their upgrade and refurbishment, the Finnish K9s will be fitted with a battle management system, GPS, as well as intercoms and radios. One FDF spokesperson said last year that the tracked SP K9 THUNDER is viewed as an ideal solution for the defence of Finland; its mobility will keep pace with manoeuvre units and its ease of use ideally suited to the country's conscript army. The last of the vehicles destined to complete this stage of the FDF's 155mm artillery upgrade plans are expected to be delivered by 2024.

## Denmark

The Danish Defence Acquisition and Logistics Organization (DALO) awarded Nexter a contract for 15 8x8 CAESAR, 155mm wheeled self-propelled artillery systems in mid-2017, with an option six more systems. The 8x8 will help meet current and future Danish Army needs providing improved operational autonomy and a platform offering significant growth potential. With a 52-cal gun, CAESAR carries 36 rounds and has a range of 40+km and an achievable arc of fire of +/- 300 mils. As long as the stored ammunition is requested for a fire mission the platform's fully automatic loading system can load the gun without intervention from the 4-man crew. Three rounds can be fired in 45 seconds. Operational in-service date is expected during 2021. Denmark's new defence agreement 2018-2023 sees the Danish focusing on new guns for a 3rd artillery brigade and possibly of a new rocket system. Last year, DALO awarded a contract to Danish software company, Systematic, for the delivery of a new fire-support capability intended to reduce the sensor-to-shooter engagement cycle, enabling fire missions to be conducted swiftly, so the gun can bug out and redeploy before counter-battery fire can be brought down on the position. The new process enables fire mission data to be transferred digitally into the FCS and a fire mission to be carried out without human intervention for anything more than calculation verification.



Photo: NEXTER



## Excellent Results on More than 15 Different Howitzers

MSM has been active in the defence business for several years through its subsidiary ZVS. ZVS has been producing artillery ammunition for more than 80 years. Although production shifted from "eastern" to "western" calibres in the 2000s, since the acquisition of MSM, ZVS has increasingly focused on sales and development. During this time, ZVS has established itself as the leading manufacturer of 155mm ammunition and has concluded supply contracts for more than 30,000 rounds of 155mm ammunition in several European countries such as Slovakia, Cyprus, Poland, Latvia, Serbia and African and Asian countries. ZVS was also able to diversify its 155mm portfolio. While in the past ZVS only produced standard M107 and ER

shells with self-developed point detonating fuses, nowadays it can produce the Smoke and Illuminating version of 155mm as well as various types of filling of HE shells including IM and PBX. In cooperation with its partners, ZVS also offers multi-option fuses to its customers. For 2019 and 2020 it is planned to cover the entire 155mm portfolio, including guided smart ammunition, which is currently at an advanced stage of development. In addition to base bleed technology, it is also planned to offer customers a further range extension of the projectile range – BER and rocket-assisted versions of 155mm. ZVS offers its ammunition either with older "bag" charges or with modern bi-modular charges, which, complemented by ZVS Extended range projectiles, ensure maximum performance of modern artillery systems. ZVS has tested its ammunition with excellent results on more than 15 different howitzers in several countries.



Photo: MSM

## A US Footnote

Above are just a few of the moves within the NATO Alliance and its allies to upgrade their current artillery systems, and breathe new life into several artillery forces that have been languishing for too long with old and outdated systems. While this has been mainly a look at European forces, a brief look-see at what NATO's largest member is up to is worth a mention before closing.

There are a number of major upgrades expected to US artillery and missile capabilities, including intentions to add a range of new missile launchers, and a reported plan to award Lockheed Martin with a production contract for up to 343 new HIMARS – High-Mobility Artillery Rocket Systems. On the tube artillery side, a small business programme that would see an upgrade found for key 155mm howitzers in the form of a new muzzle brake. This might seem at first

glance as quite a modest, even unnewsworthy piece of information, and yet with one of the artillery's priorities – which is of great significance to NATO – being that of Long-Range Precision Fires, the need exists for innovative muzzle brakes that can support new ERPs of every kind currently in the pipeline. Such new munitions cause added noise and recoil making the design of a new and innovative muzzle brake potentially a simple, though beautiful, upgrade fix for any gun.

In the 2019 Pentagon spending appropriations, US\$20M was set aside for exploring extended range cannon artillery, with a further US\$67M aimed at improving the lethality of such a system. Meanwhile the range of the towed 155mm M777 has been doubled using a trial XM1113 rocket-assisted projectile (RAP); for this to happen the M777's chamber was redesigned and a longer barrel added. The round is part of the Insensitive Munition HE RAP programme to extend tube artillery ranges out beyond 40 km. This impacts the M109 upgrade to the PIM programme; so not only will the PALADIN have a new M109A7 chassis, it will also take on an upgraded turret with an increased bore length of 29 feet (instead of 20) to be able to fire extended-range ammo as a result of the Extended-Range Cannon Artillery programme. This effectively delivers a completely new SP gun. All these projects are still trialling, as beyond 40 km to ranges of 70 km and further must be achieved by such artillery systems for effectiveness on any future NATO-involved battlefield. ■



Photo: US Army

**The M142 High Mobility Artillery Rocket System (HIMARS) is a light multiple rocket launcher developed in the late 1990s for the US Army, mounted on a standard Army M1140 truck.**

# Urgently Needed: Weapon-Locating Radars

**Tim Guest**

Were a future battlefield conflict to arise in Europe, artillery would play a major role in tipping the balance for either side. It would also find itself at the top of everyone's priority target list. Precise counter-battery fire and the effective use of Weapon-Locating Radar (WLR) to locate enemy gun and rocket launch positions will, therefore, be of paramount importance for all players, should such a confrontation ever arise.

Major battlefield conflict has returned as very real threat to future European peace and stability. If such a Europe-wide scenario were, heaven forbid, to unfold, artillery will come into its own once more and be as important now as it has been over the past 100 years. New tactics, modern technology and increased mobility of modern field artillery systems, however, mean that tactics, for one, are being rethought. The hard experience of Ukrainian gunners in the Donbass, where 275 rounds per barrel per day was often the norm, has certainly highlighted this need; some 85% of casualties there resulted from indirect fires and a lack of mobility and a failure to move positions fast enough (also the case in Mosul, Iraq), with fatal results for gunners. During the conflict with 'Russia-backed' forces, confrontation between the two sides showed the huge importance of artillery in defeating the enemy, with an almost 90% reliance on artillery to win the day, rather than using infantry, tanks, or air support.

The stark reality for NATO in the face of these recent events is that component nations have, for too long, had their eyes more on the war on terror than any possible future conflict with an old, Cold War adversary in Europe. Alliance skillsets and equipment relevant to major combined force operations have been allowed to fade, while 'said adversary' has been steadily and quietly revamping its military might, both quantitatively and qualitatively. Currently, a revitalised Russia has fires and electronic warfare (EW) capa-

bilities which outrange anything the US or NATO has. The Alliance is now faced with a situation in which revitalising and re-equipping its own various member states is needed urgently, not least the need to build up artillery capabilities, including the ability to locate enemy artil-

## Threat Profile: Equipment and Capabilities

Artillery is a 'system' of systems relying for its effectiveness on links in a chain, such as resupply, ammunition, C4I, mobility, and delivery, such as by tube or rocket. Target

Photo: Saab



**A GIRAFFE 4A Multi-Mission Radar developed by Saab**

lery, mortars and rocket launchers using advanced WLR systems.

This article looks at the threat posed to the Alliance from the revitalised, potential adversary in the east, in terms of the artillery assets enemy ground forces possess. It then looks at WLR (with a comparative mention of Multi-Mission Radars - MMR) in context, and the need to identify and locate these enemy assets in order for them to be neutralised using counter-battery fires at the earliest possible phase of battle.

location, too, is part of this artillery system, whether it be target details sent from a forward observer or from a WLR troop. Any weaknesses in any part of this chain will cause the whole 'system' to falter. To enable effective counter-battery fires, however, it is the WLR that will detect 'unseen' batteries firing and enable Allied artillery to deliver accurate rounds on enemy battery positions before weapon systems have time to move to safety. This is hugely important when considering the threat from today's reinvigorated Russian Army, which is as

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Photo: via author

**A tactical concept increasing survivability: three radars working together and each radar is deployed in an individual RMA. One radar transmits, while the other two are on standby or on the move.**

artillery-centric a force as its predecessor, the Soviet ground forces. The description of the country's artillery and missile troops on the Russian MoD homepage reads: "The missile troops and artillery (MT&A) are an arm of the land force, which is the primary means of fire and nuclear destruction of the enemy during conduct of combined-arms operations (combat actions)." So, if there was ever a doubt in anyone's mind as to why the Alliance might need effective counter battery weapon locating capabilities in the form of WLR, let's look

artillery can deliver a wide range of effects, including high-precision fire. The rounds from these delivery systems use a variety of technologies to guide them to their target. Terrain recognition is used by TBM, inertial navigation by TBM and MLRS, while laser guidance is common to TBM, MLRS, howitzers, and mortars. And what they can and will deliver, if allowed to do so, is, quite frankly, sobering: minefields to protect enemy flanks and shape any allied approach; cluster ammunition with different types of bomblets effective against allied



Photo: via author

**The tactical concept of a Radar Manoeuvre Area (RMA): Four to six radars transmitting for a maximum of 5 minutes from each position. They then move between positions in a coordinated manner to ensure 100% coverage at all times.**

at what the potential threat from the East has up 'his' proverbial sleeve lying in wait. Russia's tactical MT&A presents a formidable arsenal of tools, with deep fire range capabilities as far as 500 km+ using Theatre Ballistic Missiles (TBM), and more typical shorter ranges using Multiple Launch Rocket Systems (MLRS), SP and towed howitzers, and mortars. Using these, Russia's

armour of all kinds; thermobaric rounds effective in urban areas and in combination with cluster munitions to deliver devastating effects against armoured units. There's also an Electronic Warfare (EW) round that will locally jam HF/VHF radio systems and temporarily disrupt allied command and control at critical phases of battle. Traditional mass fires, too, using conventional

ammunition like HE or any combination of available ammunition type adjusted to size and type of target, along with sophisticated ground-penetrating ammunition to destroy fortifications such as bunkers. And, of course, chemical and nuclear warheads are also in the ammunition inventory of certain weapon systems.

As for specific weapon types, the main TBM is the 9K720 ISKANDER (SS-26 STONE), which can deliver different types of warheads, including ground-penetration, cluster and nuclear rounds. Also known to be able to deliver a conventional warhead that creates an Electromagnetic Pulse (EMP) that will destroy unprotected electronic equipment and disturb radars, ISKANDER's 'official' range is <500 km, not beyond INF treaty stipulations. Western Intelligence agencies, however, suspect the system has a much greater range and can deliver a cruise missile beyond 2,000 km. The TBM is known to have a number of capabilities to penetrate a missile defence system, including evasive manoeuvres, decoys and its very high velocity (2,200–2,600 m/s). Of Russian MLRS, there are three types in the MT&A:

- BM-30 SMERCH, 300mm, 12 tubes (70-90 km)
- BM-27 URAGAN, 220mm, 16 tubes (35 km)
- BM-21 GRAD, 122mm, 40 tubes (20.5 km).

All three will gradually be replaced by TORNADO, a modular system with pods containing different types and calibre of rockets, but with a common bracket, making logistics and reloading quicker and more efficient.

The main howitzer in Russia's MT&A is the SP 152 mm 2S19 MST, developed in the 1980s and on active duty since 1989. It has been upgraded a number of times and is now, in principle, quite similar to Pzh 2000 in effectiveness. The 2S19 will be supplemented and gradually replaced by 2S35, first seen at Moscow's Victory Day Parade in 2015. Its fully automated, unmanned gun turret provides the capability to fire multiple rounds simultaneous impact (MR-SI), which dramatically increases the instantaneous firepower of a traditional battery of six guns, so it exceeds that of a battalion of 18 guns.

## **Threat Profile: Tactical Considerations**

Russian ground forces are artillery centric. After the complete reorganisation of Russian ground forces following the campaign against Georgia in 2008, the main building block became, and remains, the brigade

### Developments in the Alliance

The Danes are introducing new fire support systems, improving digitalisation and revitalising brigade level capabilities. This is to meet new threats including a extensive use of counter fire systems and fire support of all kinds and to revitalise their artillery, which has seen its various systems systematically depleted and taken out of service over the past 15 years. The 2018–2023 Danish Defence Agreement will see the establishment of a brigade with strengthened capabilities and new units. This will include the procurement of multi-mission radars. That said, with several other priorities, target acquisition capabilities will likely be focused on in the 2024–2031 timeframe.

The Czech Artillery's latest modernisation and development plans as part of its Strategic Development Project 2019-2022, include sustaining and further development of its counter battery capability in the form of its Arthur WLR, in service for over 10 years. Developments will include integrating the WLR capabilities with a new fire direction system, which is also part of the strategic plan. It has been reported that plans, since 2016, to purchase ELTA's ELM-2084 MMR were put on hold last May pending investigations by the defence ministry into interoperability issues with NATO equipment and other issues. The Finnish Defence Force (FDF) has been wanting a new counter-battery radar solution for some time, and it is understood that currently Saab's counter-battery radar, ARTHUR – Artillery Hunting Radar, is one contender, and IAI ELTA's ELM-2084 ground-based mobile 3D AESA multi-mission radar, is another. The outcome of an early 2018 RfQ, a head-to-head trial for the FDF between the two systems later last year and rumours the Finnish Defence Ministry intends to field a new system operationally by 2020 are, as yet, unclear.

with four manoeuvre battalions. There are two main brigade types: mechanised brigade with three mechanised battalions and one tank battalion, and the tank brigade with three tank battalions and one mechanised battalion. Both have three artillery battalions (one 122mm MLRS, two 152mm Howitzer). In addition, they have one anti-tank artillery battalion for flank protection.

Normal tactics use battalion combat teams comprising a manoeuvre battalion supported by one artillery battalion. This means that the brigade artillery will be deployed forward with short firing ranges for close support fire missions, while at the same time delivering possible deep fires, making the most of these weapons' maximum ranges. Typical fire missions will be situational targets, defined killing zones and rolling fire in attack or defence. Shoot-and-scoot tactics of firing units will see artillery constantly on the move, firing and then upping sticks to move to the next position to avoid counter-battery fire. The artillery battalions include organic counter-battery radar units, UAS and other sensors for targeting. One interesting development is a network-centric approach combining cyber-warfare, electronic warfare, psychological operations and artillery. This type of operation was reported in the Ukraine and went something like this:

An individual soldier on the battlefield receives an SMS, or call, telling them, personally, that artillery rounds will land on their position in 20 seconds – and they do. To be able to achieve this, the soldier's mobile has to be located, the number and

soldier's name has to be identified, a fire mission has to be prepared and executed, all while being coordinated with an SMS, or call, 20 seconds before impact.

Russian artillery also has sufficient firepower to provide fire support and engage targets within the whole theatre of any European conflict/operation without any air support. This compares with NATO countries being dependent on air power to supplement artillery to achieve the same result. These two facts alone make the case for NATO needing to have the most sophisticated and effective target location capabilities possible, if the Alliance is to stand a chance of neutralising Russia's artillery assets. However, there's one additional operational twist – that of Russia's superior

air defences. These can deny alliance air power access to the theatre of operation, thereby creating an even more unbalanced scenario.

### To the Rescue: Weapon-Locating Radar

The main requirement for a WLR is to be able to support manoeuvre units (Brigade/Division) in high-tempo operations. Development of effective WLR started in the 1950s and allowed firing mortars to be located out to around 10 km with sufficient accuracy for effective counter fire. In the 1970s, with the development of the US FIREFINDER system (AN/TPQ-36/37), effective, long-range location of howitzers and rocket systems first became possible. In the 1980s and 1990s, other systems, such as ARTHUR (Artillery Hunting Radar) and COBRA (Counter Battery Radar) were developed in Europe using improved sensor and computer technologies, together with improved ballistic calculations and command and control. Since then, both US and European systems have been further developed with longer range, improved accuracy and new functions. It is worth noting that Russia, China, India, Poland and South Korea have each recently developed their own latest WLR systems; more can be expected in the future.

Since 2000, the development of Multi-Mission Radar (MMR) has increased, due to the need for force protection of static targets, especially camp protection of forward operating bases in Afghanistan and Iraq. The first effective MMR deployed was SAAB's Giraffe AMB. In principle, an MMR combines the functions of a WLR with those of an air defence

Photo: via author



**The Artillery Hunting Radar (ARTHUR) mounted on a high-mobility BOXER**



(AD) radar, using the same techniques for tracking through 360°.

