



European Security & Defence

5/2017

International Security and Defence Journal



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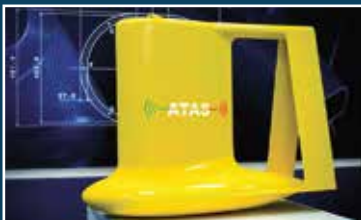


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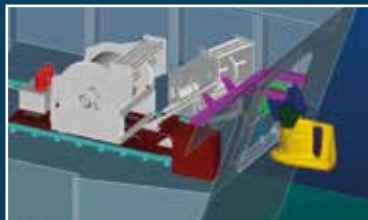
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The Western Balkan Dilemma



After eight years on hold, NATO extension in the West Balkans has taken another step “forward”. At a ceremony on 5 June in Washington DC, birthplace of the Alliance, the Foreign Minister of Montenegro, Srdjan Darmanovic, submitted his country’s accession documents to US Undersecretary of State Thomas Shannon. With a population of 620,000 and just 2,000 soldiers, it is true that the new member will not be viewed as a military heavyweight, but its geographic location is of relevance: NATO has been able to close the last loophole on the Adriatic coast, and that denies Russia, the “new” opponent in the game, a potential point of access. Russia is weaving a web throughout the Balkans, and Montenegro was potential prey. One fly in the ointment with the accession is that it was not the outcome of a referendum, for which its opponents had called, but legitimised only by parliamentary decision. It may be assumed, however, that vox populi would probably not have demurred. The government knows that it has the backing of a majority of the population in its aspirations for integration into NATO - and later also the EU – although it faces a powerful and implacable opposition that does not yet accept the dissolution of the union with Serbia, and that is traditionally inclined towards Moscow. The political climate is poisonous, and the risk of a violent escalation of the situation has not eased. Last year a ring of potential rebels was unmasked, allegedly planning the assassination of prominent government figures. Investigators have gone so far as to point the finger at individuals in Belgrade and Moscow, but the case remains inconclusive.

The immediate benefit which Montenegro can derive from its NATO membership might be negligible – the security of the country is not under threat, and the border dispute with Kosovo can be largely disregarded – but joining the ranks should rather be seen as a sign of a “pro-West decision”; as a first step towards EU membership as the real goal. The example of neighbouring Albania, however, which joined NATO way back in 2009 and since that time has made hardly any progress at all in getting closer to the European Union, suggests that this is far from a foregone conclusion.

Of the successor states to the former Yugoslavia, only Slovenia and Croatia have taken the big step of joining the EU. True, the euphoric expectations harboured in Ljubljana and Zagreb remain only been partially fulfilled, but the attraction of the European Union remains unimpaired in the other countries of the Western Balkans, and Brussels declared over and over that their membership continues to be the EU’s intention, too. Now, however, they find themselves in a holding pattern, with no sign of permission to land. This dilemma is something for which the countries concerned can only partly blame themselves: the more complex integration within the EU became, and the more the EU deviated from the original model of a confederation, now pursuing a path towards a de facto state, the higher the hurdles have become for candidate members to clear. Fear that changes in the status quo could trigger a dangerous chain reaction has crippled all attempts to tackle the fundamental problems of Bosnia-Herzegovina, Macedonia, and Kosovo. And confronted by a range of internal crises and growing criticism from an increasingly sceptical public, Brussels seems to have lost the courage and vision to pursue expansion any further.

The risks of these longstanding wait-and-see tactics are plain to see. Where hope of EU membership as an assumed precursor to economic upswing has been lost, emigration has increased. Today, 1.2 million of a total of 4.1 million Albanian citizens are already trying their luck abroad, and the situation is similar in other countries in the region. The exodus of often younger, more ambitious people, with greater expectations of success, undermines efforts to get these countries back on their economic feet. When Brussels fails to deliver the goods, other options come into play. These include Russia and Turkey in particular, but also Salafi extremists, who are finding growing support among young Muslims. The European Union, so keen to see itself as a global player, could have proved in the Western Balkans – rumoured to be part of Europe – that it is more than just an economic area, that it is specifically a power for stability and growth. So far, that proof has not been furnished, and there is not much will and less time to make up for the opportunities that have already been wasted.

Peter Bossdorf



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Headwinds Continue for European Air Lift



Photo: Airbus

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■ New Adaptions for VULCANO

(df) BAE Systems and Leonardo have announced an initiative to pursue collaboration on new precision-guided solutions that will offer US and allied military forces

Graphic: Leonardo



a range of low-risk, cost effective, advanced munitions for advanced, large-calibre weapon systems.

In future they will offer new adaptations of Leonardo's VULCANO in a variety of gun systems, including the BAE Systems built Advanced Gun System (AGS) and the Mk 45 naval gun. The AGS is currently on board the US Navy's ZUMWALT class destroyers, and the Mk 45 is widely used by the Navy and allied nations.

"The VULCANO long-range guided ammunition family represents state-of-the-art technology with its unmatched range, accuracy, and effectiveness, which was successfully demonstrated in testing," said Gianpiero Lorandi, Managing Director at Leonardo Defence Systems. "Not only is it compatible with 155 mm land and 5 inch naval gun systems, VULCANO can also be easily integrated with current and future platforms such as the AGS."

VULCANO is available in two versions. The Ballistic Extended Range (BER) unguided multi-role ammunition with multi function (Altimetric, Impact, Delayed Impact, Time, Self-Destruction) programmable fuse and the Guided Long Range (GLR) with canard control actuated by IMU + GPS guidance system for navigation (gliding trajectory) and possibility of terminal guidance with optional Semi-Active-Laser (SAL).

■ S-70 Cockpit-Modernisation

(Georg Mader) On 01 June, the Austrian MoD contracted the long-overdue upgrade and modernisation of the flight-decks of the nine S-70A42 (UH-60L-standard) BLACK HAWK helicopters, based at the transport-helicopter Sqn. of the air-support-wing at Langenlebarn.

Quite surprisingly, the tender was won by Ace Aeronautics LLC (doing business as) Global Aviation Solutions of Huntsville, AL, a company only founded in 2015 by former Sikorsky- and Lockheed-Martin-engineers. The company's main "products" comprise cockpit upgrades for fixed-wing and rotary transport aircraft with a focus to minimise technological upgrade and obsolescence-challenges.

Programme Director Col. Reinhard Zmug confirmed to ESD that for a volume of € 48 million the Austrian S-70s architecture will be rebuilt according GAS' ACE-HAWK concept shown at the recent Heli Expo in March. This centres around a new tactical mission system and man-machine interface (MMI) via Garmin GTC570 touchscreen controllers, all displayed on Garmin G5000H advanced widescreen aspect ratio displays and new HUDs. An ACM9454 Cockpit Management Unit (CMU) will be used to seamlessly integrate tactical radios – in the Austrian case the military

Photo: Mader



CONRAD- and the civilian-authorities' TETRA-systems. The package will include IFF transponder Mode 4 with provisions for Mode 5. GAS' solution also covers new weather radars, but no FLIR-gimbals. However, there is a projected video-interface to use FLIR-systems acquired earlier for the OH-58B KIOWA and PC-6 PORTER.

Updating the nine helicopters acquired in 2001 with a new cockpit has been an imminent requirement since 2015, since the original Rockwell-Collins displays ceased to function, bringing the fleet down to sometimes three or four flyable ones. Work will begin this autumn when the first S-70 will be shipped to Huntsville via Genova. With this first integrator/prototype flown and accepted there and then back at Langenlebarn, the next one will be done on site by GAS from kits, with the rest handled by the unit's local maintenance centre until 2020 during regular 500 hour inspection intervals.

■ First Autonomous Flights with VSR700

(bk) With a VSR700 demonstrator, an Optionally Piloted Vehicle (OPV) helicopter, Airbus Helicopters recently started autonomous flight trials. The VSR700 is a light military rotary-wing tactical unmanned aerial vehicle. It was developed jointly by Airbus Helicopters and Helicopteres Guimbal, the original manufacturer of the civil-certified CABRI G2 helicopter from which the VSR700 is derived. With a maximum capacity of up to 250 kg the vehicle's endurance could exceed ten hours.