Effective, complete camp protection systems include the US CRAM and the German MANTIS systems. Both are based on existing AD systems and both use radar detection and tracking of incoming rockets and mortar rounds, combined with an effector – a 20-30mm AD gun - to neutralise the round itself. These systems also send out a local-area warning, enabling personnel to take cover, and both have

### Tactical Requirements for WLR

There are some very basic tactical requirements relevant for any system operating within a manoeuvre unit in addition to capacity, range and accuracy:

- Mobility to follow and operate in a high-tempo manoeuvre operation
- Survivability
- Operational availability for the duration of a typical mission

vehicle's level of armoured protection, as well as its ability to avoid detection and move quickly from an active position, and all within the enemy 'counter-fire decision circle'. All active systems can and will be detected, and moving even seconds outside the counter fire decision circle can spell disaster. This, therefore, requires tactics allowing only limited transmission time from any position, before the WLR troop must move. Today, that time constraint is five to six minutes; 20 years ago, it was 10 minutes. Finally, the operational availability of a WLR is its ability to complete a mission successfully, on time, and without interruption by technical issues, or gaps in coverage when moving positions.

### Radar Position and Movement

An active position for a WLR must be as far forward as possible, with as low a crest in front as possible, so that it can locate projectiles with low-flying trajectories and use its full range capability over an enemy-controlled area. For protection against ground-based enemy radar locating systems and jammers, WLR needs to have a crest profile with no visible ground behind the crest. The key is to find the balance between these two requirements.

Other requirements include the need for good command, control and communication, effective local security, making use of shielding and multi-spectral camouflage against visual UAS detection, and having good routes in and out of any position.

When it comes to following a manoeuvre unit and locating enemy artillery, two or more WLRs must work together and coordinate their actions. Studies and trials in Norway, Sweden and the UK conclude that three to four radars working together are needed for this purpose. All three countries use a Radar Manoeuvre Area (RMA) for each radar, with



Photo: via author

**An ARTHUR mounted on an M113F4 tracked vehicle**

saved many lives in these two theatres. Another recent development is ELTA's ELM-2084 ground-based MMR. The ELM-2084 is a mobile S-Band Multi-Mission Radar (MMR) Family implementing an advanced 3D Active Electronically Steered Array supporting modular and scalable architecture. The MMR family supports artillery weapon location and air defence operational missions and provides optimal solutions for short-, medium- and long-range missions. The system features high redundancy, graceful degradation, high reliability and very high availability. In its artillery weapon location capacity, it can detect mortars, tube artillery, rockets and missiles to locate hostile battery locations; it can calculate impact points and aid friendly fire ranging. In its air defence capacity it can detect and classify all types of airborne targets with a fast update rate for the tracking of manoeuvring targets and the ability to generate a real-time air situation picture. It can also aid fire control activities providing information to anti-missile interception and SAM systems.

In terms of mobility, the logical choice of carrier vehicle for a WLR is to use one of the same main vehicle chassis as used by the supported unit, which will offer the same mobility and protection level, as well as having the same logistical needs. An ideal vehicle will be a tracked or wheeled APC/IFV. As for survivability, this depends on the



Photo: via author

**An ARTHUR on a BV-206 tracked vehicle in Afghanistan**

more than three to four qualified positions in each. The three to four radars transmit, one at a time, while the others move to new positions, wait in standby, or move to a new RMA. The transmission time in each position is adjusted to the enemy reaction time – detection, decision, execution plus time of flight. Even when detected by a sensor (EW, UAS, or any other), survivability will be acceptable if, as previously mentioned, transmission time and movement fall within the enemy decision circle.

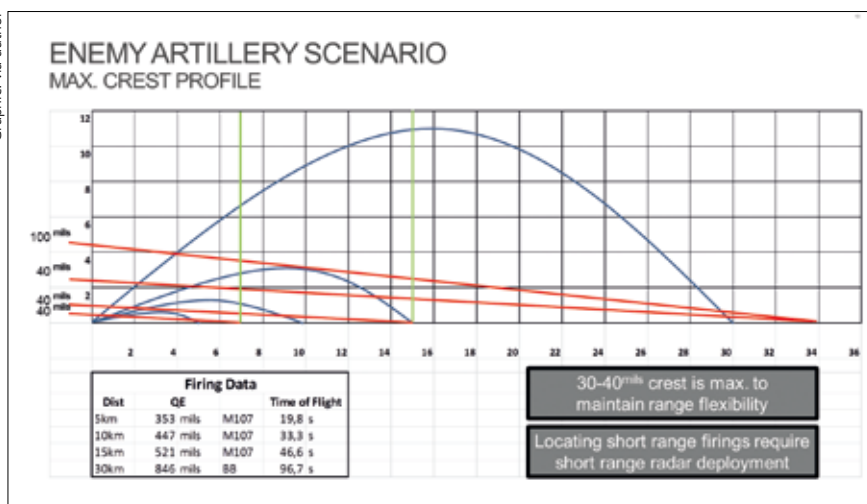
## WLR or MMR for Artillery Location

From a logistics point of view, a single sensor type to detect all enemy actions would be the ideal, which is exactly what an MMR system is capable of doing — detecting and tracking all flying targets, including artillery rounds. To do this simultaneously, the radar uses volume search, as in an AD radar, detecting all targets within the search volume for each rotation of the radar antenna; software then puts a tracker on relevant targets. This method delivers a very high, instant capacity (>1,000 targets), but with only one track per radar rotation (30-60 RPM), it can take far too long for enough track points to be placed to provide sufficient accuracy for target location.

A dedicated WLR, on the other hand, or using the dedicated WLR-mode of a MMR, employs another principle called Track on Demand (ToD). Here, the radar only searches along the horizon electronically using a static antenna, typically covering a 90-120° arc. When a projectile is detected and identified, the system starts to track it along its trajectory with a high number of track points per second. It takes between four and 10 seconds for the required number of track points to be reached in order to locate the point of origin. A WLR can normally track eight to 12 projectiles, simultaneously.

So, while an MMR is ideal for force protection of static targets and has advantages, such as being able to fix air targets like fixed and rotary wing, missiles, UAS and artillery, simultaneously, together with more efficient logistics, it does have what might be termed perceived drawbacks in terms of technical and operational complexity. Because of its size, for example, an MMR is likely to need to be housed on a larger vehicle chassis, such as that of an MBT; and to be optimally effective, the sensor command and control should ideally be manned by personnel with both AD and artillery competence. On deployment, an MMR might also find itself with a conflict of interests; in its capacity as an AD radar it needs to be positioned to create an umbrella over own forces' brigade/division area, while

Graphic: via author



### Crest profile requirements

Photo: ELTA



**ELTA's ELM-2084 mobile ground-based Multi-Mission Radar (MMR) is a recent development.**

in WLR-mode, it will need to be positioned forward, so its range over enemy-controlled territory is as great as possible.

## Radar Tech Future

Today, active electronically scanned array (AESA), a type of computer-controlled, phased array antenna in which the beam of radio waves can be electronically steered to point in different directions without moving the antenna, is dominant in new radar systems. The technology delivers a software-controlled, flexible antenna that can be used for many applications, both on land and at sea. Currently, the aim is to develop fully digital AESAs with no analogue elements used for signal processing. This will enable smaller, standardised hardware and more flexible installations with easier interfaces between sub-units. A modern AESA radar uses newly developed GaN technology for the transmitter/receiver modules in the antenna and its transistors will

be more efficient in enabling higher output, less heat and/or less power consumption, in the future. The expected impact this will have on WLR is reduced weight and size, greater range and improved accuracy. Software enhancements are also likely to improve both target handling and ECCM capabilities, while also enabling the handling of new target types, such as smart ammunition, as well as projectiles/missiles that follow non-ballistic trajectories. AI algorithms are also likely to enable support tools that will help rectify and determine best radar positions, routes and movement between positions, as well as customised ballistic models, all by using HD 3D-maps, mission planning tools, and detailed intelligence information. ■

### Acknowledgement:

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# New Realities for Training and Maintenance

Emerging technology platforms including Virtual, Augmented and Mixed Reality are changing the way we interact with the world in our leisure time, but what benefits can they bring to the work environment?

"Augmented Reality (AR) is a versatile platform that is becoming increasingly sophisticated in its applications," explains Nigel Best, Business Development Director for Simulation at Holovis. "Achieving adoption

space Academy in 2017, brings real training scenarios to life in a VR CAVE in combination with desktop immersive learning displays.

"LEARNVIEW allows groups to train in the same physical and virtual spaces regardless of geographic location and examine and interact naturally with datasets in 1:1 scale, without the restrictions and limitations of headsets and in a risk-free environment," continues Nigel.

expand it to see the inner workings and components. It can then be used to launch videos or step by step guides showing how to replace or change elements, trouble shoot problems or instantly log and reference them for further attention, all linked in real-time to a back-end database system," explains Nigel.

"This instant access to information saves time in trying to locate physical user ma-



Photo: Holovis

**LEARNVIEW allows the user to virtually lock on to a part of an engine and expand it to see its interior and components. It can then be used to start videos or step-by-step instructions that show how to replace or modify elements.**



Photo: BAE Systems

**The VR software LEARNVIEW, which was introduced at the BAE Systems Aerospace Academy in 2017, brings real training scenarios to life in a VR CAVE in combination with desktop immersive learning displays.**

in the field of simulation relies on developing the right applications where the technology is the best way to solve those challenges and the engagement feels natural to the process, not clunky and bolted on as a gimmick."

### Bringing CAD Data to Life

Visualisation specialist Holovis has been working in the field of emerging technologies for over 15 years, originally pioneering the use of group based Virtual Reality (VR) in CAVEs and projection domes and more recently developing applications of machine AR, that accurately brings CAD data to life in a tracked environment, for OEM clients.

The company has developed LEARNVIEW, a proprietary software suite that translates training materials into intuitive and interactive scenarios. The VR module, which was first presented at the BAE Systems Aero-

The LEARNVIEW AR module allows real-time tracking with augmented data overlays for training and maintenance on real-world platforms and assets. This means that elements can be explored and interacted with to bring up additional information such as training, damage inspection, operational and maintenance data.

"In the case of training, this allows engineers to instantly access additional information, such as manuals, specifications, videos and data overlays, over the top of real-world platforms and assets. This can teach and guide them through processes, acting as a virtual companion."

### Reduced Meantime to Fix

"One function within the training option allows the user to virtually lock on to part of the model, such as an engine, and

nuals and ensures engineers can complete tasks with reduced training and mean time to fix. If a problem needs to be escalated, this can also be done in real-time from the device, alerting a specialist engineer instantly.

"Information can be linked to manufacturing and enterprise management systems for even greater functionality and added value. Data can be recorded and insightful analytics generated, reporting on how often certain parts are failing, the reasons why and collated as part of service level agreements with suppliers. LEARNVIEW can also be integrated with purchasing systems to facilitate the submission of requests for replacement parts orders instantly."

The LEARNVIEW platform is scalable, from a single part through to a whole system and is compatible with many viewing devices.

# Simulator Visualisation Systems

**William Carter**

**Originally, the equipment itself was used for training. This was a waste of time on expensive equipment and in many cases led to damage. Nowadays simulation is so realistic that its fidelity is very close to the real equipment.**

In the past, some front-line equipment was even written-off in training. This was accepted as a consequence of realistic training, but with hindsight this is surely quite unacceptable where there are alternatives. Mock-ups of the equipment

large, indeed, very large. An example in Germany was a flight simulator model-board that extended from the base airfield all the way to potential targets several hundreds of kilometres to the East. In Army training, an equivalent to a model board

was first purchased in 1934 by the US Army Air Force (USAAF), followed by the Imperial Japanese Navy and the UK Royal Air Force, then by many other air arms. The Link Trainer had a fully-enclosed cockpit with flight instruments that responded correctly to the

Photos: BAE



**F-35B Simulators at BAE's base at Warton, UK – motion-based aircraft sim and sim of Ships's FlyCo**

were then used so that familiarisation with weapons and crew positions could be carried out without using the equipment itself. A Mock-up can be a simple representation of the equipment or a crew station with dummy switches, instruments and other controls so that checks can be carried out and repeated until they are learnt. More advanced mock-ups use instruments that work and incorporate correct responses to the use of switches and other controls. The word "Simulator" started to be used, which rolls off the tongue rather better than "Mock-up".

## Early Simulators

However, the majority of these early "simulators" had no outside-world visual systems because technology did not exist for computer-based imagery of large areas. What did exist were so-called "Model Boards". These were miniature representations of small areas of the real world that could be shown on screens at crew stations using small TV cameras that tracked across the model board in the same way as the real vehicle. Model boards work quite well for small areas, but are not suitable for large areas or where enemy action is to be trained. For aircraft, some model boards became

is the "sand table" that can be used to model small areas of a range or battlefield, and some are many square metres in area. Meanwhile, aircraft cockpit trainers had existed since the 1930s, the most famous being the "Link Trainer" developed at Binghamton, NY, by Edwin Link. The Link Trainer

pilot's control movements. It also had real motion using pneumatic bellows for pitch and roll and an electric motor for yaw. Over 20,000 Link Trainers were built, later models being in service with some Air Forces until the early 1970s. They were fine for teaching basic instrument flying techniques

Photo: Saab



**Dome screens such as this one of the Saab Full Mission GRIPEN fighter simulator have now become standard.**





**XPI Simulation Imagery from Tank by Day and with NVGs**



to one pilot at a time, but in the 1950s, when complex jet aircraft came along, such as various types of US Bombers, the UK V-bombers, and civil jets like the Boeing 707 and DC-8, closer models of the real cockpit were needed. Early aircraft simulators had realistic cockpits and some were mounted on hydraulic-driven motion platforms. Although model-board visuals were available, they had limitations in fidelity and area. It was only when digital Image Generation technology became viable during the 1970s and 80s that simulator visual systems began to be effective training tools. Simulator imagery has to be created and stored in three-dimensions rather than just a simple flat image, so that the eye-point used in the simulation can be from any direction. Such a 3D data base needs very large storage compared to a 2D picture. Original simulator digital images were crude, limited to representations of large objects such as runways. However, advances in computer

technology soon allowed 3D imagery to be improved and, equally important, to be stored. Another advance in image fidelity was the addition of "texture" within otherwise plain polygons. Texture within polygons started as simple contrast patterns but soon developed so that small images and even photographic detail could be applied to polygons in an overall visual scene. For instance, a skyscraper can be modelled using a series of so-called "texture maps", each map containing just a few windows so that when many maps are put together, the whole building is seen on-screen without the need to model every detail separately. Turning to night imagery, this includes light intensifiers such as Night Vision Goggles (NVGs) working in the near Infra-Red at a wavelength of about 1 micron. There is also the more expensive passive Forward Looking Infra Red (FLIR) which senses thermal contrast within the scene and works on the blackest of

nights. Both NVGs and FLIR are easy to simulate by adding monochrome colours and appropriate texture to each polygon in the visual database. In real NVGs, a monochrome green colour is often used, but whatever colour is in the real equipment, it is easy to simulate. In any case, the picture can be changed from white-hot to black-hot at the touch of a switch, and is straightforward to simulate.

## Simulator Display Systems

Turning now to simulator display systems, projectors can be used to show imagery on screens of various shapes and sizes. These can be used either in free-standing displays for group briefings, or to provide imagery at a simulator crew station. Simulator display technology also includes edge-blending between channels, and Head-Mounted Displays (HMDs). There is also what is known as "Collimation", the word being derived from "co-linear" which implies parallel lines. Parallel lines in optics imply infinity-focus, rather than a focus at the screen distance of direct projection systems in which the lines converge. The essence of a collimated display is that the subject looks into a mirror that has vertical curvature, rather than at a screen. The amount of vertical curvature determines the focal distance, which can be set to what is best for the simulation, rather than always at precisely infinity. Single-screen collimated units are sometimes known as Wide-Angle Collimated (WAC), and several "WAC windows" can be placed side-by-side for a larger horizontal or vertical view. However, where two crew sit side-by-side, some imagery seen by one crew member cannot be seen by the other, leading to "black holes" in the display. The solution is to use a large mirror of wide horizontal extent, typically of mylar coated with a reflective surface. Imagery seen in the mirror is created on an intermediate screen above the mirror. This imagery is reflected in the mirror, and it is the reflection in the mirror that is seen by the subject. Typically, three or five projectors can be used, the screen height and width matching that of the mirror in which the crew view the scene. This system was first marketed in 1982 by Rediffusion Simulation of Crawley, UK (now split between L-3 Commercial and Thales), under the name Wide-angle Infinity Display Equipment (WIDE), with an unrestricted across-the-cockpit view of 150 x 40 degrees. Many other companies now make what are now called Cross-Cockpit Collimated Displays (CCCD) with cover up to 240 x 60 degrees.

## Recent Visualisation System Updates

**Barco**, headquartered in Courtrai near Brussels has launched its RigiFlex portable screen system. The screen can be rolled up for transportation, is rigid once installed, and is available in sizes up to 33 x 13 ft.

**Bohemia Interactive Simulations** has released four updates. 1) The VBS3 3D model library is expanded, there is more interaction with vehicles and equipment, updated voice communications and a mission planning tool. 2) VBS Blue IG adds to the realism of training for joint fires and close air support. 3) VBS Simulation SDK includes new samples, improved documentation and new Application Programming Interfaces (APIs). 4) VBS IG SDK has a new set of APIs.

**CAE**, headquartered in Montreal, Canada, has launched the Medallion MR (Mission Reality) e-Series Visual System optimised for fast-jet & helicopter training. It includes a back-projected dome display with 360 and 225 degree options, laser projectors, and CAE Medallion imagery. Other features include head movement compensation to reduce parallax errors; 3D depth perception through special eyewear; night-vision goggle (NVG) compatibility; and support for the International Open Geospatial Consortium Common Database (OGC CDB).

**Distributed Simulation Technology** (DiSTI of Orlando, FL, released version 6.2 of its GL Studio development toolkit for 2D/3D graphics, with over 30 enhancements. Non-programmers can use drag-and-drop and there are systems for fine control, customized build settings and WebGL deployment on Linux.

**Quantum3D** of Milpitas, CA, announced version 3.4 of its Mantis Image Generator. This includes compatibility with the Common Database (CDB) standard of the International Open Geospatial Consortium. Users will be able to upgrade to a commercial off-the-shelf (COTS) compliant Image Generator without the cost of transferring

the current CDB visual database. The update has a new StaticModels plugin that can add features such as buildings, wind-turbines and radio towers, without having to regenerate the complete landscape. An Autonomous Traffic plugin now includes small ship models.

**SimthetiQ Inc** of Montreal has announced that its X2 Visual System has been qualified on over 50 flight simulation training devices worldwide, including over 20 Level D full flight simulators. X2 is powered by the aXion Image Generator and uses Whole Earth Terrain.

**Terrasim Inc** of Pittsburgh, Penn, announced version 5.6 of its TerraTools terrain generation software. This has a new plug-in for generating Bohemia Interactive's VBS Blue IG insets. V5.6 can be added to existing TerraTools systems, or the OmniWizard function can start a new project with correlated terrain. TerraTools VBS Blue IG Source Plug-in gives control over satellite imagery, models, road layers, etc., and V5.6 can define attributes for lanes, one-way roads and crosswalks.

**TrianGraphics** of Berlin released Version 6.5 of Trian3DBuilder. This supports a wider range of data and includes new scripts, integrated databases, material and shader support, and additional editing functions. It now supports Unity and Titan Vanguard formats and includes an update to OpenSceneGraph 3.4.1. It also includes billboard creation and OpenStreetMap online access.

**VT MÄK** of Cambridge, Mass, has released an update to VR-Forces, VR-Vantage and VR-Engage. VR-Forces v.4.6 improves simulation accuracy, the use of CDB databases, modelling close-up warfare, and making scenario changes. VR-Vantage 2.3 gives better visual correlation, for instance to computer-generated forces (CGF). VR-Engage V1.2 adds remote assignment of roles, interaction with simulated control panels, improved weapon modelling and expanded flight simulation capabilities.

Photo: Wärtsilä

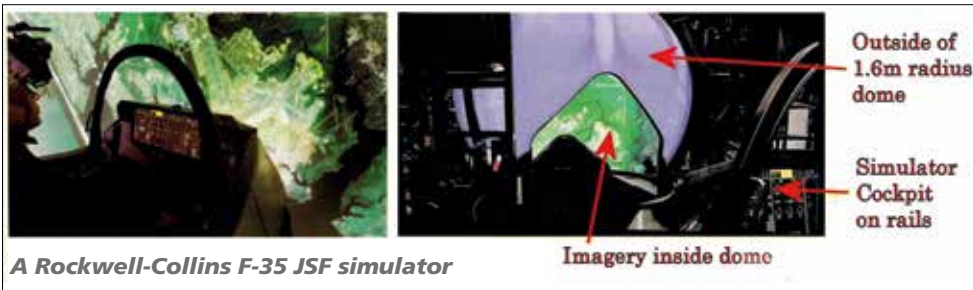


*Nautical Imagery from Wärtsilä Voyage*

## Fighters and Helicopters

The above field of view is adequate for simulators for airliners and military transport aircraft, but what about fighters and helicopters? For some helicopters, there is a relatively simple solution - use a CCGD system for the main display but add two WAC Widows below the display for the downward look needed to hover. However, simulators for Attack Helicopters and Fighter aircraft need almost unlimited external view. One solution is to mount the simulator cockpit inside a large dome, and project the outside-world scene on the inside of the dome using projectors either inside or outside the dome. Visual domes are normally several

Photo: Rockwell-Collins



metres in diameter, inside which can be placed the simulator cockpit, a Forward Air Control (FAC) or other station to be trained in the simulator, even, in large visual domes, a platoon of soldiers with shoulder-mounted SAM systems. For single-seat aircraft, instead of a dome, an

array of back-projected flat screens can also be used to surround the pilot with the outside-world visual scene.

A specific example is the unique dome-based visual system used in the Full Mission Simulators for the F-35 LIGHTNING II fighter, a nine-nation programme with



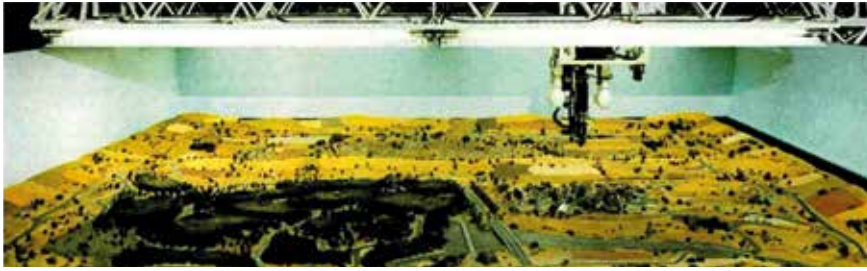


Photo: via author

**Model board and travelling camera 1970**

Photo: via author

**First generation digital imagery**

Photo: CAE

**CAE MEDALLION MR e-series imagery – October 2018**

three variants of the aircraft. These are the F35A Air Force version, the F-35B Short Takeoff and Vertical Landing (STOVL) version for the US Marines and UK Royal Navy, and the F35C, a larger aircraft for the US Navy. The F35B is in service with the UK Royal Navy on board its new QUEEN ELIZABETH aircraft carrier. The prime contractor for training simulators for the F-35 A, B and C models is Lockheed Martin Training, Logistics & Sustainment in Orlando (LM-TLS). These use the Rockwell Collins WHOLE-EARTH database and the EP-X Image Generator with a resolution of 4 megapixels per channel. For outside-world and target imagery, 25 Rockwell Collins Zorro projectors are used. The simulator dome design is by the UK branch of Rockwell Collins (the ex SEOS company), and is unique in that it is only 1.6 metres in radius rather than several metres like other simulator visual domes. The small size means that the pilot has to strap in to the seat outside the dome, the seat then being slowly motored into the dome, after which it is raised to the correct pilot's

eye-point. Will this small radius dome set a standard for the future? I think not, because the only reason for its uniquely small size is that, many years ago in the original US Air Force Specification for the F-35 Full Mission Simulators, it was stated that they had to fit inside existing buildings that had already been built for an earlier generation of F-16 simulators. It would have been better and less expensive to use a new simulator building that could accommodate a conventional and cheaper visual system that would use one of the many full-size simulator visual domes that are readily available from many manufacturers. An example is the F-35B simulator at the British Aerospace factory at Warton in the north west of England, used for Research and Development of the B model. This simulator has been used for optimising deck landing techniques, linked to another simulator at Warton of the FlyCo station in the aircraft carrier itself. I have had the privilege of flying the Warton F-35 simulator with its big visual and 6-axis electric motion. Take-off using

the UK carrier's "Ski-jump" and hovering back to the deck at the end of the sortie, was extremely realistic, enhanced by the real motion that enable cues in a simulator to closely resemble those in the aircraft itself. This enables "handling fidelity" that is not possible with a visual-only simulator, particularly under conditions of night, poor visibility, or in situations where quick control movements have to be made.

## Head-Mounted Displays

Head-Mounted Display systems (HMD) can also be used instead of larger displays. However, weight on the head and display resolution are critical. Although HMDs can show stereoscopic imagery, two separate image channels are required that must be set up very precisely if "simulator sickness" is to be avoided after prolonged use. However, in many roles it is not essential to use two different images because so called "optical infinity" is about 9 metres (30 ft), beyond which distance in the real world each eye sees the same picture. HMDs are useful if a training system has to be particularly compact or portable, because they give a wide outside-world view without the need for screens and projectors. Examples of HMDs in service include the Link AHMD in US Army systems such as the trailer-mounted AVCATT and in Reconfigurable Collective Training Devices (RCTDs) that are part of the "Flight School XXI" programme. Other HMDs are used in simulators for vehicle convoys and for shoulder-mounted weapons.

## Summary

Computer-generated imagery is now available with nearly real-world resolution, including images of terrain by day and night, plus different weather conditions and the addition of forces both enemy and friendly. Imagery can be displayed in many ways, from TV screens, forward- and back-projected displays on screens or in domes of various sizes, mirror-based collimated systems with a distant focus, and Head-Mounted Displays. Some wide-angle displays are compatible with mounting on 6-axis motion platforms, giving unprecedented realism where training requires fidelity of handling rather than just a visual scene, such as in simulators for fixed-wing and rotary-wing aircraft, and for drivers and crew of ground-based vehicles such as tanks and other Armoured Fighting Vehicles (AFVs). Overall, modern simulator visualisation systems are very capable, and are now essential in modern training. ■

# The Kajaki Lesson: Leadership Under Extreme Stress

**Alec Mackenzie, Kajaki Film Ltd.**

6 September 2006: a three-man patrol of British soldiers near the Kajaki Dam in Helmand Province, Afghanistan, sets off to observe a Taliban roadblock. In a dried-up riverbed at the foot of the ridge, one of the soldiers steps on a landmine that blows his leg off and sets off a desperate rescue operation. His comrades rush to help him, only to be shocked to discover that they have inadvertently wandered into an unmarked minefield, a relic of the Soviet campaign in the 1980s.

ka Films Ltd in 2014; it has also become a case study for decision making under intense pressure. A group of British companies with extensive background in training, psychology and behavioural change is offering defence and security forces worldwide a classroom-based, immersive and interactive training package into practical "Command and Leadership under Extreme Stress" (CLUES). The CLUES package explores how individuals respond to coping with threats, limited

psychological pressure on decision-makers. While there is clear understanding of the debilitating effect of traumatic injuries and stress upon leadership, morale and unit cohesion, until now it has been very difficult to replicate it in training. Today in 2019, the significant majority of young officers and soldiers within Europe's armies have little or no direct exposure to combat. Instead many have been exposed to hyper-realistic video gaming portraying a soft illusion of warfare which does not require its players to address the consequences of the lethal force at their disposal. Injury or death is a mere inconvenience, resulting at worst in a loss of points and the option to respawn and fight again. Casualties disappear quietly and painlessly from the game. Mortality is an inconvenient truth and one easily ignored. The CLUES Training Package has been created to address the debilitating effect of catastrophic injuries on decision making, unit cohesion, morale and combat effectiveness. It is presented principally for use by defence forces at battalion level, with relevance to all ranks from private soldiers through to sub-unit commanders and unit operational staff. The CLUES Training Package has been structured around a series of high-resolution video clips taken from Kajaki Kilo Two Bravo. This multi-million pound feature film gained international acclaim for the extreme realism of the minefield incident and, in particular, for the harrowing depiction of the multiple traumatic injuries sustained by the troops involved. The film has proved hugely popular with the military, with many units screening the film as part of combat familiarisation and pre-deployment training. It has been cited as being one of the most realistic portrayal of armed forces in action and provides insight into how soldiers respond under extreme pressure, coping with threat and multiple catastrophic injuries and the degrading impact such injuries have on combat effectiveness. However, this informal training is often unstructured and so fails to draw out all the lessons

Photos/Graphic: Pukka Films Ltd.



From now on, the young soldiers know that with every movement they risk serious injuries and possible death. On top of that, in the minefield they are like sitting ducks awaiting an imminent Taliban attack. This extremely stressful situation turns into a harrowing nightmare for patrol commander Corporal Mark Wright who is faced with a number of painful decisions.

### A True Event

This true event has not only been turned into an award-winning feature film Kajaki Kilo Two Bravo produced by Puk-

information, a rapidly changing situation and catastrophic injuries. CLUES is intended to retain and build on the lessons learnt from land-mine clearance and mass casualty drills during British military operations in Afghanistan. Through real life examples taken from Kajaki Kilo Two Bravo, the CLUES training package examines the factors contributing to poor operational preparedness and cognitive impairment, with the objective of equipping soldiers to cope better with decision making in battle-stressed situations. Very few defence and security forces worldwide have access to effective methods of imposing extreme emotional and psy-



that could be learnt. The background and mission briefings, the build up to the series of mine-strikes, the decision-making process and its consequence are explored in a series of modules in which the students role-play and relive the incident in graphic detail

## Do What Is Right

The students are encouraged to consider situational awareness, preparedness, risk assessment, judgement, evaluation, the acceptance of responsibility and decision-making— all of this under conditions of limited time and information, a changing situation and sensory overload, in order to help them understand how stress and motivation can distort and impair rational decision making.

## The training package

also examines concepts of moral and physical courage and the need to do what is right, rather than what is easy.” These factors are very much part of the moral and conceptual components of fighting power, of why and how we fight”, explained Lieutenant General Jon Riley, the senior military adviser to the CLUES Project. Formerly Deputy Commander ISAF in Afghanistan, and now author and defence and security consultant, General Riley has been closely involved in developing the training package. “Much money is spent on addressing the needs of the physical component of fighting power – both in equipment and in training to use that equipment. It must be right to invest proportionally in the moral and conceptual components in order to gain full advantage of training. Using simulation models in the physical component saves time, wear-and-tear ,resources and ultimately lives. Simulation in the moral and conceptual components can equally save lives when those who have undergone training face real-life situations. Simple, low-tech simulations to train soldiers in exercising judgement during the preparation for operations have been in use for many years, for example, firing ranges linked to film or digitised engagement scenarios. This programme is a development of that simple idea, aimed at an entire team and its leadership”. The Training Package While CLUES is assessed to sit well within NATO training concepts,

instructors should see the package within national and service doctrines. It is intended to be used as an aid, not as an off the shelf resource. Andrew de Lotbiniere, Producer of Kajaki, explained that if the end-user so desired, the company could develop a variant specific for a customer, to include their specific operating procedures and corporate branding, as well as sub-title the film clips in any language. Kajaki Film Ltd can also provide a ‘train the trainer’ service. Delivery of the

plans, notes and background information for trainers to use, along with discussion points and classroom exercises. The training video includes interviews with senior experienced commanders, giving their experience, analysis and recommendations. There is no investment required into hardware, other than for a computer capable of playing MP4 files, supported by a high resolution projection and sound system. Kajaki Film Ltd is promoting the training package as being



***Kajaki gained international acclaim for its extreme realism and for the harrowing depiction of the multiple traumatic injuries sustained by the troops involved.***



CLUES Training Package requires an instructor familiar with the material to take a class of students through a series of scenarios. Examples range from the initial decision to take the patrol off the unit base through to the decision whether to wait for help or attempt to self-extract. Time for analysis is limited so as to place pressure on rapid situational analysis and pressured decision-making. The medium of film and the graphic portrayal of the injuries adds significantly to the load on the students. The video-based immersive training is delivered over a number of modules with pause points for group discussion and an analysis of the impact of the decisions made. The video is accompanied by a training pack with lesson

a highly cost-effective training solution. “CLUES is in your face training” said Paul Katis, Director of Kajaki.” Once the programme starts you find yourself stuck very quickly with the patrol in the middle of an unmarked minefield with no easy way out. You share their fear of who will be next, the sense of paralysis, the risk of losing the initiative and being trapped by indecision”.