Photo: Airbus Helicopters



"We are pleased to have achieved this milestone only eight months after starting work on the OPV," said Regis Antomarchi, head of the VSR700 programme at Airbus Helicopters. "The OPV is able to autonomously take-off, hover and perform stabilised flight and manoeuvres." These first flight trials will be executed with a safety pilot. Thereby, they can focus on refining Airbus Helicopters' fully-digital, multi-channel flight control system aboard the OPV which will eventually lead to fully autonomous flights without a safety pilot. Sea trials of a manned CABRI G2 have also recently taken place with the support of a French Navy air defence frigate in order to assess the flight envelope of the VSR700 platform for shipborne operations.

■ Contract for Three Type 26 Global Combat Ships

(df) The UK Ministry of Defence has awarded a contract worth £3.7Bn to manufacture the first three ships for the Type

Graphic: BAE Systems



26 Global Combat Ship programme to BAE Systems. Steelcut for the first ship will take place in Glasgow in the coming weeks. "The Type 26 Frigate is a cutting-edge warship, combining the expertise of the British shipbuilding industry with the excellence of the Royal Navy," said Defence Secretary Sir Michael Fallon. The Type 26 Global Combat Ship is an anti-submarine warfare ship and will replace the anti-submarine variant Type 23 frigates. Globally deployable, it will be capable of undertaking a wide range of roles from high intensity warfare to humanitarian assistance, either operating independently or as part of a task group. Fallon expressed: "Backed by a rising defence budget and a £178 billion Equipment Plan, the Type 26 programme will bring vast economic benefits to Scotland and the wider UK. The contract is structured to ensure value for taxpayers' money and, importantly, now designed to protect them from extra bills from project overrun. The investment will secure hundreds of skilled jobs at BAE Systems on the Clyde for the next twenty years, and thousands of jobs in the supply chain across Britain."

■ Finland Chooses Bittium TAC WIN for SDR Communication

(df) Finland will sign a framework agreement with Bittium for the purchase of its Tactical Wireless IP Network (TAC WIN) products. In the scope of this framework agreement the renewal of the Finnish Defence Forces' command, control and com-

Photo: Bittium



munications system will continue, with the software defined radio-based Bittium TAC WIN system acting as the backbone for tactical data transfer. Bittium TAC WIN provides broadband IP network connections for mobile communication stations and command posts. In the reformed combat doctrine of the Finnish Defence Forces, mobility, leading the troops on the move and effective communications play a key role.

The delivery of Bittium TAC WIN products will take place in the years 2018-2020 and has a total value of €30 million.

Bittium TAC WIN is intended for military and public safety use. With the system MANET (mobile ad hoc network), link and connection networks can be formed into one logical IP network quickly, no matter the location. Bittium TAC WIN is compatible with existing fixed and wireless network infrastructures. The core of the system is a tactical router that enables users to freely form both wired and wireless broadband data transfer IP connections.

■ Modern Training Arena for Electronic Warfare

(bk) Elettronica SpA, a company for electronic countermeasures, collaborates with Antycip Simulation and VT MÄK to develop the Electronic Warfare Battlelab, a multi-role, multi-platform, joint-force training arena designed to conduct joint mission exercise sessions that focus on electronic warfare. The software offers flexibility and extendibility for future evolution of electronic warfare systems and is delivered by the

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Photo: Elettronica

American business VT MÄK. The Battlelab is capable of individual training tasks as well as complex coordination actions required for multi-echelon joint-force operations. This kind of enhanced collaboration between different roles and forces creates a more nuanced and beneficial simulation.

■ First TYPHOON for Oman

(bk) The first Eurofighter TYPHOON – out of 12 in total – was delivered to the Royal Air Force of Oman (RAFO) at Adam Air Ba-



Photo: Eurofighter

se. The Sultanate of Oman announced its decision to purchase the fighters in December 2012. In addition to that, the Oman bought eight HAWK aircraft which are produced by BAE Systems.

■ New Tactical UAV for The Netherlands

(bk) The Dutch Ministry of Defence has awarded the Short Range Tactical UAV (SRTUAV) contract to Insitu for its proposed INTEGRATOR. The baseline offering is for three INTEGRATOR systems of the



Photo: Insitu

Boeing subsidiary that will replace Insitu's SCANEAGLE vehicles currently in use by the defence forces, which have been in service since 2012. INTEGRATOR is a multi-

mission, long-endurance unmanned aircraft. It has a payload capacity of 18 kg and supports an evolving set of sensors, delivers line-of-sight communications up to 100 km, and is supported by runway-independent launch and recovery systems. The UAV is controlled by ICOMC2, which enables one operator to control multiple unmanned vehicles from a single workstation. In addition to that, INTEGRATOR is the baseline aircraft for the RQ-21A BLACKJACK, a programme of record with the US Navy and Marine Corps that achieved full rate production in autumn 2016. The Netherlands will take delivery of their INTEGRATOR in early 2018.

■ Leonardo to Deliver the NATO AGS Logistics Information System

(df) Leonardo has been chosen to develop and deliver the NATO AGS Logistics Information System (ALIS). Leonardo is also a member of the primary Northrop Grumman-led industrial team for the delivery of the NATO AGS Core System.



Photo: leonardo

Leonardo won the international competitive bid to deliver an integrated logistics platform. The company has signed a contract with the NATO Alliance Ground Surveillance Management Agency (NAGSMA). ALIS will be used by NATO to support the management of operations and maintenance services at the Main Operating Base (MOB) in Sigonella (Syracuse, Italy), in theatres of operation and by NATO logistic support management organisations during the AGS Core System life cycle. Main ALIS functions allow for the planning, control and management of the supply chain, maintenance and repair activities, field service activities, accounting, warehousing and for personnel employment and training. ALIS will be also used to maintain the NATO AGS Core baseline and configuration in supporting the maintenance organisation's requirement to comply with continued and continuing air worthiness norms. Within the NATO AGS programme, Leonardo is also responsible for the development of the

Mission Operation Support (MOS) systems and the Transportable General Ground Stations (TGGs). One of the main functions of the MOS and TGGs is to collect data and images from the remotely-piloted aircraft for processing and intelligence analysis. Leonardo will also deliver the Wide Band Data Link (WBDL) which provides line-of-sight communication between the ground segment and the system's UAVs.

■ Supply Contract for Danish EAGLES

(df) General Dynamics European Land Systems (GDELS) has been awarded a supply contract for the Danish Army's new 4x4 Armoured Patrol Vehicle (APV) programme, namely GDELS-Mowag's EAGLE 4x4 vehicle. The EAGLE 4x4 is a light armoured



Photo: GDELS

wheeled vehicle and available in different configurations. The initial batch consists of 36 vehicles in the Patrol configuration with first deliveries in 2018. The contract has options for further variants including Electronic Warfare, Support and Reconnaissance. The vehicles will complement the Danish Army's existing EAGLE fleet. "We are very proud to have received this contract after an intensive international competition," said Thomas Lattmann, Director International Business & Services, General Dynamics European Land Systems-Mowag. "The EAGLE's selection underlines the confidence and satisfaction of our Danish customer with our products and proves the 'first-in-class' position of our EAGLE 4x4 in the segment of light and highly protected vehicles."

■ New SUPER HERCULES

(bk) Lockheed Martin has developed the C-130J-SOF, a special variant of its aircraft that is intended to meet the demands of international Special Operations Forces (SOF). Particularly, the C-130J-SOF is associated with executing operations of strategic importance. This airlifter provides the



Photo: Lockheed Martin

capability to execute a variety of specific missions such as Intelligence, Surveillance and Reconnaissance (ISR), psychological operations, airdrop resupply and personnel recovery including humanitarian relief. The C-130J SUPER HERCULES is used by 17 nations; to date this "global SUPER HERCULES fleet" has surpassed more than 1.5 million flight hours.

■ New Logistic Vehicles for the German Armed Forces

(df) Rheinmetall MAN Military Vehicles has entered a framework agreement with the Bundeswehr to modernise the Bundeswehr's fleet of logistic vehicles. This order covers a total of 2,271 HX2 family vehicles with a gross value of around €900



Photo: Rheinmetall

million, with delivery of the first lot from 2018 to 2021. The HX2 family comes in variants ranging from 4x4 to 10x10 for a multitude of different missions, like cargo trucks and heavy-duty recovery vehicles, tankers and system platforms as well as folding-roadway and bridge-laying systems. The engines of these trucks are designed for outputs of up to 680 HP. The vehicle family concept results in largely identical modes of operation, maintenance and repair as well as spare parts, in turn leading to lower life cycle costs. Another distinguishing feature of these vehicles is the robust chassis design, enabling the application of add-on protection elements.