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# Gunnery Simulation and Training

William Carter

A significant distinction in gunnery training is whether live rounds or lasers are fired, or whether simulation is used. Training will always need the firing of live rounds, but this is expensive, it limits the types of training that can be safely carried out, and in live-fire exercises there will continue to be the occasional injury and even death.

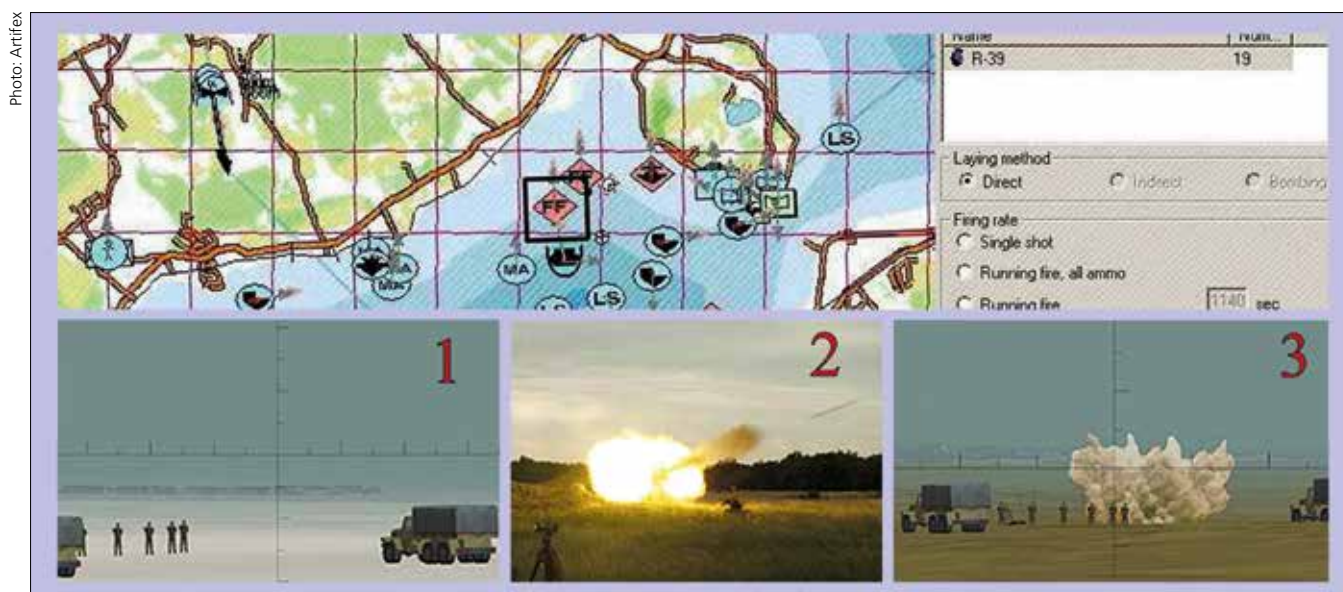
Using lasers rather than live rounds is safer, but can lasers provide meaningful training, and what is the place of simulation in gunnery training? This article addresses these issues and concludes that laser-based exercises and the use of pure simulators can cover more complex training cases than when live rounds are used.

An alternative to firing live rounds for training is to use a laser transmitter that is triggered by the normal firing circuit of each weapon, and in multi-weapon training scenarios this is described as Tactical Engagement Simulation (TES). This can include guns large and small, vehicles of

damage categories. Realistic on-range weapon effects can be created by adding smoke and flash/bang devices to potential targets that can be triggered either by laser "fire" or through the range computer that assesses engagements as they happen. Range targets can be models or target boards moving on wheels or on rails, or can be static targets that pop up and down as required. However, once laser fire is used rather than live rounds, targets can be real personnel, real vehicles and real buildings. An additional benefit is that laser transmissions can be coded so that the use of individual guns ranging from large artillery

show where improvements can be made both in the short and long term, and for statistical purposes. In the short term, such data can show how a gun system could have been handled better and how soldiers and commanders at all levels performed. In the long term, exercise data can show how changes could enhance weapon system effectiveness and improve command and control.

In other types of range exercise, special training ammunition can be used instead of a TES laser. Training rounds with no warhead can be fired with a full or reduced propellant charge. Reduced propellant rounds en-



*The ZEUS artillery training system developed by Artifex Hungary*

all types, plus infantry with their weapons. Since laser beams are straight lines, the gravity-drop of live rounds is allowed for in TES systems by computer-based calculations of hits and near-misses. Depending on the round's accuracy and the weight of its warhead, its effect can be computed in terms of degrees of damage or a complete target kills. Effects include damage to weapon systems, mobility kills in mobile systems, effects on personnel, and other

pieces to rifles and pistols can be identified during the exercise and, more significantly, after the exercise for debrief. This, combined with accurate GPS tracking of each weapon, vehicle and soldier, produces a comprehensive database for After-Action Review (AAR). Such exercise de-briefs can be extremely detailed and, rightly, take longer than the exercise itself. This data can be stored so that progress (or otherwise) in training effectiveness can be recorded, to

able live-fire training to take place without the need for large range space. With large-calibre guns, a barrel insert can be used for training. Inside the inserted device is a sub-calibre barrel capable of firing a small training round, generally of rifle calibre such as 6mm or .303 inches. There are also full-size dummy rounds just for loading practise. However, whenever the real equipment is used for training, firing lasers or live rounds, critical components such as engines, guns,



wheels and tracks, wear out and have to be replaced. Training alternatives vary from training devices that can be attached to a real, but static, vehicle, to completely separate devices such as part-task trainers (PTTs) up to full mission simulators (FMS). Where the real gun or a static vehicle is used for training, gun and vehicle systems can be sTimulated (notice the capital "T") by the training device including simulated visual scenes injected into weapon sights. Where appropriate, an external screen can be used so that the crew commander has a view of the simulated outside-world. In training systems attached to static guns and vehicles, crews are at their normal combat stations, weapons are not fired but systems are triggered by the computer in the training system. At a training centre more than one vehicle can be fitted, the exercise being co-ordinated at an Instructor Operating Station (IOS). Such systems can be in a specially configured training building with all the facilities installed ready for the real guns and vehicles to be brought in and connected for the training exercise. Simpler systems can be portable where the training console is taken to the guns or vehicles, rather than the other way round. The constant use of real hardware for training causes fatigue, and sometimes damage, to expensive front-line equipment, and has limitations in what can be done safely. Training should be a balance between using real and simulated equipment, and today the pendulum has swung in favour of more use of simulation rather than less. Once the decision is taken to design a training system that does not need to use the real vehicle or weapon, devices can be optimised for the training role and take full advantage of modern simu-



Photo: ETC-PZL

**The gunnery trainer's imagery, developed by the Polish company ETC-PZL**

lation technology. In the past, simulation-based devices were less capable than use of the real equipment on range exercises, but simulation technology has advanced so that it can include scenarios not possible on-range. A variety of different enemy actions can be simulated, plus situations that are too hazardous to train on-range with real equipment. Trainers vary from simple to complex, starting with PC-based desktop trainers for each crew member, through more realistic trainers for each crew station, to Full Mission trainers with a high level of realism in the crew station layouts and displays. Levers, switches and other controls can be as realistic as those in the real vehicle, and visual display units can be mounted in and around the replica gun or vehicle. Above the desktop level, models of each crew station can first be used to train individuals, then linked together for full-crew training. Real and virtual imagery can be mixed, so-called "aug-

mented reality" (AR), so that enemy vehicles and weapon effects can be added to real terrain imagery. For larger-formation training, Local- or Wide-Area Networks (LAN/WAN) can be used so that interactive multi-role exercises can be carried out - these can be more comprehensive than exercises with real vehicles on-range because they do not have the safety limitations that apply to the use of real vehicles and weapons in a training mode. Finally, crew stations to be considered are not only those for the gun or vehicle crew, but also include those for Forward Observers (FO) and HQ battle staff. An example is Artillery Forward Observer Simulators (AFOS) that have wide-angle battlefield imagery so that target co-ordinates can be relayed to the crews of indirect-fire training systems such as long-range artillery, high-trajectory howitzers, and smaller weapons such as mortars. In terms of the shift to simulation systems for training, a forecast from Frost & Sullivan has predicted that by 2020 nearly all training exercises will include some sort of mixed Virtual and Augmented Reality (VR/AR).

A selection of companies making gunnery training systems include, in order of nation: in the Czech Republic, Bohemia Interactive (BISim); France, MASA, Thales; Germany, Krauss-Maffei Wegmann (KMW), Rheinmetall (RDE); Hungary, Artifex Simulation & Training; India, Bharat, Zen Technologies; Israel, Bagira, Elbit, Rafael; Poland, ETC PZL; Sweden, Saab; Switzerland, RUAG; Turkey, Havelsan; UK, CAE UK (ex Invertron), Lockheed Martin UK (ex Solartron), Phoenix Simulation; USA, BiSim USA, Cubic, DISTi, ETC, Meggitt, Quantum3D, QuantaDyn, Raydon, Tapestry, VT M&K. A web search using these company names will give details. Some training systems follow, followed by deliveries and contracts in alphabetical order of country or region.

Photo: Havelsan

### Havelsan - Artillery Forward Observer Simulator (AFOS)



**Classroom and Portable Versions**

**Havelsan's forward observer simulator is available in a classroom and a portable version.**

## Systems

**360 degree view:** Saab Security and Defence Solutions, headquartered in Järfälla, Sweden, has developed the "We:Are" imagery system. This gives a 360 degree view of the battlefield with targets, engagements and other movements. It is based on Google Maps and is compatible with other digital maps and other Saab training systems. We:Are can also introduce new threats and assesses personnel casualties.

Photo: Phoenix UK



**Forward observer training devices manufactured by Phoenix UK**

**Battlespace Systems:** Bohemia Interactive Simulations (BISim), of Prague, Czech Republic, and Orlando, USA, produce the Virtual Battlespace 3 (VBS3) system. As well as screen and projected imagery, it can also be used with head-mounted displays (HMD). BISim has also released version 18.3 of its Virtual Battlespace Image Generator (VBS IG) that enables users to use existing databases or to build new ones using standard Geographic Information Systems (GIS).

**Exercise Management:** SimCentric Technologies of Oxford, UK, have announced their SAF-Foresight system. This is for live-fire exercises and includes planning, briefing, exercise management and visualization. It

with the Cubic Long Term Evolution (LTE) network for army field training. Users can operate EXONAUT via the LTE connection in remote training locations. This will allow exercise managers to monitor and control training in real-time from smart phones or tablets. After Action Review is based on the RMP Dashboard system which includes visualisation and analysis.

**Forward Observer Training:** Havelsan, headquartered in Ankara, Turkey, have introduced a Portable Artillery Forward Observer Simulator (PAFOS), developed from their existing classroom-based AFOS system. The portable system can train up to 5 Forward Observers at a time, weighs about

troller Training System (AJTS) that can be used for calling in artillery or air strikes. This has a dome-based wide-angle view of the battlefield with a Forward Observer or Attack Controller station, plus an Instructor Operating Station (IOS) for different training scenarios.

**Multi-Role Simulator:** VT MÄK, of Cambridge, Massachusetts, USA, produces their VR-Engage V1.3 multi-role simulator for gunners, commanders, or vehicle drivers. It includes vehicle models, a vehicle physics engine for motion modelling, sensors, weapons, countermeasures, and models of a variety of engagements. Imagery includes Vortex Studio Essentials from CM Labs Simulations with access to Vortex Studio tools including desktop applications, multi-body dynamics engine, visualisation system, power-train modelling and motion-platform integration. It also includes the library of DI-Guy characters including friendly, hostile, and neutral images.

**Recoil Simulation:** Worldwide Enterprises of Albuquerque, New Mexico, has patented a full-force recoil system for machine gun trainers. This is the all-electric Gun Active Recoil (GAR) system for gun trainers used by the Canadian MoD, UK Royal Navy, and the US Army, Air Force, Navy and Marines.

## Regional Projects

**Asia Pacific Region:** Cubic Global Defense, of San Diego, California, has a US\$25M contract for several mobile Combat Training Centres (CTCs) for a customer in the Asia-Pacific region. Laser-based simulation will be supplied for various gunnery systems, vehicles and soldiers.

**Belgium:** The Belgian Army is using the SWORD war gaming system from MASA Group, headquartered in Paris, France. This is deployed in the simulation centre in Limburg for command-post training at Company and Battalion levels. At Limburg, SWORD works with the Virtual Battlespace 3 (VBS3) system from Bohemia Interactive Simulations (BiSim).

Photo: RUAG



**The RUAG tank gunnery simulator**

includes a safety alert intervention tool aimed at reducing injuries in live-fire exercises. SAF-Foresight is to be used by the Australian Army in its modernisation of range and target systems.

Cubic Corporation of San Diego, California, and 4C Strategies of Stockholm, have developed the EXONAUT training and exercise management system. This can be used

90 kg, and can be folded up into a transportable box after use. It includes an operating station with keyboards and flat screens, together with "Virtual Binoculars" for target acquisition. The binoculars can also be used as a laser rangefinder.

At the IITSEC exhibition in Orlando, Quantadyn of Herndon, Virginia, demonstrated their Advanced Joint Terminal Attack Con-





Photo: Saab

### Saab's mortar trainer and training ammunition

**Hungary:** Artifex Simulation of Budapest produces the ZEUS artillery tactical and fire control simulation system. This is used for battery, battalion, and reconnaissance training and can be linked to the company's MARCUS Computer Assisted eExercise (CAX) system for training at brigade and corps levels.

**Finland:** Saab Security and Defence Solutions, headquartered in Järfälla, Sweden, is to supply simulators for marksmanship and combat training to the Finnish Defence Forces Logistics Command. The order value is about €9million and the system is to be operational in 2020. It will have simulations of weapons, a virtual environment and after-action review (AAR).

**Germany – US Army:** Cubic Global Defense has a US\$11M contract for Rotational Exercise Design Support Services (REDSS) at the Joint Multinational Readiness Center (JMRC) in Hohenfels Training Area (HTA) north of Munich. JMRC provides realistic training including opposing forces and after-action review (AAR). Tapestry Solutions, a Boeing company headquartered in San Diego, USA, has a US\$58M contract with the US Army overseas 7th Training Command. This includes live and virtual training at Hohenfels, and the Joint Multinational Simulation Center (JMSC) Grafenwöhr including its satellites in Kaiserslautern and Vicenza, Italy.

**Israel:** Bagira Systems, headquartered in Holon, Israel, has delivered more Israeli-Engagement Skills Trainers (I-EST) to the Israel Defense Force (IDF). These are at the Advanced Armor Training Base, the Artillery Corp Training Base, and the Border Security

and Patrol Training School. The system is based on Cubic EST 2000 system and Bagira leads the project in Israel.

**Netherlands:** The NLR aviation research organisation, headquartered in Amsterdam, and TNO, the Netherlands Organisation for Applied Scientific Research, headquartered in The Hague, are providing Mission Training through Distributed Simulation (MTDS) to the Netherlands Ministry of Defence. The contract is for €5.7M over four years.

**Peru:** Bagira Systems delivered its MAGNET system to the Peruvian Army. MAGNET is a laser-based weapon training system, controlled by an Android-based Instructor Field App (IFA).

**Thailand:** Van Halteren Defence has delivered a 105mm Howitzer Crew Trainer (HCT) to the Royal Thai Army (RTA). This includes a virtual database of training areas, howitzer models LG1, M101 and M119, and covers the fire support cycle from forward observer, fire control centre (FDC) to the gun crew. The package includes a Joint-fires BattleSpace Simulator (JOBSS) from Bagira Systems.

**UK:** Cubic Global Defense has a US\$35M three-year contract for Area Weapons Effects Simulation (AWES) at the Salisbury Plain Training Area (SPTA) in the UK, and the British Army Training Unit Suffield (BATUS) in Alberta, Canada. AWES uses GPS to track the positions of more than two hundred vehicles and a thousand individual soldiers. It includes weapon and NBC effects and records hits and misses using Cubic's MILES system.

Saab Security and Defence is to continue support for its Direct Fire Weapons Effects

Simulator (DFWES) system for the British Army. The three-year contract extension has a value of about £21M. DFWES is a laser-based Tactical Engagement Simulation (TES) system that simulates the effects of fire from artillery, Armoured Fighting Vehicles (AFVs) including Main Battle Tanks (MBTs), and small arms, plus recording for After Action Review (AAR). It is used at the Royal Military Academy Sandhurst, the UK Infantry Battle School (IBS), unit training on military ranges such as Salisbury Plain in the south of England, and at the British Army Training Unit in Alberta, Canada.

The UK branch of Bohemia Interactive Simulations (BISim) at Farnborough, south west of London, is to supply the British Army with virtual reality, machine learning and cloud computing systems for the Army's Collective Training Transformation Programme (CTTP). The system will use BiSim VBS3 software; VBS Blue IG image generation; and the VBS STE desktop trainer. The HIVE Insight Engine from Cervus Defence and Security will be used to process training data from the other systems.

**US Army – Augmented Reality:** The US Army is developing an Augmented Reality (AR) Synthetic Training Environment (STE) utilising One World Terrain (OWT) based on geospatial data. Work is underway at the Army Research Laboratory (Orlando), the University of Southern California Institute for Creative Technologies, the Army Combined Arms Center, and the Army Program Executive Office for Simulation, Training and Instrumentation (PEO STRI).

**US Marine Corps:** Cubic Global Defense has a US\$11.5M contract for Marine Air Ground Task Force (MAGTF) Training Systems Support (MTSS). The MTSS program trains individuals, units, commanders and their staff. Cubic will provide combat training, command post exercises, battle staff training, mission rehearsal, C4 training (Command, Control, Communication & Computers), and simulation of combat scenarios.

## Conclusion

Training will always be a balance between using the real equipment in a training mode, and exploiting the latest simulation technology. For on-range training, lasers can be fired instead of live rounds and their use recorded for After Action Review. As in other areas of military training, the use of simulation has steadily increased over the years in the gunnery area. As well as reducing training costs and fatigue on front-line equipment, modern simulation with network links can also be used to cover aspects that are difficult to train using real guns and vehicles. ■

## Better Mortar Training Saves Lives

The picture is of three mortar accidents in Afghanistan, Syria and the US that killed a total of thirteen people. At least one was due to "double loading" in a hurry to achieve rapid fire. How can we prevent live-fire accidents in the future? Clearly by better training, but what sort of training? The current training buzzword is "LVC", standing for Live, Virtual and Constructive. The idea is that first you start in the virtual world with simulations, then you progress to using models and dummies

**Estonia:** The Eli Group of Tallinn produces simulators for 60mm, 81/82mm and 120mm mortars. CO<sub>2</sub> gas from a large bottle is used to propel dummy rounds up to one tenth the distance of a live round. The diameter of the barrel is slightly smaller than the real weapon so that live ammunition cannot be loaded by mistake - a very wise precaution. The CO<sub>2</sub> bottle has enough gas for about 200 shots, more if reduced pressure is used when range is not critical. The rounds

**Sweden:** Saab Training & Simulation at Huskvarna produces the MAPAM 60mm Indoor Trainer (M-IDT). This includes a mortar replica, dummy rounds, a Forward Observer (FO) position and Instructor Operator Station (IOS). A rotating carousel at the base of the tube recovers the rounds, allowing up to five rounds of salvo fire.

**Turkey:** Havelsan, headquartered in Ankara, produces a Mortar Training Simulator with a dummy mortar and visual sys-

Photo: EXPAL



**Three mortar firing accidents in Afghanistan, USA and Syria that claimed 13 lives**

of the equipment, then move to so-called "Constructive" training where other systems are added for extra realism. Finally, training goes "Live" with the real weapon and real ammunition. For training with direct-fire weapons, lasers can replace live rounds, but for indirect-fire weapons such as artillery and mortars, lasers cannot fire "over the hill". Either real rounds must be fired or, for training purposes, impact predictions can be made through the exercise computer. Also, there are special training rounds that have propulsion and either a nominal warhead or no warhead at all. Some training rounds have reduced propulsion so that they can be used on small-area ranges, and others are inert dummies for loading training. A selection of mortar training systems follow, in alphabetical order of country.

**Austria:** ESL Advanced Information Technology of Vienna produces a Training Simulator for artillery and mortars. This includes acoustic and wind effects and the visual scene can be either on the trainee's monitor or on a projected display.

**Canada:** MIL-SIM-FX International of Tillsonburg, Ontario, produces the Remote Detonated Mortar Launch Simulator. A dummy round includes a small CO<sub>2</sub> cartridge and a plastic "burst-disc" that produces a loud report on firing. The system can also be used to launch sub-calibre inert rounds.

have a hardened nose so that they can be used several times, and a smoke generator in the round marks where it falls.

**Germany:** Rheinmetall Defence, headquartered in Düsseldorf, produces mortar training systems including a re-usable "carrier cartridge" or dummy round, for preparation, loading and firing drills.

**India:** Bharat Electronics of Bangalore produces an 81mm Mortar Simulator for Mortar Fire and Position Controllers (MFC/MPC) using screen projection and replica mortars. Training rounds can mark impacts by smoke, flash, or a small amount of explosive.

Zen Technologies of Hyderabad produces the Zen 81mm MIS (Mortar Integrated Simulator). This can train up to 6 mortar crews using replica weapons. There is a projection screen, and binoculars with a graticule display can be used for correction-of-fire. A variant is available for vehicle-mounted mortars.

**The Netherlands:** Van Halteren Defence of Bunschoten produces the MORSIM mortar training system. This has a dome-based screen inside which is a dummy mortar, the impact of rounds being displayed on the visual system.

**Spain:** EXPAL of Madrid produces the SIMOX Indirect Fire Simulator. This can train up to a section of mortars including forward observers, mortar crew and the mortar section commander.

tem. There is also a Fire Planning Trainer Console (FPTC) for scenario generation. A ballistic module calculates trajectories of different types of round, and battle-field sounds are created.

**UK:** Battlefield Sim of Bideford produces the Weapon Effects Drop Fired Mortar Simulator. When the training round is dropped into the mortar tube, a CO<sub>2</sub> capsule in the round is initiated by a spike at the bottom of the tube, venting CO<sub>2</sub> gas into a Powder Chamber and out through a plastic burst disk, creating a loud noise followed by a 2m smoke plume.

Modelling Simulation Education Training Technology (MSETT) of London produces a mortar simulation under the name "EUCLID", for training crews up to platoon level. EUCLID map software can be used for training and also for real mortar fire.

Phoenix Simulation of Littlehampton on the south coast of the UK make projector-based classroom and transportable training systems for FOs (Forward Observers) and MFC's (Mortar Fire Controller's). Systems can be extended to cover command post and battery training.

**USA:** Meggitt Training Systems of Suwannee, Georgia, produce 60mm, 81 and 120mm Mortar Simulators that can be integrated into the company's FATS 100MIL training system. Each simulator includes dummy rounds for explosive, phosphorous and illumination. A cut-out at the bottom of the mortar tube allows removal of the round after firing.



# The Turkish Defence and Aerospace Industrial Base

## Players and Programmes

**Kubilai Han**

**As one of the leading powers in a region which is facing major challenges and undergoing significant transformations, Turkey has to have an effective and deterrent military power - proportionate to the risks and threats to which it is exposed, to preserve its stability and national interests.**

**D**eveloped with remarkable progress in many areas during the last decade the Turkish defence and aerospace industry today can compete in the international arena and has the ability to meet the majority of both Turkish armed and security forces' as well as its international customers' needs.

### Self-Sufficient Industrial Capabilities

With the Turkish armed and security forces being among the world's largest (over 400,000 armed forces, more than 500,000 security personnel) and with a defence budget of TL46.5 billion (around US\$7.8 billion) and a combined defence and security budget of around TL102.8 billion (around US\$17.2 billion), the Republic of Turkey spends more than US\$5 billion annually from its national resources (including defence industry support funds) to meet the modernisation requirements of the Turkish armed forces (TAF).

Two decades ago Turkey relied heavily on imports to satisfy its defence procurement needs, but over the last decade the Turkish defence and aerospace industry has rapidly developed local capabilities to become self-sufficient and a player on the export market. Turkey has invested efforts in developing a national capability to meet the requirements of the TAF and security forces since the early 2000s. As a result of dedicated efforts and significant investments (during 2002-2017 Turkey invested over US\$35 billion in the development of a national defence industry), key defence industry institutions have been established to meet the requirements of the TAF locally, and major emphasis has been on indigenous manufacturing and development according to the defence equipment policy imposed by the MoD/SSB during the last decade.

In 2018, the share of local content reached a level of 68% in Turkey's defence procurement. In 2008, this share was only 44.2%. However, even if the local content share has increased considerably during the last decade the Turkish defence and aerospace industry still needs subsystems and material imported from abroad to produce its indigenous products. Accord-

Celebrating its 34th anniversary in November 2019 the Defence Industry Directorate (SSB), the sole military procurement authority in Turkey, is now (as of April 2019) managing over 660 defence and security programmes valued at over US\$70 billion in weapon systems for the TAF, SGD (Turkish National Police) and other government organisations including (but not limited to) the

Photos: Author



**Mockup of the HURJET Advanced Jet Trainer at TUSAS' facilities**

ing to the Defence & Aerospace Industry 2017 Performance Report published by the Defence Industrial Manufacturers Association (SASAD) the Turkish defence and aerospace industry imported goods valued at US\$1.544 billion (US\$776 million from Europe, US\$536 million from US and US\$232 million from elsewhere) to generate US\$1.824 billion in exports and a US\$6,693 billion turnover in 2017. As this issue goes to print figures for 2018 have not yet been available.

General Directorate of Forestry and General Directorate of Mineral Research and Exploration (MTA). In 2008 the SSB managed 194 projects valued at US\$19 billion.

### Cooperation with Foreign Partners

Considering the fact that modern international cooperation approaches like joint ventures and partnerships rather than direct sales are now an absolute

necessity in the field of defence, SSB has been encouraging local companies to establish joint ventures and partnerships with potential foreign partners in friendly and allied countries rather than merely seeking direct sales, which is becoming

In parallel with the development of the local defence industry and the creation of new domestic capabilities in recent years, Turkey has turned to be an attractive partner for international defence industries wishing to establish strategic partnerships with Turkish

*The T129B ATAK combat helicopters are built under licence to Leonardo and will be delivered in two basic configurations.*



harder day by day because the majority of countries in Turkey's target markets are increasingly seeking local content and joint production.

As a result of this strategy, the Turkish defence and aerospace industries have established several joint ventures and partnerships during the last decade, addressing the Middle East and North Africa (MENA), EurAsia, and Asia-Pacific regions, which are among Turkey's target markets for defence equipment.

companies for both local and international markets. In this context, countries such as Italy, the UK and Germany have increased their efforts to enhance bilateral cooperation with Turkey and to explore opportunities to establish partnerships in the defence sector for sales to third parties. To develop and manufacture high-tech products not only to meet national requirements but also for sales to third countries Turkey wishes to make joint investments and partnerships with European countries based on a win – win principle.



*The ALTAY MBT is based on the Korean (RoK) K2 BLACK PANTHER design. The first prototype was publicly presented in 2012.*

## Major Procurement Efforts in Turkey

It should be noted that all defence materiel items delivered by the Turkish defence and aerospace industry to the Turkish armed and security forces, could also successfully be made subject to export programmes

## ALTAY MBT Series Production Project

The contract for the ALTAY Phase-II Series Production Project was awarded by SSB to BMC on 9 November 2018. In the scope of this programme, 500 ALTAY MBTs are to be procured in two batches. The first batch of the ALTAY MBT Series Production Phase, for which the contract was awarded, covers the production of 251 vehicles in three configurations. 40 vehicles will be in T1, 210 will be in T2 and one vehicle will be in T3 configuration. The T1 variant is scheduled to be in service with the Turkish land forces 18 months from the date that the contract became effective, and deliveries shall be completed in 2021. The deliveries of the T2 configuration vehicles are expected to begin shortly after completion of the T1 deliveries. The ALTAY MBT T3 configuration is scheduled for qualification in 2024.

## ADA Class Corvettes

Under the MilGem (National Vessel) Programme, four ADA Class corvettes, wholly indigenous patrol/anti-submarine warfare (ASW) vessels, have been built at Istanbul Naval Shipyard to meet specific requirements of the Turkish Navy in terms of speed, seakeeping and stability. The Turkish Navy currently operates three ADA Class corvettes, TCG HEYBELIADA (F-511), TCG BUYUKADA (F-512) and TCG BURGAZADA (F-513). Provisional acceptance of TCG KINALIADA (F-514), which started sea trials in March 2019, is scheduled for September/October 2019.

## ISTIF Class Frigates

In the scope of the ISTIF Class programme was four frigates, an extended and enhanced version of ADA Class corvettes, are to replace the aging YAVUZ Class frigates from mid 2020s. Istanbul Naval Shipyard is responsible for the design and the prototype ship construction. The construction of the FoC, TCG ISTANBUL (F-515), was officially started on 19 January 2017 with a steel cutting ceremony. TCG



ISTANBUL was scheduled to be operational in 2021, but the deadline has been recently extended to 2022. The three sister ships (TCG IZMIR, TCG IZMIT and TCG ICEL), planned to be built in private shipyards, are to follow in 2022, 2023 and 2024, but again, at least one-year extension of the schedules can be expected. The series production of the sister ships was made subject to a competitive tender, and Dearsan and TAIS were shortlisted in late 2016. No final decision has been taken since.

### TCG ANADOLU Multipurpose Amphibious Assault Ship (LHD)

Under the terms of the Multipurpose Amphibious Assault Ship (LHD) project contract signed on 1 June 2015 between SSB and Sedef Shipbuilding Inc. (Sedef Shipyard), the keel laying ceremony of TCG ANADOLU (L-400) took place on 30 April 2016. The project activities (T<sub>0</sub>) had started on 18 September 2015. TCG ANADOLU is to be built with a 68% share of domestic content and temporarily delivered to the Turkish Naval Forces Command (TNFC) in the T<sub>0</sub> +67 month (April 2021). Following the

12-month warranty period, the final acceptance is scheduled to be completed in the T<sub>0</sub> +79 month (April 2022). TCG ANADOLU is expected to be launched in April 2019.

### REIS Class Type 214TN Submarines

A total of six REIS Class Type 214TN submarines with an air-independent propulsion system (AIP) are to be built at Golcuk Naval Shipyard. The first four submarines are currently building. Construction of

(TCG HIZIRREIS) started in 2016 and construction of the third submarine TCG MURATREIS started on 25 February 2018 with a first welding ceremony. At a ceremony held on 4 November 2018 the first welding of the fourth REIS Class submarine TCG AYDINREIS (S-333) was conducted by President Erdogan. The REIS Class Type 214TN AIP submarines are scheduled for commissioning between 2021 and 2026.

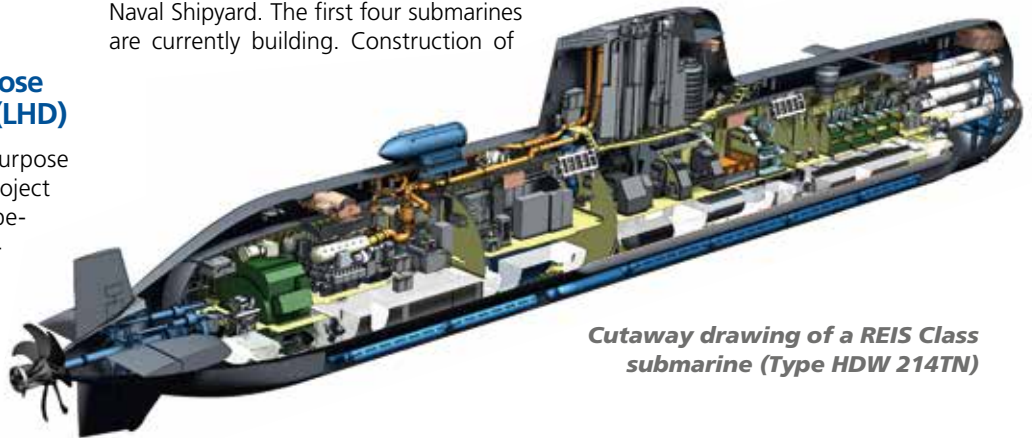


Photo: tkms

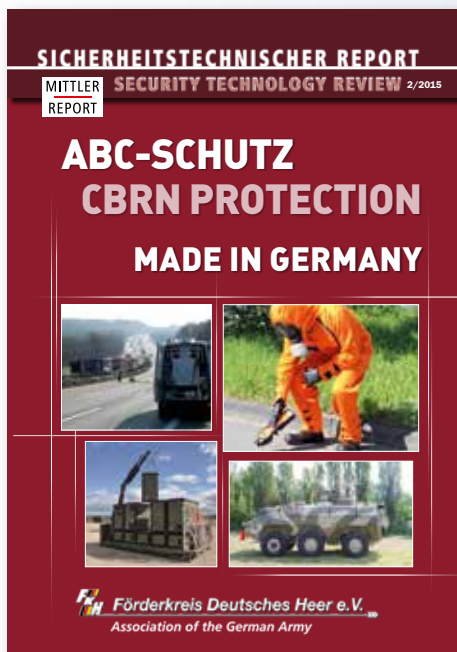
Cutaway drawing of a REIS Class submarine (Type HDW 214TN)

the first boat, TCG PIRIREIS, started in October 2015 (the launch of the vessel was originally scheduled for late 2018 but was postponed to 2019), the second one

As the first AIP-equipped submarines operated by the Turkish Naval Forces Command (TNFC) the REIS Class will replace four AY Class (Type 209/1200) diesel-electric submarines.