■ Helicopter Laser Test

(df) For the first time ever a high energy laser has been successfully tested mounted on a helicopter. Raytheon, in partnership with the US Army and the US Special Operations Command, installed a high energy laser on an APACHE AH-64 attack helicopter and



Photo: Raytheon

engaged and fired at a target at the White Sands Missile Range. The laser system was capable of acquiring and hitting the target over a wide variety of flight regimes, altitudes and air speeds. During the tests the system tracked and directed energy at a stationary target at a slant range of 1.4 km. The data collected from the test, including impact of vibration, dust and rotor downwash, will help shape future high-energy laser systems. "Our goal is to pull the future forward," said Art Morrish, Vice President of Advanced Concepts and Technologies for Raytheon Space and Airborne Systems. "This data collection shows we are on the right track."

■ Schiebel under Contract to NATO for 700 Mine Detection Units

(df) The NATO Support and Procurement Agency (NSPA) has awarded a contract for the delivery of 700 units of the AN-19/2 mine detecting set to Schiebel. The AN-19/2 mine detector is suitable for fast, accurate



Photo: Schiebel

demining in all climates and terrains. The system features a modular design that provides maximum flexibility to the user, who may operate the system in whatever configuration is most comfortable. Also, the AN-19/2 can be operated to full effect by novice personnel. Experience has shown that a total of eight hours of equipment training is sufficient to provide the operator with the capability to search and locate mines in the field. Due to these features the system is in service in many countries worldwide, including NATO countries and is the US Army standard metal detecting set, designated AN/PSS-12.

■ Five More Corvettes for the German Navy

(df) The German Navy will receive five more Class K130 corvettes by 2023. The necessary funds have recently been approved by the Budget Committee of the German Parliament. The Chief of the German Navy, Vice-Admiral Andreas Krause, emphasised that he was greatly pleased with this decision. "The Bundestag has thus cleared the way for the German Navy to receive the urgently needed five Class K130 cor-



Photo: German Navy

vettes as quickly as possible," said Krause. "This proven and modern ship type will be available to us earlier than any new development could be, which is another important contribution to the essential growth of the Navy." The original five corvettes of the BRAUNSCHWEIG class, or class K130, entered service from 2008 to 2013. During operations at the Horn of Africa and the Eastern Mediterranean the German Navy has also been able to test its new multi-crew concept in practice; while the ship remains in the area of operations, the crews alternate on a four-month schedule. "These new corvettes make the 'trend-change in material' tangible, so we can now really leave the bottom of shrinking forces behind us," said Krause.

The Baltic States' Defence Capabilities

Giulia Tilenni

The Baltic states' protection from external threats, namely Russia, should be ensured by NATO (and, to some extent, EU) allies. However, Estonia, Latvia and Lithuania are trying to build up some autonomous defence capabilities

Estonia, Latvia and Lithuania became NATO and EU members in 2004. As a result of their membership, NATO borders experienced important modifications. The EU has bordered Russia since 1995 (when Sweden and Finland became members), and NATO has bordered Russia since 1999 (the year that Poland gained membership). If the 1999 NATO–Russia border was limited to the Kaliningrad exclave, it broadened when the Baltic states became members – therefore becoming buffer states, somehow. This has a twofold impact at the political level. First, it exacerbates mutual misperceptions between NATO and Russia, especially when it comes to military exercises taking place in the Baltics, alongside the Russian border or in the Kaliningrad exclave (see ESD 03/2017). Second, although the three states have always affirmed their independence from Russia (even during the Cold War), Moscow still perceives them as part of its backyard. The fact that the Baltic states host significant Russian-speaking minorities (about one million people out of 6+ million), which perceive themselves as ethnically Russian, leaves room for destabilisation and external political influence.

NATO Bases

As buffer states embedded in Western political organisations, the Baltic states have been granted protection from eventual Russian aggression, especially in the air defence tasks.

To balance the Baltic states' limited aerial capabilities, the aerial surveillance and defence of their skies have been ensured by NATO assets for the last twenty years.

When the Baltic states became NATO members (2004), the existing Baltic Air Surveillance Network (BALNET) was con-

nected to the NATO Integrated Air and Missile Defence System (NATINAMDS), allowing data exchange with NATO relevant units. The BALTNET system, consisting of three air surveillance subsystems, can perform air surveillance data acquisition, coordination, distribution and dissemination for both military and civilian purposes.

Photo: mil.ee



Estonian Defence Forces (EDF) during the 15th SPRING STORM exercise. In this exercise, the EDF assessed the performance of its current infantry battalion made up of soldiers in compulsory service in different scenarios and situations before they join the reserve.

The Baltic Air Policing mission, in charge of scrambling over Baltic states' skies when needed, 24/7, was launched in the same year. According to a prearranged rotation, NATO allies' air personnel and assets have been deployed at the Šiauliai Main Operating Base (Lithuania) and, since 2014, at the Ämari air base (Estonia) to ensure the Baltics' airspace protection.

More recently, in order to reaffirm Baltic states' importance as recipients of the NATO collective defence system, the Atlantic Alliance is enhancing a Readiness Action Plan to deter eventual Russian aggressions in the region. 17 NATO countries are therefore contributing to the build-up of 3

Enhanced Forward Presence Battlegroups based in Tapa (Estonia, 1,100 troops), Adazi (Latvia, 1,138 troops) and Rukla (Lithuania, 1,022). These battalion-sized battlegroups will operate on a rotational basis and they will be fully operational by 2018.

Baltic Defence Capabilities in 2014 – 2016

When the Ukrainian crisis erupted (and relations between Russia and NATO deteriorated accordingly), Estonian, Latvian and Lithuanian military capabilities were overall limited. This explains why the Baltic states have been undergoing a phase of renewal

Author

Giulia Tilenni is an analyst for international affairs based in Paris, France.



AJBAN 440A

4x4 Blast and Ballistic Protected
Light Tactical Patrol Vehicle



A member of the Emirates Defense Industries Company





Photo: ErWin Donovan

Latvian soldier with an HK G36

surface-to-air missiles, mortars, and few or nil high value assets and force multipliers. The three navies have been used to a special focus on countermine capabilities. The Lithuanian Navy is considered the most balanced of the three, as it can perform a number of maritime security tasks (from defending national waters to SAR missions). Conversely, the Estonian navy can be considered as the poorest one in terms of tasks, as it cannot protect territorial waters and focuses instead on mine countermeasures. For naval operations missions the three navies rely on a limited number of vessels:

- 3 ADMIRAL COWAN class (ex-British SANDOW class) minehunters (Estonia);
- 5 IMANTA class (ex-Dutch ALKMAAR class) mine countermeasures ships (Latvia);
- 2 KURSIS class (ex-German LINDAU class) coastal minehunters, 2 SKALVIS class (ex-UK HUNT class) minehunters (Lithuania).

The three states also own some logistic support (1 TASUJA/ex-LINDORMEN class auxiliary vessel, Estonia) and maritime patrol capabilities (SKRUNDA class patrol boats, Latvia; the remarkable 4 ZEMAITIS/ex-FLYVEFISKEN class, Lithuania).

Latvian and Lithuanian capabilities are pledged to NATO through the Baltic mine countermeasures squadron (BALTRON) – Estonia withdrew from the squadron in 2015. On a rotational basis, units from the three navies contribute to the Standing NATO Mine Countermeasures Group 1 (currently led by Estonia) and/or 2.

Aerial capabilities were and remain the less developed branch of Baltic states' armed forces, as they consist of small fleets of helicopters and transport aircraft. In particular:

- Helicopters: Kazan Helicopters Mi-8MTV (Latvia, 4), PZL Mi-2 HOPLITE (Latvia, 2), Robinson R-44 (Estonia, 4), Mil Mi-8 (Lith-

uania, 3), Airbus Helicopter AS365 N3+ DAUPHIN (Lithuania, 3).