## New brochure

## MITTLER REPORT



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**TCG ANADOLU, the new multi-purpose amphibious assault ship (LHD) currently being built at SEDEF Shipyard, will have a local content share of 68%.**

## TF-2000 Air Defence Warfare (ADW) Destroyer

TNFC has initiated a project called TF-2000 to build a total of four (+2 optional) destroyers fitted with enhanced anti-air weapon and sensor systems. The objective of this project is to acquire an area air defence capability. The TF-2000 Air Defence Warfare (ADW) Destroyer is expected to have an overall length of 145m to 150m, a displacement of between 6,500 and 7,000 tons, an overall beam of 18.5 to 19m and a draught of 5.5m. Under the terms of the programme, which is expected to reach a financial volume of US\$3.5 to 4 billion the construction of the FoC will take place at Istanbul Naval Shipyard while the three other units are to be built in private shipyards.

likely not be kept with due to the fact that construction has not started yet and a delay of at least two years is anticipated. The other three hulls are planned for commissioning in 2028, 2029 and 2030.

## TF-X National Combat Aircraft

In order to meet Turkish Air Force (TuAF) requirements beyond 2030s, the TF-X National Combat Aircraft Development Programme was launched in accordance with Decision No 545 taken at the Defence Industry Executive Committee (DIEC, the highest decision-making body on defence procurement in Turkey) meeting held on 15 December 2010. The TF-X National Combat Aircraft with twin-engine and a conventional wing tail assembly configuration will be a single

provide air protection for the TuAF's F-35A LIGHTNING II fleet.

In order to meet the TuAF's operational requirements, the 60,000lb class TF-X will be equipped with twin turbofan engines, with low observability and super cruise capabilities. According to TUSAS President & CEO Temel Kotil the TF-X will have indigenous turbofans each generating 27,000lb thrust. The first of seven TF-X prototypes, to be powered by a pair of GE's F110-GE-129 turbofan engines, was originally scheduled to perform its maiden flight in 2023, when Turkey will celebrate the 100th anniversary of the founding of the Republic, but this schedule was changed in March 2018 when Kotil disclosed that the first flight will not be before 2026. The first of an envisioned 150 production TF-X aircraft is expected to leave the TUSAS facilities in 2029 and to enter TuAF service in 2031. Deliveries will continue until 2039 and the TF-X aircraft will be phased out from the TuAF inventory after the 2070s.

## HURJET New Generation AJT & Light Attack Aircraft Development Project

The HURJET project is aimed at the development of an indigenous new generation Advanced Jet Trainer (AJT), capable of supersonic flight to replace the T-38M jet trainer fleet in TuAF, and a Light Attack Aircraft (LCA) able to perform a Close Air Support (CAS) role to assist and release the loads on the TuAF's F-16C/Ds. The HURJET indigenous jet trainer will be used to train pilots for the next generation F-35A and TF-X fighters in 2030s. Currently, the TuAF operates 68 T-38M for advanced jet and combat readiness transition training at Çiğli Air Base (2nd Main Jet Base Command) in Izmir. As in the case of the T-38M, HURJET will be used for both advanced jet training and combat readiness transition training. The TuAF can also employ the HURJET as a hostile aircraft during exercises.

## T129A/B Mk-I and T-129 Mk-II ATAK Multi-Role Combat Helicopter Programmes

TUSAS manufactures T129A/B helicopters under licence from the Italian-British AgustaWestland (rebranded as Leonardo Helicopters in 2016) and as of 12 April 2019, the company has completed the delivery of 38 T129A/Bs (9A and 29Bs) to the Turkish Land Forces (TLFC) and 7 T129Bs to the Gendarmerie General Command. The delivery of the first three T129Bs to the Gendarmerie General Command took place on 19 April 2018, the fourth one (J-1512 YAVUZ) on 7

Photo: TUSAS



**Artist impression of the future TF-X national combat aircraft**

According to the Naval Vessel Construction Projects Road Map prepared by the Turkish MoD's General Directorate of Shipyards (TGM), the FoC of the TF-2000 ADW Destroyers is scheduled for commissioning in 2024. However, this schedule can most

seater sixth generation indigenous air superiority fighter, which will replace the F-16C/Ds in TuAF service from 2030s. The TF-X will have stealth features, super cruise capability and new generation avionics (AESA radar and integrated EW suite) and will escort and



November 2018, the fifth in January 2019 and the sixth and seventh on 2 April 2019.

The T129B ATAK helicopters for the TLFC have two basic configurations; Phase-I (covers 29 helicopters) and Phase-II (covers 21 helicopters). The major difference between these two configurations is their EW self-protection suite. Phase-II T129Bs, which incorporates 39 new equipment items if compared to T129B Phase-I helicopters, will be fitted with RWR, RF Jammer and LWR (in addition to existing CMDs launchers, MWS sensors and IRCM System), as well as with 9681 V/UHF Radio sets. Deliveries of the Phase-II T129Bs will commence in 2019.

On 22 February 2019 the contract for the T129 Mk-II heavy attack helicopter project was signed between TUSAS and SSB. According to the project schedule the first test flight will take place five years after contract award. According to information released after the signing ceremony the 10-ton T129 Mk-II will be powered by two turboshaft engines and will have double the take-off weight of the T129A/B Mk-I ATAK multi-role light combat helicopter (with a take-off weight of 5 tons [11,023lb]). The payload capacity will be more than 1,200kg, there will be three hard points

on each wing and armament will include a 30mm, single-barrel automatic cannon attached to a turret under the helicopter's nose.

### T70 TUHP

Valued at approximately US\$3,5 Billion the Turkish Utility Helicopter Program (TUHP) contract was signed on 21 February 2014 and became effective on 15 June 2016. Under the contract 109 T70 (S-70i International BLACK HAWK) helicopters (+191 options) will be manufactured with 63% local content over the next 10 years in Turkey at Turkish Aerospace (TUSAS) facilities to meet the requirements of six Turkish military and government agencies. The Turkish Land Forces will receive 22 Utility (UH)/SAR configured T70s, the special forces will receive 11 T70s in the SAR/CSAR configuration, the Turkish Air Force will receive 6 in SAR/CSAR configuration, the Gendarmerie General Command will receive 30 in the SAR/CSAR/ Armed Reconnaissance Helicopter (ARH)/ UH configurations, the Security General Directorate (SGD, Turkish National Police) will receive 20 UH versions and the Direc-

torate General of Forestry will get 20 T70s in fire-fighting configuration.

### T625 GOKBEY TLUH

The T625 GOKBEY Turkish Light Utility Helicopter (TLUH) programme will be executed under a US\$687.3 million contract awarded on 26 June 2013 by SSB to prime contractor TUSAS. Under the terms of the TLUH programme TUSAS has completed design, development and manufacture of an indigenous twin-engine 5-tonne class light utility helicopter with a take-off weight of 6 tons and powered by two CTS800-4AT turboshaft engines.

The T625 TLUH can accommodate a maximum of two crew, namely a pilot and co-pilot, and up to 12 passengers. The T625 TLUH prototype performed its first flight on 6 September 2018. The T625 GOKBEY TLUH will initially be certified by SHGM & EASA and then converted with mission equipment for Turkish military use to replace the aging UH-1H HUEYs. Certification and qualification efforts started in 2018 and are scheduled to be completed in 2021. Serial production is expected to start in 2021. ■

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# Turkish Defence Exports and Political Environment

**Korhan Özkilinc**

**With more than 300 core companies, the Turkish defence industry is broadly diversified and its competencies include the manufacture of ships, armoured land vehicles and tanks, software systems, NBC protection, aerospace components, helicopters, training aircraft and military electronics.**

More than a thousand highly specialised suppliers contribute to these core companies. However, as in many other countries, not all critical technologies are manufactured in-house, such as engines, special aerospace components or rare earths. Over

support them with their internationalisation process and branding efforts in 2011. These companies are basically the prime contractors for all important projects in the country, e.g. ASELSAN, TAI, ROKETSAN, HAVELSAN, TEI, ISBIR, ASPILSAN,

through a company set up specifically for this purpose, SSTEK AS (Defence Industries and Technology), so that these SMEs can reach their critical mass. If necessary, these SMEs are also managed as subsidiaries of the Turkish armed forces. Several



Photo: EUROSAM

**Turkey is currently negotiating with France to participate in the EUROSAM project. To this end, President Erdogan and French President Emmanuel Macron signed a Memorandum of Understanding.**

the past 15 years, Turkey has tried to reduce its dependence on the US and Europe or NATO partners and is seeking partners such as Russia and China to multiply its procurement strategy. But it is not the case that the US and its allies will no longer play a central role in the future, on the contrary.

## The Defence Ecosystem

As an important measure to strengthen local industry, Turkey committed the Turkish armed forces to contract Turkish SMEs and

TRtest, etc. The Turkish armed forces are also responsible for the internationalisation of Turkish SMEs. The association around the TÜBİTAK Institutes (Scientific and Technological Research Council of Turkey) contributes a very important part to this, as they are very well networked with other institutes and universities and bring these important start-ups to the market using research and development. For some years now, the SSB (Presidency of the Defence Industry) has been trying to invest in the creation of new companies

dozen start-ups are currently in the starting blocks. They are active in the fields of microtechnology, nanotechnology and rocket systems. A well-known example is ULAK HABERLESME, a company specialising in the 5G mobile communications network, which was taken over by ASELSAN at the end of 2018. Last but not least, by decision of President Recep Tayyip Erdogan, 27 factories of the Turkish Army and three naval shipyards (the largest in Turkey, by the way) have been merged and commercialised un-



der ASFAT (Military Factory and Shipyard Management Inc.) since the beginning of 2018. When necessary, these companies can pass on the knowledge they have acquired over several years to private companies in the framework of specific projects. ASFAT is also entitled to be involved on its own in these projects. For instance, ASFAT is the company that has sold the four MILGEM corvettes to Pakistan and can acquire large projects abroad. In other words, through some reorientations and restructurings, the Turkish Government has created an ecosystem for the Turkish defence industry with the goal of becoming as independent from abroad as possible - and that works very well. This strategy is motivated by the fact that in the past the US and some of its closest allies have embargoed or delayed the supply of arms to Turkey for political reasons, thus endangering the country's security.

### Dispute with the US

Relations between the USA and Turkey are currently strained on account of the planned purchase of the Russian S-400 air defence system. This is because the security of NATO and the F-35 produced by Lockheed Martin would be threatened

by Russian malware. But one should bear in mind that the three NATO members Bulgaria, Greece and Slovakia already have the mature model of the Russian S-400, namely the S-300; more than 200 Russian missiles are already in the NATO inventory.

Geopolitically, Turkey is located in a troubled region and at the intersection of the world's most important energy hubs. The country has major deficiencies in air defence and the few batteries provided by NATO partners cannot meet the country's requirements. Against this background, Turkey received offers for its tender in 2010 and in September 2013 decided to purchase the Chinese FD-2000 for \$3.4 billion from China National Precision Machinery Import and Export Corporation, but due to discrepancies with the US in November 2015, this project was cancelled with the intention to purchase the PATRIOTS from the US. Subsequently, also this project was no longer in Turkey's interest and negotiations with the USA were discontinued. In 2016, Turkey expressed its intention to procure the Russian S-400 BMD and the project was officially launched in 2017.

Now the US threatens to suspend Turkey's Level 3 partnership with the US armed forces on the F-35 JSF programme

because of the procurement of the Russian S-400. Despite pressure from the US, Turkey insists on its ambitions - and with good reason. For example, Turkish Secretary of State Mevlüt Cavusoglu said on 3 and 4 April 2019 at the NATO Foreign Ministers' Meeting in Washington D.C. that the procurement of the S-400s would be continued and the US-PATRIOTS would also have to be procured, but Turkey fears that, as with previous agreements, arms supplies would be blocked by US Congress, even though the US government had approved them. The Secretary of State also said that his country would not be choosing between Russia and the US for the sake of sovereignty. In early 2019, Turkish President Recep Tayyip Erdogan said on television that he would procure PATRIOT, but the US side has not yet resolved the issue of financing and technology transfer. Of course, Turkey's purchase of Western technologies such as PATRIOT is in the interest of NATO and Alliance interoperability, but in addition to PATRIOT, Turkey of course also has the possibility to acquire European alternatives as part of ongoing negotiations with EUROSAM on the ASTER SAMP/T development and/or to participate as a partner in the German MEADS development.

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We can be sure that the US will be confrontational with Turkey, and US sanctions will also have a negative impact on the dynamic Turkish arms industry which will also affect other important projects. But one thing is clear: the S-400 is a very mature weapon system, but the Turkish chain of effects is tailored to NATO strategy and therefore the S-400 weapon system is not fully usable in Turkey.

## Mature Missile Technology

Turkey can of course act as a sovereign country and pursue its own procurement strategy, but Ankara should ask itself a question: Why is Russia not worried about delivering mature missile technology to a reliable NATO member?

It is obvious that Russia wants to pull Turkey out of NATO. This is how the article "The Value of Science Is in the Foresight," by Valery Gerasimov, acting Russian Chief of Staff, in the February 2013 issue of the Russian magazine "Military Industrial Courier" can be understood. This article went down in Russian military history as the "Gerasimov Doctrine", although President Vladimir Putin never approved it.

Essentially, it is not a new strategy of the Russians, because it is based on the "maskirovka", a kind of camouflage or masking of one's own intentions by hybrid strategies. Turkey should adopt a cautious approach in its relations with Russia and the US. But in the last sixty years there have been many crises between Turkey

Photo: DoD



**Joseph Dunford, Chairman of the Joint Chiefs of Staff, meeting with his counterparts, Turkish General Chief of Staff Hulusi Akar and Russian Chief of Staff General Valery Gerasimov.**

and the USA that both countries have always been able to overcome, not least because Turkey's geopolitical situation is God's most beautiful gift to the Turks. An abridged chronicle on the crises between Turkey and the USA:

- In the Cuba Missile Crisis, the US secretly resolved the conflict with the Soviet Union by withdrawing the JUPITER missiles from Turkey against the will of the Turkish Government.
- On 5 June 1964, President Lyndon B. Johnson sent a legendary letter to Turkish Prime Minister İsmet İnönü, in which he threatened to stop US aid and isolate Turkey in NATO if Turkey landed on the island of Cyprus. The Turks then did not pursue further military steps, but the Turkish invasion of Cyprus began later.
- Between 1958 and 1971, at the request of the US Government, the Turkish Government restricted opium cultivation in 42 provinces to four provinces. Although the Turkish National Assembly passed Law 812 on "Convention on Narcotics" in December 1965, the US stepped up its pressure. In 1970, the then US Attorney General John Mitchell threatened Turkey with economic sanctions and in 1971 President Richard Nixon finally imposed a ban on opium cultivation in Turkey. Turkish Prime Minister Nihat Erim signed a decree on 30 June 1971 and banned the cultivation of opium as of 1972. As a result, several hundred thousand farmers were deprived of their livelihoods and the Turkish pharmaceutical industry suffered a severe setback in many drug development projects.

- In 1974, Turkish Prime Minister Bülent Ecevit legalised opium cultivation and ordered the Turkish armed forces to invade Cyprus and suppress a Greek uprising against the Turkish minority. Turkey then proclaimed the foundation of Cyprus, cancelled the treaty for defence cooperation with the US and placed all US bases in Turkey under Turkish control.
- In 1976, Turkey and the USA signed a new defence treaty, and two years later, US President Jimmy Carter lifted the arms embargo.
- The year 2003 was overshadowed by two important events for Turkish-American relations. On 1 March 2003, Turkey refused to participate in the Iraq war. Only after the end of the war and UN Security Council Resolution 1483 did Turkey decide to send troops to Iraq for a peace mission. Meanwhile, more than a dozen Turkish special forces had been captured in Iraqi Suleymaniye by US troops and taken to Baghdad for interrogation. In Turkey, this was perceived as profoundly offensive.
- Former Prime Minister Ahmet Davutoğlu repeatedly declared during his term of office in 2015 and 2016 that Turkey will not accept a Kurdish state in Northern Syria and sees the US-backed YPG as a puppet of the PKK terrorist organisation.
- Since 2016, relations between the two countries have cooled down considerably. Reasons for this were the military coup and the associated dispute over the extradition of Fetullah Gülen from the US, in December 2017 the arrest of the US pastor Andrew Brunson in Izmir



Photo: TAI

**In late March 2019, TAI promoted its T129 ATAK multipurpose combat helicopter ahead of LAAD, the largest and most important trade fair for the defence industry in Latin America.**



for espionage and the support of Kurdish separatists, the summits of discrepancy. Pastor Brunson was released from prison prematurely for health reasons and flown to the USA.

## Export Ambitions

In 2017 and 2018, Turkey achieved above-average economic growth of 7.5% of GDP, as domestic consumption was stimulated by government subsidies and because the depreciation of the Turkish lira favoured exports. In 2010, GDP grew by 8.49% compared to 2009, while GDP in 2018 grew by only 4.41%. In comparison, in 2010, US\$14.05Bn were spent on defence, amounting to 1.82% of GDP and in 2018, US\$21.05Bn (2.36% of GDP). Thus, Turkey has been able to meet the targets of NATO. In April 2019, the President of SSB Ismail DEMIR and the Chairman of the SSI (Defence and Aerospace Industry Exporters Association) Latif Aral Alis jointly issued a statement on the situation of the Turkish defence industry in which they stated that the companies had grown steadily over the past 10 years and were more visible on the international stage.

The figures presented show that exports in the first three months of 2019 were 60% higher than in the first quarter of 2018. This shows just how ambitious Ankara's future objectives are. Turkey wants to place ten global player companies in the TOP 100 rankings of the world, but currently only four companies are ranked. The SSI is said to have had only 60 members in 2011; currently that number is over 700. In 2011, Turkish defence exports amounted to US\$884M and by the end of 2018, the amount was well over US\$2Bn, showing growth of 130% in 8 years. Exports for 2019 are estimated to be in the range of US\$3Bn and this number does not even include sales of four MILGEM corvettes for US\$1Bn and 30 T129 attack helicopters for US\$1.5Bn to Pakistan and eight T129 attack helicopters to the Philippines.

The most important export markets for the Turkish defence industry are Azerbaijan, Germany, Great Britain, India, Malaysia, Qatar, Saudi Arabia, Tunisia, the UAE and the USA. Only the local hero ASELSAN has customers in over 80 countries. Turkey's diplomatic missions contribute to this positive development so that the local industry can open up new markets. The visits by the President and CEOs of SSB and major Turkish companies to trade fairs such as the Malaysia LIMA Fair in March 2019 and LAAD Defence & Security in April 2019 in Brazil illustrate Turkey's offensive sales strategy.

In 2018, the Turkish defence industry exported 17% more goods than it did the year before, for a total of US\$2Bn. In 2018, the USA was the most important export destination accounting for US\$726.7M, which means an increase of 5% for Turkish companies compared to the previous year. Military equipment was exported to Germany for US\$226.1M, an

## Outlook

As a result of the failed coup of 15 July 2016, several 10,000 military personnel were released or arrested. In order to reduce the military's influence, the armed forces were restructured - a goal that the AKP government has pursued since taking office in 2003. Many of the General



Photo: SSB

**Malaysia is a primary export partner for the Turkish defence industry.**



Photo: SSB

**The visits by the President of SSB and CEOs of major Turkish companies to trade fairs such as the Malaysia LIMA Fair in March 2019 are part of Turkey's offensive sales strategy.**

increase of 8% over 2017. Oman is exceptional because of APV exports worth US\$153.4M. Qatar is also a major market and has recently purchased APVs for US\$800M. The numbers will be in the books in the near future.

The figures will increase significantly in the next few years, as many Turkish SMEs have focused on the domestic market and internationalisation is only picking up slowly, so that the figure of US\$3Bn dollars and a growth rate of 20% is not unrealistic for the defence sector. But the target of 2015 to reach US\$25Bn in 2023 - the 100th anniversary of the Republic of Turkey - is likely to take some time.

Staff's responsibilities were assigned to the MoD, and the paramilitary units, i.e. the General Command Gendarmerie and the Special Police Forces, were assigned to the Ministry of the Interior. The Turkish police then took over some military tasks and at the same time was equipped with heavy weapons and armoured vehicles, so that in future internal security will be more closely controlled by the Ministry of the Interior than previously by the military. In the course of the restructuring of the Turkish Army, the high proportion of conscripts was reduced and the level of professionalisation of active soldiers increased, i.e. mobility and competence increased enor-

mously. Ankara's intention to participate more widely in NATO missions was clearly hampered by the military coup.

Of course, current economic growth and high inflation over the last two years have damaged competitiveness. However, the defence industry is not affected by the neg-

ative developments due to its solid position in international markets, well-developed infrastructure and high domestic demand. This is partly because after the military coup many foreign defence companies took a break from the Turkish market, which was a blessing for the Turkish defence industry as many companies were able to improve their skills, make new investments and reposition themselves on international markets. Moreover, between 2005 and 2015, many hundreds of highly qualified Turkish officers were recruited from the military or forced to serve by the disciples of the preacher Fetullah Gülen. It was precisely these former officers who, with their valuable knowledge and experience, served as a catalyst in the defence industry.



Photo: Pentagon

**For a number of reasons, relations with the US have been bad for several years.**

The Turkish defence industry has gone through four phases since the founding of the Republic, with the fifth phase gradually beginning. The first phase began in 1923 immediately after the founding of the Republic and lasted until 1950 when the young state tried to establish new companies through state intervention. The second phase lasted from 1951 to 1973, when Turkey joined NATO, which was an important milestone for the Turkish armed forces as they began to integrate Western technologies. The third phase between 1974 and 1985 began with a severe

blow when Turkey was forced to invade Cyprus to stave off a looming genocide against the local Turkish population and the subsequent US arms embargo against Turkey. From 1985 to the present, Turkey has deliberately continued to modernise and expand its military capabilities. The

fifth phase has already begun. It is an open secret that Turkey, like many Western countries, is working on disruptive defence technologies. Digitisation is also in full swing, with ASELSAN, HAVELSAN and STM employing a number of private companies. In 2016, SSB presented its export strategy for 2017-2021, according to which Turkish companies should not only focus on exports, but also conclude partner agreements with foreign companies for mutual benefit. In addition, the country has also developed a financing strategy for cooperation in research and development and for projects with foreign companies, i.e. everything that promotes exports. Countries that buy Turkish military equipment can also benefit from Turkish loans. In addition, companies are encouraged to participate more strongly in international tenders and projects such as the NATO-CNAD (Conference of National Armaments Directors) and NSPO (NATO Support and Procurement Agency) programmes. European programmes are little known in Turkey, but it seems that European defence programmes such as PESCO (Permanent Structured Cooperation) and OCCAR (Organisation for Joint Armament Cooperation) will be very popular. The efforts of Turkish companies to participate in a common European security

alliance would be important for the security of Europe. Recently, several domestic political events have delayed important developments and subsequent elections. Following the local elections in Turkey at the end of March, there will be no further elections in the next four and a half years, which is why the SSB Presidency of Defence Industries, SASAD Defence and Aerospace Industry Manufacturers Association and SSI Defence and Aerospace Industry Exporters are likely to concentrate more on the internationalisation of the Turkish defence industry.

## Conclusion

Turkey has been a NATO member since 1952 and has reliably fulfilled all the tasks assigned to it by the Alliance. The country has pursued an active foreign policy and is and remains true to its Western orientation and follows the guidelines of the republic's founder Mustafa Kemal Atatürk. Moreover, the country has been a candidate for EU membership since 2005, although the political situation inevitably leads to discrepancies with some European countries. Nevertheless, Turkey's geopolitical position between the Black Sea, the Middle East and Central Asia is strategically indispensable; the country could play an important role in the European Defence Union and the long-standing partnership between the Turkish defence industry and the European defence partners should be taken into account.

Unfortunately, relations with the US have been bad for several years, not only because Turkey wants to buy the Russian S-400 missiles, but also because the US is promoting the establishment of a Kurdish state in northern Syria threatening Turkey's security. In addition there is the non-extradition of the preacher Fetullah Gülen, who is supposed to be responsible for the military coup in Turkey. There is no solution in sight, mainly because the US has not appointed a new ambassador in Ankara since October 2017 due to political squabbles in Washington. It is important, however, that the new US ambassador in Ankara understands the local conditions and is not a disciple of President Trump's "America First". Moreover, improved relations with Israel are important; political relations between Ankara and Tel Aviv have been on hold since January 2009, but economic and cultural relations between the two countries have existed for decades.

The complex situation of Turkish foreign policy currently requires diplomatic rather than political skills, which means that the Turkish defence industry with its international connections can contribute significantly to reaching an understanding with the West. ■



# Komatsu's Withdrawal from the Armoured Vehicles Business

**Shinichi Kiyotani**

**Komatsu, the second largest construction equipment manufacturer and one of the most important suppliers to the Japanese Ministry of Defence, has discontinued the development and construction of armoured vehicles.**

**F**or a limited period of time, Komatsu will continue with its ongoing production of the NBC reconnaissance vehicles, maintenance and repair for the existing armoured vehicles fleet, a Komatsu spokesman said. According to industry sources, Komatsu also laid off all its military advisers, most of whom were retired generals of the Japanese Self-Defence Forces (JSDF).

In 2018, Komatsu was the seventh largest supplier to the Ministry of Defence (MoD), supplying products and services worth a total of JPY2.8Bn. However, this represents only 1.1% of Komatsu's consolidated net sales, which amounts to JPY2.5Tr in 2018.

For some years, ammunition and detonators for tanks, howitzers, mortars, etc. accounted for two thirds of Komatsu's overall turnover and one third of its armoured vehicles. In recent years, however, orders for armoured vehicles have declined.

The engine of the LAV had to be adapted to the new emission regulations and the MoD instructed Komatsu to modify the LAV. In 2016, the MoD requested JPY300M for the improved version of the LAV; however the Ministry of Finance rejected this request as overpriced.

The unit price of the LAV was JPY30M to JPY35M, about three times as expensive as other foreign competitors such as the VBL. The unit price of the new LAV version was JPY50M. When the MoF asked for a cost reduction, Komatsu considered using overseas engines like the Cummins. However, the idea was not accepted by MoD. Komatsu then developed another improved version and a 6x6 version of the LAV on its own, which was also rejected by the MoD.

For the record, on 27 July 2018, the MoD announced that the procurement of the 8x8 WAV (Improved) or WAV-In armoured wheeled vehicle to replace the Komatsu 96 8x8 APC used in the GSDF, which had been discontinued. While the MoD declared that Komatsu was unable

to uphold the quality of its armour, an industry source said that the problem was not only armour, but also mobility, certain services as well as overall quality. These problems with LAV and WAV-In were the reason why Komatsu was unable to maintain its production line for armoured vehicles. This was probably the trigger for Komatsu to withdraw from

and 500 artillery pieces, but in the future, we will reduce them to 300 tanks and 300 artillery pieces."

This means that Komatsu's ammunition business will be halved. To make matters worse, Komatsu had developed precision-guided artillery ammunition for the GSDF, but then abandoned development. Although the JSDF has not yet in-

Photo: Hunini



**A Komatsu LAV. The roof-top shield has a provision for a machine gun.**

the armoured vehicle business.

The GSDF plans to replace the LAV and the soft skinned High Mobility Vehicle with one vehicle. Mitsubishi Heavy Industries, Hitachi and another large automotive company have all expressed interest in the programme, an industry source said. Komatsu does not intend to participate in this programme.

And Komatsu's the ammunition business also looks bleak. Japanese National Defence Programme guidelines for 2019 to 2028 state: "We currently have 600 tanks

produced precision-guided ammunition, it plans to do so in the future and import it from abroad. This will further reduce Komatsu's sales and make it more difficult for Komatsu to maintain its production line. The MoF has criticised the exorbitant price of Japanese ammunition and said that there are too many small players on the field, suggesting a reduction in the number of ammunition suppliers.

In short, it is very likely that Komatsu will withdraw completely from the defence business. ■

# Saudi Arabia Shows Off

**Alan Warnes**

**Saudi Arabia organised its first international aerospace show during 12-14 March 2019.**

While the bulk of the near 100 aircraft were civilian there was plenty to catch the eye of the defence world at Al Thumamah Airport, outside of Riyadh where the event was held. Among

and Saudi's Vision 2030. Other RSAF exhibits were a single HAWK Mk65A from the Saudi HAWKs aerobatic team, which was making its first appearance in the new colour scheme, a CIRRUS SR22T and

Project Centurion, the STORM SHADOW should be officially operational with the TYPHOON on 31 March, following the retirement of the TORNADO GR4. Also seen perched next to it was the short range European IRIS-T missile, which the RAF does not use, preferring the Raytheon AIM-132 ASRAAM for now. Completing the Typhoon display was a Raytheon GBU-12/Mk 82 500lb PAVEWAY 2, two GBU-16/Mk83 1,000lb PAVEWAY 2 and a dual mode 500 lb GPS/INS PAVEWAY IV.

Another interesting batch of weapons, in front of the latest F-15SA STRIKE EAGLE was the newer generation 500lb dual mode guided GBU-49 Enhanced PAVEWAY II, 500lb dual mode GBU-54 JDAM (Joint Direct Attack Munition), 2,000lb/Mk 84 GBU-50 with semi-active laser (SAL) seeker, 2,000lb/Mk84 GBU-56 Laser JDAM, AGM-65G MAVERICK and AIM-9X SIDEWINDER. The Saudi Government has been purchasing huge numbers of these precision guided munitions (PGMs), to keep up with the war in Yemen. These arsenal of smart bombs are all part of Saudi Arabia's efforts to ensure there is no collateral damage from bombing missions. In Yemen there have been several cases of bombs missing the target, which claimed a lot of civilian lives. It was clear the RSAF is doing its best to ensure this doesn't happen as it bids to fight back in the propaganda war. The F-15S STRIKE EAGLE were seen with the older 2,000lb GBU-31 and 500lb GBU-38 JDAMs.



Photos: Alan Warnes

**A flypast during the opening day ceremony saw two RSAF TYPHOONS flying alongside one of the KE-3A tankers.**

the all-Saudi military presence, were five Royal Saudi Air Force (RSAF) fighters – a relatively new F-15SA EAGLE while a TYPHOON, F-15C, F-15S and TORNADO wore special markings celebrating last year's 88th anniversary of Saudi Arabia

PILATUS PC-21 training aircraft. The Saudi Army National Guard (SANG) showed off four helicopters, as did the Royal Saudi Land Forces Aviation (RSLFAI) and the Navy not wanting to miss out, contributed with an AS332 SUPER PUMA.

## Author

**Alan Warnes** is a journalist specialising in military aviation and has travelled to over 60 countries researching articles and taking action photos for his work. For 12 years, he was the Editor of AirForces Monthly magazine in the UK, before opting to go freelance. He has also written several books, including two on the current Pakistan Air Force in 2008 and 2017, and the most recently on 100 years of Aero Vodochody.

## Weapons

All the fighters were displayed with their weapons laid out in front of them, with the only notable absentee being an AIM-120 AMRAAM because the RSAF does not have a captive training round I was told. The TYPHOON was showing off a MBDA STORM SHADOW, although it is only operational on the TORNADO parked beside it. But that is expected to change "within weeks" an officer told me, which would make sense as the RSAF's TYPHOON evolution is following that of the RAF TYPHOON. Under

## CONVERTING EAGLES

Riyadh-based Alsalam Aerospace is currently working on its first Boeing F-15S to F-15SA upgrades. Last July, the US Government announced the award of a US\$59.7M fixed-price contract to the company, owned 40% by Boeing, to convert six F-15S at its Riyadh facilities. Work is expected to be completed by August 2020, with completion of all the upgraded 68 F-15S sometime after 2026. The bulk of the F-15SR (Saudi Retrofit) work



covers the manufacturing of the forward fuselage, both wings and new pylons and adaptors on underwing station 1 and 9, being built by Alsalam. Other updates include the installation of the Raytheon APG-63(V)3 electronically scanned array radar and BAE Systems digital electronic warfare suite.