- Transport aircraft: Antonov An-2 COLT (Latvia, 4; Estonia, 2), Letov L-410 UVP TURBOLET (Lithuania, 2), Leonardo C-27J SPARTAN (Lithuania, 3).

Uncertainty about Collective Defence...

In principle, as NATO members, Estonia, Latvia and Lithuania should not be over-concerned about their lack of cutting-edge military technologies or their limited capabilities. An eventual Russian aggression should activate Article V, NATO charter, and the targeted country/countries should receive full protection from its/their allies. However, Riga, Tallin and Vilnius do not take collective defence for granted for two main reasons.

The first reason concerns NATO. Recent divides raise doubts about members' automatic reaction. Reaching a consensus on the activation of Article V might take time or

even fail to happen, as some states might not accept actually going to war for Latvia, Estonia or Lithuania. In theory, given the EFP initiative, casualties in multinational battle-groups would work as an additional pushing factor, as it would be a deliberate act of war.

The Logic of Nuclear Deterrence, above All

Today, a direct Russian act of war against one of the Baltic states is highly unlikely. Although Russian conventional forces are broad and ready to jump in, the logic of deterrence provided by the US nuclear umbrella would take direct confrontation to another stage – both Russia and the US continue to deploy a “nuclear life insurance”. Rather, an eventual Russian military action in Europe would probably shape up like a rapid dominance or hybrid warfare action against a European non-NATO member, read Finland or Sweden. Over there, the NATO-Russia confrontation could still play out indirectly and out of the nuclear deterrence master dynamics.

Of course, a 3,000-troops-strong force is ridiculous in a conventional war scenario, the value added is rather its political meaning – and the consequences of its annihilation. But, if Russia would/could not target them deliberately, some European states might be tempted by alternative political calculus. Instead, should a prompt consensus be reached at the NATO level, joint exercises like TRIDENT JUNCTURE 2015 raised doubts that the deployment of NATO troops in the operational theatre would be timely and consistent. Thus, in the case of Russian aggression against Baltic states, timing would be of primary relevance, as



Photo: SakuraNet

Lithuanian soldiers during the ZAIBO KIRTYS 2016 exercise

24/48 hours might be enough for Russians to storm or besiege Riga, Tallin or Vilnius. To date, a conventional Russian aggression hitting Estonia, Latvia or Lithuania remains the worst scenario (although the less likely, see BOX) for the three Baltic states. However, Moscow could put in practice other forms of aggression which might not fall under Article V, especially hybrid warfare or other out-of-the-box limited operations. The Baltics could be especially vulnerable to Russian propaganda, cyberwarfare, and covert actions because of the number of pro-Russia people residing in their territories. This kind of strategy could destabilise these countries from the inside and advance into Europe.

This is the second reason why the Baltic states are working to advance their own credibility and are planning to do so through a comprehensive approach.

... Pushed for New Defence Plans

The Baltic countries' comprehensive approach to national and collective defence is being built around three key measures.

1. Raising defence budgets. Estonia was one of the first NATO countries to spend 2% of GDP on defence. This objective was established by NATO members in 2014, and Latvia and Lithuania are expected to comply with it by 2018.

2. Bolstering national security strategies to adapt the three defence systems to current threats. This includes raising ranks in both regular forces and the reserve (Lithuania resumed conscription in 2015) and the approval of new defence concepts to rationalise armed forces. For example, Lithuania has established a rapid reaction force (2 battalion-sized battlegroups) deployable in 2-24 hours to respond to hybrid threats. The 3,000-4,000 conscripts will mainly join the newly established Motorised Infantry Brigade "Žemaitija", which will also include two already existing infantry battalions and should reach its full operational capability (FOC) in 2021. In wartime, the existing Mechanised Infantry Brigade "Lone Wolf" and the "Žemaitija" brigade will be fleshed out by the Infantry Brigade "Aukštaitija", established in March 2017 and consisting of institutional units and reservists.

Moreover, the three countries are pushing forward the concept of "total defence". In order to raise resiliency, Estonians, Lithuanians and Latvians are being educated to cope with the eventuality of a war, as well as with hybrid warfare scenarios and other emergencies. The massive education campaigns are mainly conducted through the distribution of dedicated manuals.



NATO Enhanced Forward Presence troops road march through Poland in support of NATO's defence and deterrence measures

The Baltic states are also working on enhancing their cyberwarfare capabilities – Estonia will establish its cyber command by 2020.

3. The launch of ambitious acquisition programmes to upgrade military hardware and to boost armed forces' efficiency.

Estonia has procured 44 CV9035 IFVs from The Netherlands (deliveries expected by 2019) and 35 from Norway (to be converted for logistics and support). Sisu XA-188s purchased from The Netherlands in 2015 will side the bulk of mechanized forces on CV9035. The stock of big calibre ammunitions will dramatically increase in the 2017-2021 period in order to create proper war stocks. Other acquisitions are expected in the 2020-2021 timeframe, namely new armoured supports to CV90 vehicles, self-propelled artillery (probably the Hanwha Techwin K-9 THUNDER 155 mm self-propelled howitzer) and light fire-arms. Additional investment is expected for training and a number of military facilities and infrastructures.

Lithuanian Land Forces will receive 88 BOXER 8x8 wheeled AFV (2017-2019) from Germany, 21 PzH-2000 155 mm SP trucked howitzers, 26 M577V2 trucked command post vehicles and six BPZ2 ARVs (Armoured Recovery Vehicles) to be delivered by 2019. The country has also planned to enhance its air defence systems through the purchase of NASAMS short range surface-to-air missile systems and the installation of next generation 3D radars (4 posts expected to be operational by 2019-2021).

Latvia has procured 123 CRV(T) trucked AFVs (a mix of FV103/4/5/6) from the British army surplus, to be delivered by 2020, and the FIM-92 STINGER MANPADS in undisclosed numbers. The delivery of the 47 M109A5 self-propelled howitzer systems recently acquired from Austria will start in Autumn 2017.

At the end of 2016, Riga received from the US 2 Thales-Raytheon Systems SENTINEL AN/MPQ-64F1 radars and related equipment as part of the European Reassurance Initiative. But cooperation with Washington will go further thanks to a recent procurement agreement aimed at raising interoperability and enhancing the transfer of technology to ameliorate Latvian defence capabilities.

Conclusions

Estonia, Lithuania and Latvia are working on gaining some degree of national credibility in addition to reliance on the NATO deterrence mechanism. They aim to face hybrid threats and, in case of aggression, to compensate for NATO's delays – or to gain enough time to allow for NATO intervention before annihilation.

In order to optimise their efforts, the three countries are planning to push forward their defence cooperation. This includes the development of joint aerial solutions and the opportunity of common purchases (as Latvia and Lithuania agreed in 2016).

This notwithstanding, the Baltic states are well aware NATO is essential for them – in military and political terms. NATO membership per se implies primary deterrence against the Russian symmetric threat. In addition, the three countries are trying to boost their contribution to NATO in order to gain as many bargaining chips as possible. In 2018, Latvia and Lithuania will join Estonia in meeting the level of defence expenditure established in 2014. The three are also ameliorating their military infrastructures and facilities and the level of interoperability with NATO's servicemen. Furthermore, they are increasingly contributing to NATO by pledging their assets to the organisation – such as in the counter-mine and the cyber domains overseas. ■



Viewpoint from Warsaw



Marek Swierczynski

Stronghold Poland Serves PiS

During his recent visit to Warsaw, US President Donald Trump did not offer Poland any direct and special security guarantees, but decisions made in Washington and Brussels in the previous months and years speak for themselves: Polish territory will serve US and NATO as a stronghold and key access corridor to the Baltic states. In a way, and in its scale, Poland takes over the role of Germany from the time of the Cold War. A remarkable shift for a country which only 30 years ago maintained the Warsaw Pact's second largest army and was home to 50,000 Soviet troops, including those nuclear-capable.