A spokesman told the author; "each F-15S will take around nine months, with multiple aircraft on the conversion line at any one time." First deliveries to the Royal Saudi Air Force are expected in the fourth quarter of 2019.

Two jets were flown to the St Louis during mid-2014 after participating in a Red Flag exercise at Nellis AFB, Nevada. A team of Alsalam technicians worked with Boeing personnel to complete the validation and verification of the conversion and the aircraft were delivered to the RSAF in late 2016.

Alsalam also carries out the periodic depot maintenance (PDM) of all the RSAF F-15C/D/S EAGLEs and will eventually take on the F-15SA work. In addition to the EAGLE work, Alsalam is a primary service provider to Saudi's military, and a preferred provider for heavy maintenance and operational maintenance support. The platforms the company focus on is the E-3A, KE-3A tanker and C-130. It started maintenance of the RSAF's TY-PHOON fleet in 2014. The company has also upgraded three VIP HERCULES since 2008, one civilian L-100 and two RSAF C-130s, with new cockpits and elegant new interiors, which include bedrooms and suites, luxurious bathrooms, gold plating and state of the art entertainment and communications systems.

## SAMI

By the end of the year, Alsalam will have become part of the Saudi Arabia Military Industries (SAMI), which has been tasked to embrace the full industrial participation of Saudi's international programmes. The target is to employ a work force of around 40,000 people in aerospace and defence by 2030. It is all part of Saudi's Vision 2030 – HRH Mohammed bin Salman's blue print for a future Saudi, at least 50% of the Kingdom's military spending is to be localised. The Crown Prince, effectively the real ruler of Saudi Arabia, is the Minister of Defence and Chairman of the Public Investment Fund (PIF). He wants to boost jobs and revenue as well as preparing for a future with lower oil income. The Crown Prince sees this investment in defence business as a way to increase defence capability in country.

## Helicopters

There were several exhibits from other Saudi air arms. The Royal Saudi Land Forces Aviation (RSLFAI) was present with a UH-60L BLACK HAWK, AH-64E APACHE, Schweizer 333 training helicopter and a Bell 406 COMBAT SCOUT. I was told the latter are no longer fulfilling an operational role now the AH-64Es have been delivered.

LITTLE BIRD used by US Special Forces. The weapons mix includes an M-134 minigun, .50 calibre GAU-19B machine gun, M260 seven-shot rocket pods and up to four semi-active laser HELLFIRE missiles. One SANG member told me, "the AH-6i is very agile and can dip down into valleys and ravines. And at a fraction of the cost of the APACHE it's a great asset." Parked next to it was a MD530F sister-



**Weapons galore in front of the RSAF fighters. The RSAF F-15SA was showing off its large arsenal of smart weapons.**

They have provided the RSLFAI with a huge leap in capability, with the Lockheed Martin APACHE ARROWHEAD Modernised Target Acquisition Designation Sight (M-TADS) and Pilot Night Vision Sensors (PNVS) systems. The APACHE's Joint Tactical Information Distribution System (JTIDS) system allows the data-linking of information being picked up on the gunship's LONGBOW radar, to be distributed to other APACHES, without the sensor or shooter actually seeing the target. It means the vulnerable Bell 406CS, based on the OH-58D KIOWA and armed with AGM-114 HELLFIRES does not need to be fielded in harm's way. The Saudi Army National Guard was also present with four helicopters – a new AH-6i LITTLE BIRD light attack helicopter, MD530F training helicopter, AH-64E APACHE (with LONGBOW radar) and UH-60M BLACK HAWK. Undoubtedly, the highlight was the AH-6i referred to affectionately by the SANG personnel as the 'LITTLE APACHE' which has been proving itself in the Yemen. The AH-6i has gained from Boeing's development of the AH-64E APACHE and the A/MH-6M

ship, which the AH-6i has been developed from. The SANG use the helicopters for training, although the first official training course hasn't yet started – that is expected to start by the end of the year. Under the far-reaching Vision 2030, the military are also trying to bring more maintenance and training work back to Saudi Arabia. Up until now much of the ab-initio helicopter training has taken place at Fort Rucker, Alabama.

There was some foreign participation, but the likes of Raytheon and BAE Systems who have a large presence in the Kingdom were absent. Fortunately Saudi aerospace companies did appear in large numbers as they prepare to take on more local industrialisation.

The three day event was a real eye-opener for those lucky enough to attend as you seldom get the opportunity to talk to the Saudi military. What's more the event is now expected to become a biennial event, which one day could rival Dubai Air Show as the premier Middle East air show and exhibition. ■

## Changes at Airbus Board of Directors

(gwh) Following the succession to Tom Enders by Guillaume Faury (shown here) as CEO



Photo: Airbus

of Airbus, both Airbus top positions are filled by Frenchmen. Denis Ranque, Chairman of the Board, has announced his retirement for 202. According to press reports, German trade unions are pressing for a German to head the board, and René Obermann has been named, an independent non-executive Member of the Airbus Board of Directors since

April 2018. He has served as a Managing Director of the private equity house Warburg Pincus since 2015 and is also a Member of the Boards of Telenor ASA and Allianz Deutschland AG. Between 2006 and 2013, René Obermann was Chief Executive Officer of Deutsche Telekom AG.

## Curtiss-Wright to Expand into TDL Market

(ck) Curtiss-Wright Defense Solutions, a supplier of aerospace instrumentation and flight test technology, has bought the IT company Tactical Communications Group (TCG), LLC. TCG is a global provider of tactical data link (TDL) software and hardware for the military, defence contractors and government organisations. TCG's TDL software minimises the time and effort required to build, integrate, test, train and deploy communications systems. The company's products help to exchange wireless communications, including voice, imagery, text, and command and control messages, between various platforms such as ships, aircraft, weapons, and ground vehicles, and by dismounted soldiers. TCG products are integrated in high-performance military aircraft and at major defence flight test centres.

Curtiss-Wright has bought TCG in an attempt to venture into the complementary TDL training and testing market and apply TCG's communications expertise to its embedded hardware solutions. Additional market growth is expected to result from the combination of TCG's and Curtiss-Wright's worldwide military customer base, increasing opportunities to provide TDL and Curtiss-Wright's Flight Test Instrumentation (FTI) solutions with higher levels of integration, all from a single supplier. The acquisition is also to broaden Curtiss-Wright's Aerospace Instrumentation product offerings.

## Shipbuilding to Boost Job Growth in South Africa

(ck) In February 2019, Damen Shipyards Cape Town (DSCT) hosted a keel-laying ceremony, marking the start of construction on the first of three Multi-Mission Inshore Patrol Vessels (MMIPVs) for the South African Navy. These vessels are to aid in protecting the country from threats such as trafficking, illegal fishing and piracy, as well as to support job creation. The keel laying ceremony is a maritime tradition that is said to bring luck to the ship; the tradition involves placing a coin under the keel and building over it. The coin laid at the DSCT event was a commemorative medal made in honour of late President Nelson Mandela's 1993 Nobel Peace Prize award. The coin was placed under the keel by the Minister of Defence and Military Veterans, Nosiviwe Mapisa-Nqakula. According to DSCT, the construction of the MMIPVs will create more than 1,000 jobs. The MMIPVs will be work horses of

Photo: DSCT



the South African Navy, reducing the load of the Navy's existing fleet of frigates. The MMIPVs will enable South Africa to mount more effective operations against illegal fishing and trafficking. The first vessel is due to be completed by mid-2021; the second and third are scheduled for delivery in 2022 and 2023, respectively.

## HENSOLDT to Buy Parts of Nexeya

(ck) HENSOLDT will acquire the major part of the activities of Nexeya, a French electronic equipment provider for defence and commercial customers. HENSOLDT will acquire Nexeya's test and integration and services business as well as major parts of its mission management and power conversion businesses. The acquired activities represent a

Photo: Hensoldt



turnover of around €95M and a workforce of approximately 620 employees. The acquisition is to strengthen HENSOLDT's industrial base in France. The space activities of Nexeya as well as certain defence activities are not part of the transaction; they will be retained by the current shareholder.

## HENSOLDT and Airbus Helicopters to Cooperate

(ck) At the end of 2018, HENSOLDT and Airbus Helicopters signed a framework

Photo: Hensoldt



agreement for the delivery of the Airborne Missile Protection System (AMPS). Initially, the agreement will have a term of ten years without any minimum purchase requirement being set. Now the first order has already been placed. HENSOLDT will deliver a total of 20 complete AMPS systems for the military multirole helicopter H145M in 2019/2020. HENSOLDT's AMPS is already deployed on Airbus Helicopters' H225M and H135M platforms. Furthermore, the initial AMPS-M project was successfully carried out on H145. The first H145M platforms were also equipped with AMPS for further customers.

## Anglo-French FC/ASW Missile Programme Passes Key Review

(ck) Equally funded by France and the UK, the FC/ASW (Future Cruise/Anti-Ship Weapon) programme was born from requirements expressed by both France and the UK for a long range anti-ship capability, to deal with the possibility of a confrontation on the high seas, plus a capability to neutralise the most advanced air defences, and a deep strike capability that can hit long-distance hardened targets. The FC/ASW aims to replace STORM SHADOW/SCALP air launched cruise missile in operational service in the UK and France as well as the EXOCET anti-ship missile in France and HARPOON anti-ship missile in the UK. Two years into the FC/ASW Concept Phase, MBDA has achieved its "Key Review" which makes it possible to select the most promising missile concepts. The conclusions of this Key Review will also make it possible to establish the road maps for maturing the required technologies.



## Naval Innovation Hub Founded in Paris

(ck) Naval Group has created a Naval Innovation Hub to accelerate innovation cycles and promote what they call "disruptive innovation". Basically, the hub is similar to an



Photo: Naval Group

internal R&D unit. The company wants the new hub "to develop new growth drivers by exploring new markets and new methods of work organisation" by transforming concepts and technologies into innovative and concrete solutions with high added value for customers. The Naval Innovation Hub brings together a multidisciplinary team from a variety of backgrounds; it wants to attract atypical intelligences. The idea is to then transmit innovations into the Naval Group ecosystem. Located in the start-up accelerator Village by CA-Paris, the Naval Innovation Hub is also fully integrated in the group, providing employees with coaching tools and methods and gathering the best ideas.

## Rheinmetall to Takeover IBD Deisenroth

(ck) By taking over the family-owned company IBD Deisenroth, Rheinmetall completes its portfolio in the field of protective technology for military vehicles. Contractual agreements to this effect have now been



Image: IBD

reached. The parties have agreed not to disclose the purchase price. The transaction is to take effect on 1 June 2019. The buyout reinforces Rheinmetall's position as a major supplier of advanced defence technology to the ground forces of Germany, its allies and other like-minded nations. IBD Deisenroth Engineering is a renowned supplier of passive protection systems, primarily for military vehicles. The company has around 120 employees and in 2018 reported a turnover of roughly €35M.

## C4ISR Support for Canada

(ck) The Government of Canada has awarded Rheinmetall Canada a major support contract pertaining to Intelligence, Surveillance, Target Acquisition, and Reconnaissance (ISTAR). The framework contract is currently worth up to CAD\$57M. The contract will run over the next five years; it is part of the sustenance of the Land Command, Control, Communication, Computing, Intelligence, Surveillance and Reconnaissance (C4ISR) programme and, as the prime contractor, Rheinmetall Canada is to provide ISTAR in-service support services (ISS). By contracting Rheinmetall, the Canadian Armed Forces aim to acquire an ISTAR Command and Control Information System (C2IS) capability, and Rheinmetall Canada will maintain that capability through the support contract.

## Schiebel Obtains EN 9100 Certification

(ck) The Vienna-based Schiebel Group has been awarded the acclaimed EN 9100 certi-



Photo: Schiebel

fication for quality management systems in the aerospace and defence industry. Schiebel has built a reputation for its development of the CAMCOPTER S-100 Unmanned Air System (UAS) and in the civil and military aerospace industry EN 9100 is the quality assurance standard for development, production and maintenance along the entire supply chain. This international quality management certification shows that Schiebel's quality processes meet all customer and regulatory requirements. EN 9100 was developed by the AeroSpace and Defence Industries Association of Europe (ASD) and is identical to AS 9100 in North America and JISQ 9100 in Japan. Approximately 18,000 companies are currently certified worldwide, 52 of them in Austria. Schiebel is thus consolidating its position as an outstanding company in the industry.

## SEA to Expand to Brazil

(ck) The new Brazilian government has announced a significant increase in defence spending, which has attracted international attention. However, most of the budget will be spent on products and services offered by domestic companies. For this reason, some international companies are partner-

ing with local companies to gain a foothold in Brazil. Such is the case with UK defence electronics specialist, SEA, that has signed



Photo: SEA

a memorandum of understanding (MoU) with the Brazilian defence company, SIATT, a specialist in intelligent weapons and integration of high technology systems. The two companies plan to work together to market defence equipment and services in Brazil. SEA intends to transfer knowledge to SIATT's personnel in Brazil in order to expand manufacturing, assembly and test capabilities in the Brazilian market. The MoU provides mutual benefits for SIATT and the Brazilian defence industry, as it gives them access to SEA's product range, including agnostic torpedo launcher systems, decoy launcher systems, simulation and training services, and thin line arrays.

## Test Lab for Laser Weapons

(ck) MBDA is involved in a number of laser weapons projects in Europe, with one technology demonstrator under development in Germany since 2015 and another in the UK since 2016. Founded in 2007, ALPhANOV is the Laser Technology Centre of



Photo: MBDA

the ALPHA Route des Lasers & des Hyperfréquences cluster. In March 2019, MBDA and ALPhANOV inaugurated their joint Vulnerability Test Facility (VTF) in Bordeaux, France. This facility, which has been under development since 2016, is designed to test the effects of lasers on materials. The site uses lasers with an output of 1 to 10 kW and various measuring instruments to monitor the effects delivered by the lasers. The VTF is able to simulate many conditions of real laser fire, including the imperfections of the alignment of a dynamic beam,

use against moving targets and the complex interactions between laser and target materials. This supports definition of the requirements for all individual components of a laser weapon (laser source, target accuracy, beam focus, etc.) and the adaptation of future laser system architectures to different types of target (aircraft, rockets, drones, grenades, optical sensors, vehicles, naval ships, etc.).

### SA Long-Range Observation System

(ck) Photonis Technologies and SYT Technologies have signed a business partnership that will combine their capabilities and products to enable the SYT SR750 long-range observation system to detect and identify by day and night. SYT Technologies is the manufacturer of the SR750 portable system, which is suitable for urban operations and is lightweight, with a powerful zoom up to x33 and

integrates a Photonis daylight and low-light NOCTURN CMOS camera in colour or monochrome that reaches up to night level 3. The NOCTURN camera is used in several major defence programmes. It is characterised by high resolution, high sensitivity and high dynamic range with low power consumption. The camera offers colour or monochrome real-time image functions in the visible and near infrared range. In combining the SR750 portable system with the NOCTURN camera, the result is a long-range observation solution that provides sharp images up to 20 km away.

### Brazilian Navy to Choose tkMS and Embraer Consortium

(ck) The Brazilian Navy selected the consortium Águas Azuis, founded by thyssenkrupp Marine Systems, Embraer and Atech, to build four defence vessels under the TAMANDARÉ Class corvette programme (CCT) as preferred bidder. Under the leadership of tkMS, the companies of the Águas Azuis consortium will now form a Specific Purpose Company (SPC) for the implementation phase of the programme. With a strong presence in Brazil, the three companies and their subsidiaries

have pledged to retain the technology in Brazil and ensure its development not only for the CCT programme but also for future strategic defence projects in the country; local content will exceed 40% and generate more than 1,000 jobs. With the CCT



Photo: tkms Brazil

programme, the Brazilian Navy will modernise its fleet. With four corvettes scheduled for delivery between 2024 and 2028, the Navy will now have new escort ships to counter possible threats, ensure the protection of maritime traffic, and control the Brazilian jurisdictional waters. The escort ships will also play an important role in peace and humanitarian aid missions. The photo shows Jackson Schneider, CEO EMBRAER Defesa (left), and Dr. Rolf Wirtz, CEO tkms.

## Preview

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UNDER THE AUSPICES  
OF THE MINISTRY OF DEFENSE  
OF THE REPUBLIC OF SERBIA



# PARTNER 2019

The Ministry of Defense of the Republic of Serbia and Yugoimport-SDPR, the co-organizer, kindly invite you to take part at the 9th International Defence Exhibition **PARTNER 2019**, which will be held in the period **25-28<sup>th</sup> June** at Belgrade Fair.



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