But this is exactly what many Polish leaders have desired for many years, and it is exactly the role they see for the country in the Alliance. The right-wingers currently in power developed a narrative of "2nd tier NATO membership" long ago, describing what they felt was the level of protection provided by the Alliance up to that point. Their centrist predecessors acted with less emotion and bombast but strived for an incremental increase in allied presence in the past decade. The unpleasant awakening of 2014 was used both to call the next NATO top-gathering to Warsaw as well as to bring NATO troops to Poland. Now, with real, combat-ready NATO and US "boots

Photo: US Army/Staff Sgt. Corinna Baltos



on the ground", many Poles feel that their Western allies are keeping their commitments, maybe for the first time in history. It is a benefit of power that what NATO presents as strategic adaptation, a process that actually never stops and which latest increment was launched before the Wales summit, in Warsaw was hailed as a breakthrough secured and delivered by the Law and Justice (PiS) government.

The Polish president Andrzej Duda welcomed American soldiers from the 3rd Armored Brigade Combat Team, 4th Infantry Division to Poland in Zagan on 30 January 2017. The arrival marked the start of back-to-back rotations of armoured brigades in Europe as part of Atlantic Resolve.

The ruling party and government leaders have used every occasion to take a selfie with the arriving allied soldiers. The US rotational armoured brigade was welcomed at the border, then at its destination in a local garrison community, unofficially and officially, and then again after dispersing to a few towns in Western Poland. The 2nd CAV convoy, which travelled from Vilseck, Bavaria, along with British and Romanian troops to Orzysz made as many as

six stops on the route, with meet and greet events, market square picnics and official speeches. Two thousand soldiers were kept waiting for many hours in cold rain expecting the late arrival of the Polish defence minister, because without him a ceremony could not start. A lot of that was a manifestation of genuine cheer by the Poles, but the message conveyed in state-controlled media was clear: it is Jarosław Kaczyński, Beata Szydło and Antoni Macierewicz who brought thousands of NATO allies to Poland. And of course their predecessors from Civic Platform were to blame for failing to do so much earlier.

But apart from all political excess, there is serious military business underway in Poland. NATO and the US seem to have established two lines of defence here. One is forward stationed, highly manoeuvrable, motorised infantry manned by US Army Europe's 2nd Cavalry Regiment, to serve as "tripwire/quick reaction" force in the north-east corner, in close proximity to the notorious Suwalki Gap. The 90 km wide stretch of land between Belarus and the Russian enclave of Kaliningrad serves as the only access corridor on land between the NATO-peninsula of the Baltic states and the "continental" bulk of allied territory. Keeping it under NATO control is a matter of life and death for defenders of the Baltic states, should the Russians invade. The second one is a backup force, in peace time hidden in the forests of south-western Lower Silesia and Lubuskie provinces, heavily armed with ABRAMS tanks, BRADLEY IFVs, PALADIN howitzers and an attack helicopter brigade to deliver a punch of firepower if required. Both components, under rotational deployment and within two different arrangements, provide deterrence and defence moderate in scale but politically significant, effectively moving the border of the West from the Elbe to the Bug. Poland would like to see more of such forces and is making some preparations to host them, if the US and NATO so decide.

Part of that effort is less visible in the public domain, but arguably more important – the expansion of NATO and US command structures in Poland. The US Army has moved its forward deployed division-level HQ from Baumholder, Germany, to Poznań in April, a clear signal that distance matters and it is better to be located closer to the troops and within their vicinity. NATO in turn decided to emplace its divisional multi-national HQ in Elbląg, just 90 km from Kaliningrad and less than 50 km from the Russian border. The staff reached its IOC in June, manned primarily by Polish officers,

but will become fully multinational and fully operational next year. That location may be a demonstration of good will from NATO, as Elbląg is easily within the reach of Russian rocket artillery from the "Oblast", not to mention the ISKANDER missiles, which are regularly deployed there. But it is also a proof that – if need be – both US and NATO forces amassed in Poland may become much larger than today.

The picture of a stronghold in the making is complemented by the high-profile NATO ballistic defence base in Redzikowo on the Baltic coast, built by the US Missile Defense Agency and operated by the US Navy, and the somewhat less publicised NATO-funded APS project to be developed in Powidz, located centrally near Poland's largest military airfield. The Army Prepositioned Stock is basically a warehouse to serve another US Army armoured brigade, because the EUCOM wants to have a full division under command relatively quickly and close to the theatre. Poland may be the place that the US Army will use for their new "return on forces" exercise. This is why Polish officials have been seeking confirmations, reassurances, renewals of defence commitment pledges both from NATO and from the United States. Not quite with the success level they wanted, but at least with no change in sight for the current NATO and US policies, they can claim that the country's security in military terms was never backed stronger. ■

Photo: US Army/Sgt. 1st Class Adam Stone



A US paratrooper practicing firing procedures for the Polish RPG-7B at the Studnica Small Arms Range near Drawsko Pomorskie during Operation Atlantic Resolve 2014, a combined military forces training programme designed to foster cohesive relationships between allies and demonstrate a commitment to NATO obligations.

Are Russia and NATO on the Collision Course around the Black Sea Region?

Eugene Kogan

There is a feeling of disharmony as well as opposite views between the NATO member states such as Bulgaria, Romania and Turkey about NATO's military engagement in the region. For instance, Bucharest has advocated and continues to advocate a NATO Black Sea presence since early 2016, but Romanian position has been met with opposition in Bulgaria that did not want to be seen to be provoking Russia.

Back in February 2017 a spokesperson of the Bulgarian MoD confirmed that: "Bulgaria had made no commitment to participate in a permanent Black Sea naval force." However, she added that the navy will participate in several training exercises in the Black Sea, jointly with other NATO countries. And that despite the last year promise that Bulgaria agreed to send 400 soldiers to the multinational naval brigade in Romania. At the same time, Turkey remains very reserved and cautious regarding its naval force participation. Yes, Turkey supports a limited and scaled-up NATO reinforcement of the Black Sea region but as long as it does not impact its interpretation of the Montreux Convention signed in 1936. Turkey does close its eyes on the Russian extensive militarisation of the annexed Crimean Peninsula even though it stated that it does not recognise Russian annexation of Crimea. The three NATO littoral are also wary of the other's military presence in the Black Sea, since they continue to have disputes over fishing rights and other issues.

Swan, Pike and Crawfish

The aforementioned states remind the author of the famous Ivan Krylov's fable "Swan, Pike and Crawfish". In other words, when leaders of the three NATO countries cannot agree on a joint policy line and perceive Russia not as a spoiler but as one of

the littoral states participants they may be jolted to agree on a joint policy line if and when Russia provokes one or all of them. Can for instance Russia stage a cyberattack as prelude for potential military operation against the three littoral states? Is such scenario possible? The cyberattack can be seen as rather innocuous operation that would give Russian leadership a clear answer whether or not they should go further and for instance, disrupt NATO naval operations in the Black Sea. At first glance, it is not expected that Russian leadership will be so short-sighted and dumb to provoke NATO.

However, at the same time, it can be said that all scenarios are feasible and nothing should be excluded. It should be remembered and emphasised that Russian politicians do not speak in terms of red lines and surprises compared with their counterparts in the West, but simply cross these lines and stage surprises after making their move. It is also important to underline that the decision for instance, to disrupt NATO naval operations, can be made instantly by President Vladimir Putin as a Commander-in-Chief. The cases of the Crimean annexation in March 2014 as well as the Russian military engagement in Syria since September 2015 prepared well in advance can be used as markers, warning signals and clear examples of a fait accompli that can no longer be ignored or if ignored at the West own peril.

Whether or not the NATO member states would be ready to fight back after such jolt is not discussed in the article, although leaders of the NATO countries would be well-advised to be prepared for such scenario and not balk if they need to confront Russia head-on. The case for defending the Baltic States by NATO might be a good example of what NATO can do for its partners when partners are united and not divided as in the case of the NATO countries around the Black Sea region. And being divided means being exposed to bully and intimidation by and also being vulnerable versus belligerent Russia. That is exactly what the Russian politicians and military count on, while politicians in Bulgaria and Turkey are willing to downplay potential Russian threat.

Neutralising NATO Member States

In response to the NATO increased presence in the Black Sea, Alexander Grushko, Russian Envoy to NATO, said back in July 2016 that "the decision to increase NATO's naval presence in the Black Sea is, in any case, yet another step towards escalating tensions in the regions of vital importance for Russia" and Russia reserve a right to respond accordingly. Seven months later Admiral Igor Kasatonov, former commander of the Black Sea Fleet, said in an article published in Izvestia on 21 February 2017: "Russia has

all the necessary resources, both material and moral, to maintain supremacy on the Black Sea. Our fleet has enough force to oppose the NATO force in the Black Sea; the Black Sea Fleet dominates in the region.” And it has no intention to give up its dominance.

Interestingly enough, Captain Dan Cioiciu, Romanian Navy’s Deputy Chief of the Naval Operation Command, said in January 2017: “Assuming that there will be no radical changes to the naval potential of other countries in the region, the Russian Black Sea Fleet will soon be equal [to] or be greater than the combined fleets of all other Black Sea coastal states.” Thus, Admiral Kasatonov reiterated Captain’s Cioiciu assessment.

Apparently, both statements should have rung a bell in Sofia and Ankara but leaders of the two countries see it differently. They prefer trusting Russia without verifying Russian deeds. In other words, they see NATO’s military engagement in the Black Sea region as provocation vis-à-vis Russia and not Russian militarisation in the Black Sea region as provocation vis-à-vis NATO. It sounds strange, however, according to the findings of a multi-national WIN/Gallup International poll published in February 2017 Bulgaria, Greece, Slovenia and Turkey (NATO member states) chose Russia for their go-to-defence partner. As a result, leaders of both countries wish to remain neutral. Thus, it can be said that Russia achieved its first tactical success versus two out of three NATO littoral states without shooting a bullet by neutralising two out of three NATO member states. Apparently, Russia is not fully satisfied with the current situation and therefore Romanian political and military leadership remains the major focus of the Russian (f)ire. Thus, it can be said that in the case of Romania we are likely to expect Russian provocations.

Changing the Balance of Power

Speaking about the low or the high risk of a direct military confrontation between NATO and Russia and saying that conflict would come at a high price for both actors is not at all correct. Russian calculations in terms of changing the balance of power in its favour and maintaining an upper hand in the Black Sea region differs from these of NATO. Russia is willing to dominate the Black Sea region and not for nothing it considers this region “of vital importance for Russia,” while NATO may be interested in maintaining a status quo in the region that however may no longer be sustainable. The author does not imply that the

Russian policy is reckless. On the contrary – it is well-calculated and takes into account potential belated reaction from the NATO member states since the latter plans speak in terms of counter-attack within 48 to 72 hours, while Russian plans envisage a potential attack in less than 24 hours.

The scenario or possibility of a military accident (most likely air and/or naval collision) between the two parties is always in the cards, while Russia as usual will deny such accident and the provoker or the attacker will be called NATO. The so-called Russian rules of engagement differs from these prescribed in the West and Russian pilots tend to behave recklessly, just to cite plenty of air accidents taken place in the Baltic Sea region over the last several years and several air accidents that occur in the Black Sea region in 2016 and as recent as 10 February 2017. Let us therefore remain sober-minded and say clearly that a collision course in the Black Sea region is no longer a phantasm or unforeseen event but a potential reality that the West at large should be aware of and be prepared for. However, even this assumption is likely to be disputed by the expert community and

the region. Furthermore, Russian willingness to deploy forces to settle international disputes and thus achieve its strategic goals and the Russian military power disbalance can lead Russia and NATO to the brink of a potential conflict. It does not mean that right now Russia and NATO collision course is predetermined or rather unavoidable but ongoing Russian militarisation is likely to push Russia and NATO to the stage of unavoidable conflict that Russia would undoubtedly blame NATO.

To conclude, despite the author’s assumptions they need to be taken seriously. If worse comes to worse, we can envisage a cyberattack on the three NATO littoral states accompanied by the propaganda or disinformation campaign to be broad in scope. Both campaigns are likely to be accompanied by the variety of economic sanctions from impairing the countries’ income from tourism to barring agriculture products, hacking banking institutions and perhaps also undermining the national currencies in the three NATO littoral states. Finally, if and when Putin’s administration decides on the collision course the military operations put in motion would be swift



Photo: NATO

One may ask the question, how united NATO might stand, not only in the NATO-Russia Council but especially in the Baltic Sea and other hotspots.

various officials until they get a slap in the face by and from a friendly Russia. Further militarisation of the Black Sea region that Bulgaria and Turkey in particular does not approve does not absolve Russia that is currently militarising its presence in

since plan for such operations has been prepared well in advance. Claiming that the author is delusional and the assumptions are circumstantial are no longer satisfactory excuses to say bluntly that Russia and NATO are indeed on a collision course. ■

What Belarus' Crisis Means for European Security

Stephen Blank

The crisis that gripped Belarus earlier this year may have entered a relatively dormant phase for now. But nobody, least of all President Alexander Lukashenka, is foolish enough to believe that Belarus' crisis has ended.



Photo: Dmitri Pachomenko

Alexander Lukashenka has been President of the Republic of Belarus since 1994, leading the country through many troubles and challenges of the post Soviet era.

Instead it may fairly be argued that Belarus has entered into an indeterminate period of permanent crisis whose ending cannot be presaged as of spring 2017. As a result, periods of actual crisis will alternate with periods of dormant or latent crisis until the pressure becomes too much for the Belarusian state and some new order comes into being, most likely by some sort of upheaval. In other words, the demonstrations and threats earlier this year and the current period of latent or dormant crisis are alternating phases of a larger and structurally deter-

mined and inescapable crisis that ultimately Lukashenka's system, as presently configured, cannot overcome. This structural crisis will evolve through periods where it waxes and then wanes. But over time it will become increasingly harder, if not ultimately impossible for the regime to survive in its present form. When that happens we may well have an explosion in a highly sensitive area of Europe because Belarus' crisis is actually a particular manifestation of a more general phenomenon, namely, the general crisis of post-Soviet authoritarianism. This form of government may have its innings, but in the long term it cannot withstand the corrosive dynamics and high speed of contemporary socio-cultural-political change. And Russia, as President Vladimir Putin and his team well know, is not at all immune to this same crisis. Indeed, their efforts to suppress this

crisis, similar to analogous responses to the Maidan in 2013-14, culminating in invasion and war, show just how afraid they are of democracy. Indeed, in 2006, Sergei Ivanov, then Minister of Defence, candidly stated that, efforts to bring about democracy or a change to the "constitutional order" represented the greatest conceivable threat to Russian security.

And, since contemporary history teaches us that any crisis inside a European state invariably becomes an international crisis, a failed state in Europe, for that is what is at stake here, tends to remove the inhibitions of political actors to internal and/or international violence. Just as Moscow invaded Ukraine because it feared what the "democratic virus" expressed in the Maidan meant for its system of governance, it may well intervene in Belarus if Lukashenka cannot sustain order and effective control. And it has long since possessed many levers by which it can intervene effectively and decisively in Belarus. In Moscow's eyes sustaining Belarus' political order means a continuation of the "illegitimate governance" that is the root cause of the present crisis, i.e., Lukashenka's system if not necessarily his person. Putinism and its epigones are the root cause of the instability and propensity to violence here.

Democratic Camouflage

Indeed Putin's system in Russia cannot survive if its neighbors repudiate that system. Therefore it must respond to such crises with either covert violence or force majeure. As the late Dmitry Furman, a Russian political scientist and sociologist, observed in 2006: "Our system's democratic camouflage demands partnership with the West. However, the authoritarian, managed content of our system dictates the exact opposite. A safety zone for our system means a zone of political systems of the same kind of managed democracies that we are actively supporting in the CIS and, insofar as our forces allow, everywhere – in Serbia, the Middle East, even Venezuela. The Soviet Union's policy might seem quixotic. Why spend so much money in the name of 'proletarian internationalism'? But if you do not expand, you contract. The same could be

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said about our policy toward Lukashenka's regime. The system of managed democracy in Russia will perish if Russia is besieged on all sides by unmanaged democracies. Ultimately it will once again be a matter of survival. The West cannot fail to support the establishment of systems of the same type as the West's, which means expanding its safety zone. We cannot fail to oppose this. Therefore the struggle inside the CIS countries is beginning to resemble the Russian-Western conflict."

Thus that illegitimate governance is embodied not only in Lukashenka's system but in that of Vladimir Putin and this has long been the case, namely that for Moscow to be secure, all of its neighbors must be ruled more or less as it is. Yet the very nature of such regimes, at least in Europe, consigns these states to a situation of permanent crisis because they cannot meet contemporary socio-economic-political demands. Thus Belarus' crisis once again highlights the fact that the precondition for Russia's neo-imperial experiment's success is the reduction of former Soviet states to a condition of permanent backwardness, maladjustment, and hence equally permanent, structural, and therefore recurrent crisis. To paraphrase Marxist writers, Belarus' current experience is but one of many examples of the permanent crisis of post-Soviet authoritarianism. And just as Karl Marx and Friedrich Engels observed in 1848 that Polish independence was the precondition for a socialist revolution in Germany (and that is actually what occurred in 1989 if one substitutes democratic for socialist), upheaval in Belarus, just as in Ukraine, puts democracy in Russia on the agenda and triggers Putin's swift and forceful response.

Critical Lessons for Europe

Thus this crisis teaches us or should teach us some critical lessons that apply to European, if not international, security a generation after the collapse of the Soviet Union. First, the crisis that led to the rise of popular and democratic movements in the former Soviet Union has not ended though it has certainly continues to undergo a steady metamorphosis. Belarus is only the latest manifestation of a process that, while dynamic, cannot be permanently suppressed. States like Moldova, pre-2014 Ukraine, and Belarus are, by definition, unstable polities because the governments who rule them degenerate rather quickly into kleptocratic, repressive, violent, authoritarian regimes that cannot weather economic crises on their own and require constant subsidization and support from Moscow to survive.

And if those subsidies of energy, corrupt financial transactions, and military presence (and the expenses thereof) cannot avail then Moscow must use force majeure, which entails its own, set of ensuing heavy burdens for Russia and the country in question. Either way these states are trapped in the vicious circle of illegitimate governance and cannot escape it except through profound crises and upheavals that contain within in themselves the inherent possibility of becoming violent either as civil wars among component political groups as in Yugoslavia in the 1990s or in invasions as in Ukraine's case.

Second, the intrinsic failure of such states to adapt to socio-economic change and the accompanying demand for political reform that emerges out of such failures underscore the fact that ultimately they can only be sustained by Russia. It is increasingly clear that empire, as in the Soviet case, entails a mandatory but very burdensome subsidization of the outlying peripheries. However, Russia's capacity for shouldering this imperial burden is not unlimited, even at the best of times. And today is hardly the best of times for Russia. Indeed, the costs of empire to Russia are mounting beyond Moscow's ability to control them, e.g. Russia's inability to conquer Ukraine by overwhelming force, which it cannot obtain except at excessive and unacceptable costs. But even the "indirect" methods of control that Moscow has hitherto employed are losing their effectiveness as these countries have now entered the phase of permanent crisis. By entering that phase Belarus has become an increasing burden to Moscow even if Russia simultaneously perceives an opportunity or threat that may force it to invade Belarus to keep it under Russian control.

Were that to happen, Belarus, like Crimea, would quickly become, if not a battleground, than an albatross around Russia's neck because Russia would have to bail it out even as its own economy continues to stagnate. And this stagnation continues despite proliferating and generally over-optimistic reports that the crisis is over. The structural defects of the Russian economy will not be eliminated under Vladimir Putin and as the costs of imperial adventures and subsidies mount Russia's room for maneuver contracts accordingly. In other words, non-military and even military means are losing their utility for Russia but increasingly the latter is all that it has left even as the costs of unleashing it appear increasingly disproportionate. Thus the crisis in Belarus as well as that now visible in Russia show that economically Russia cannot continue to govern as it has. Even force, its "ultimate reason of kings", possesses diminishing



Zvezda, a state newspaper of the Belarusian SSR, issue from August 25, 1991. The headline reads: Belarus is independent!

utility yet remains the only reliable instrument to subdue the former Soviet territories. If this is not ground for concern and even anxiety over the outcome of crisis in the former Soviet space, nothing is. Adding to this factor is the third lesson that if empire is a, if not the necessary prerequisite for the survival of Putinism, then



Signing of the agreement to dissolve the USSR and establish the Commonwealth of Independent States on 8 December 1991

Photo: J. Ivanov



Photo: Alexander Gusev

Since the eleventh century the fate of North Asia and East Europe has been ruled – or at least influenced – from the Moscow Kremlin.

war is also inherent in the Putin system. Russia, as its official military documents make clear, believes or professes to believe that it is permanently at risk and in a state of siege because of alleged but unreal Western threats. It makes these claims to preserve the country in a state of potential mobilization and indeed, in many respects is moving back towards the Soviet model of permanent mobilization. Thus the 2008-12 defense reform that overhauled force structures and the C4I (command, control, communications, computers and intelligence) aspects of the military was then accompanied by the reforms to defense industry whose purpose is to provide high-tech weapons. This sequence goes beyond some Western assessments that overlooked the military rationale behind the overall economic reform of 2001-03 and accompanying administrative reforms. Rearmament was therefore not a second stage in reform but a third and in a sense a culminating stage for the period through 2020 and the culmination of long-held strategic plans.

Ongoing Mobilisation Process

Since then and particularly after 2014 this mobilisation process of the state has accelerated to the point now visible by Western observers. Indeed, in the Kavkaz 2016 exercises Russia not only has once again (having done so before) mobilized the civil administration it even mobilized banks to pay soldiers in the field and hospitals to establish field hospitals during those exercises, a true sign of a commitment to mobilizing the entire state structure on behalf of a large war where the survival of the state is obviously at some risk. In this context the writer Isabelle Facon has found that this mobilization involves the participation of

law enforcement agencies in military drills and snap exercises with the regular army. And in view of the fact that, as she points out, the quality of the Russian forces has been substantially augmented due to a rigorous training regimen, including snap exercises, this army and its commanders now dispose of a formidable capability, capacity for surprise, and can move rapidly to deployment if necessary. The implications of these enhancements in capability and manpower for Belarus are quite obvious especially under conditions of mass social unrest.

Accordingly, in the last several years the Russian government and media have clearly highlighted moves that suggest the likelihood of a major war with the West and the return of this contingency to center stage in military planning either as a priority or at least as a major contingency whose reemergence must be assessed and taken seriously into account. And the pretext for such a contingency could well be Russia's

perception of and reaction to a so called "color revolution" as in Belarus, which is what its pundits, if not its government, claimed to be seeing earlier this year. While there is no discernible serious Western military threat notwithstanding blaring Russian propaganda to that effect, it is also possible that this lurch towards structural militarization – a term coined by the late Vitaly Shlykov, former Russian deputy minister of defence and founder of the Council for Foreign and Defence Policy – denotes as well a comprehensive movement towards stifling any public protest at home by the threat of force and the invocation of the maxim that the fatherland or motherland is in danger. This, of course, is hardly a uniquely Russian phenomenon but it does mean the systematic generation of a war psychosis replete with demands for military action and readiness along with high spending and allocational priority as under Soviet power. And that generation of a war psychosis is a fundamental precondition for the preservation of Putin's system and it's the justification for its neo-imperial policies. But war is also inherent because the peoples of these countries ultimately do want to live like Europeans not as Russians. To quote Lenin, they vote with their feet and will also vote at home if the opportunity presents itself or if and when the inevitable domestic crisis will ensue. At that time, as in almost every revolutionary crisis, the struggle will become a test of force. And it is likely that the Belarusian domestic forces that are not penetrated, as many of them are, by Russia will not support the government or it will misuse them and provoke a reaction that overwhelms those forces. At this point Russia will likely intervene forcibly as it will, as in Ukraine, have been advising Minsk to use force directly throughout

Photo: Kremlin



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the crisis and will lose hope that domestic forces can hold things together. Thus Putinist systems run the perpetual risk of revolution, civil war, and even Russian invasion, as “the masses” are unlikely to settle permanently for the blessings of permanent backwardness and structural crises.

Consequently and fourth, since the domestic means available to Lukashenka and Putin are steadily losing their effectiveness over time, both systems are at risk from the permanent state of crisis generated by the nature of their governance. Yet increas-

threats that Moscow hopes it will not have to carry out unless Lukashenka crosses the red line. Examples of crossing that line are, “if Belarus cast doubt on its union relations with Russia by exiting from the Union state, from the Organization of the Collective Security Treaty and from Eurasian integration” or “if it systematically began to oppose Russia’s position in international structures or openly speak out against Russian foreign policy in international organizations like the UN.” i.e. However, Moscow will be sure to take appropriate preparations so these moves for Zapad-2017 coincide with developments in Russian defense policy that suggested renewed Russian interest in major military contingencies in Europe and in more permanent mobilization of the Russian armed forces and people as suggested above.

First, in 2016, Russia created twenty-five division formations and fifteen brigades, while raising manpower by only 10,000 men. This suggests the possibility that Russia may aim to wage protracted large-scale war using the Soviet model, with a Soviet-type army composed of “skeleton units” that existed solely on paper until they were called up as part of the process of mass mobilization. That such mobilization may be under consideration is apparent from the Kavkaz-2016 and other military exercises in 2016 where Moscow mobilized forces from the Ministry of Interior, banks to pay soldiers’ wages in the fields, and hospitals to provide field hospitals, as well as entire provincial civilian administrations. Russia is apparently thinking about possible protracted contingencies, and is returning to fantasies of a Soviet-type military and mobilization effort. Second, as part of that military process in 2016-2017, Moscow created the 1st Guards Tank Army, the 40th Army, and the 8th Army, and deployed them all around Ukraine’s borders. The 8th Army headquarters is at Rostov-On-Don, from where it could strike toward the Caucasus if necessary, or be air or sealifted to the Middle East. Moreover, any of these armies could quickly be moved toward Belarus to put down unrest there, if Belarus’ government cannot or will not do so.

In addition, as the journalist David Batashvili has written, Russia has created four new divisions: the 150th Motorized Rifle Division in the Rostov region, the 10th Armored Division and the 3rd Mechanized Division in the Voronezh region, and the 144th Motorized Rifle Division near Smolensk. These new divisions will be headquartered fifty, forty-five, and 255 kilometers from the Ukrainian border, respectively. According to Batashvili,

In addition, the headquarters of the Russian 20th Army has been moved closer to

Ukraine, from its former base east of Moscow to Voronezh. A new 8th Army headquarters is being established in the Rostov region. And three motorized rifle brigades that were previously located deep inside Russian territory, near Kazakhstan and in the Volga Basin – the 9th, 23rd and 28th – are also being shifted westward. They will be based in the Belgorod, Bryansk and Voronezh regions, all less than fifty kilometers from the Ukrainian border.

Outflanking the Baltic States

Some or much of these forces could be easily redeployed to Belarus and not just for the purpose of exercises. A Russian invasion and/or occupation of Belarus would not only decisively militarize Europe far beyond the already tense current situation. It would almost certainly galvanize NATO into action to strengthen the defenses of its members even taking the Trump Administration’s skeptical attitude to NATO into account. It would outflank the Baltic States to the South, put Russian troops directly on the Polish frontier in a second “theater” beyond Kaliningrad, outflank and threaten Ukraine from the North, and certainly further militarize Putin’s domestic policies at home and abroad. And if one takes Moscow’s efforts to disseminate nuclear – capable Iskander missiles through its forces, it also increases the possibilities for governments to contemplate using nuclear weapons in the event of military conflict.

A fourth lesson of the crisis is that Belarus reaffirms the lesson highlighted by Alexis de Tocqueville, a French diplomat, political scientist, and historian, 160 years ago that the greatest time of danger for an autocratic or authoritarian, and therefore badly governed state is when it attempts to reform. Inevitably such efforts stimulate heightened demands for broader public participation in government and when the government tries to reinstate earlier controls demonstrations break out. The upshot is what Vladimir Lenin called a revolutionary crisis where the old order can no longer govern as it has or live in the “old way” and the lower classes refuse to live in the same old way. This kind of crisis is indeed what appears to grip both Belarus and Russia and what the former President of Ukraine Viktor Yanukovich triggered by repudiating Europe in 2013-14. Since Lukashenka’s regime cannot provide real economic growth or stability or adjust to dynamic socio-economic changes, it has to exist by means of repression, simulated appeals to Belarusian nationalism, and concurrently a mounting dependence on Russian subsidies. It is obvious that this kind of makeshift system con-



Photo: Mil.ru

Russian strategic BOREI class submarine ALEXANDER NEVSKY with RSM-56 BULAVA

ingly the only avenue out of crisis is direct force and the costs of doing so are high and mounting. Thus the crisis in Belarus, to the degree that it grows and becomes a force capable of ousting the current leadership, possesses direct relevance to all the signs of mounting crisis in Russia. And if Belarus does indeed show signs of replicating the experience of the Maidan in 2014 it is quite likely that Moscow may seek to preempt or quash it by force. Undoubtedly that actin would provoke a worldwide, not just a European crisis.

Claimed Union Relations

For some time now there have been manifestations of rising alarm across Europe that Russia may use the occasion of the ZAPAD 2017 exercises scheduled for August-September as a pretext for invading and occupying Belarus. For example, in the 2013 ZAPAD exercises, Moscow rented 200 railcars from Belarus to transfer soldiers to exercise staging grounds. This year Russia itself is providing over 4,200 of its own rail cars for what clearly looks like a much bigger exercise. Indeed, during the latest iteration of the rising phase of the crisis earlier this year Moscow essentially sent out messages warning Lukashenka that if he could not control the crisis it would do so. These messages need to be seen, as



Photo: mod.gov.rs

Russian, Belarus and Serbian soldiers join forces on an annual basis on the occasion of the SLAVIC BROTHERHOOD exercises.

tains within it the seeds of its own demise since it is an inherently unstable solution to the regime's crisis.

And Lukashenka's efforts to avoid Ukraine's fate after 2014 by moving from a guarantee of social security to Belarusians to defense of the fatherland or a "national" security compact lies at the bottom of the current crisis. Not only did he seek to avoid Ukraine's fate he also had to deal with a stagnant economy since the economy ceased to grow from 2014-16. This too is an inherent legacy of Putinism as Russia's example shows. So if Belarus, like other post-Soviet states, is not to be chained to the equivalent of an economic corpse or repeat Ukraine's revolution and subsequent invasion, reform is essential and that point is true for all the other post-Soviet regimes, not least Russia.

Belarus Turning to the West

After 2014, the threat of invasion, economic stagnation, falling oil prices, the steep decline in Russia's economy to which Belarus is closely connected if not shackled, also entailed a reduction of Russian subsidies. Lukashenka refused to recognize Crimea as part of Russia and even ridiculed Moscow's claims to it. He maintained neutrality regarding the war in the Donbas, said he would never allow Belarus to be used to attack a foreign state, and eschewed involvement in the "Russkii Mir" project (Russian world). Lukashenka also began purging the security services of suspected pro-Russian elements, resisted Moscow's

efforts to establish a new air base in Belarus. He also allowed opposition elements to participate in Parliamentary elections in 2016. Indeed, he even announced plans to deepen cooperation with NATO. On domestic and economic issues too he sparred with Moscow.

Pro-Russian publicists were arrested; Lukashenka refused to give the Collective Security Treaty Organization (Moscow's substitute for the Warsaw Pact and military alliance in the CIS) and Eurasian Economic Union summits, and extradited a Russian-Israeli dissident to Azerbaijan. Russia's introduction of passport controls on the border also provoked his resistance and has accused Russia of violating international agreements on oil, gas, and borders, announced the filing of a suit against Moscow on energy issues, and recalled delegates from the Eurasian Economic Union. Lastly he refused to sign the latter organization's customs code until oil and gas disputes were resolved. The energy crisis emerged because in 2016 Minsk unilaterally lowered the price it was paying for gas despite Moscow's long-term subsidization of Belarusian purchases. Since Moscow claimed this led to debts of \$780 million, Moscow reduced the supply of duty-free oil by a quarter to 18 million tons per annum, cutting severely into Belarusian re-export of oil, a major source of income and foreign currency. Thus Belarus is being made to feel the full effects of its dependence upon Russian subsidized energy.

Yet Belarus' efforts to carve out an enlarged sphere of its sovereign independent

actions comes at a time when, due to the militarization of European security in the wake of the invasion of Ukraine, its military-strategic value to Russia as an area where Moscow can deploy its air and ground forces, not to mention missiles, is growing. Moscow has long made repeated threats to increase its military presence and deployment in Belarus and Kaliningrad if the U.S. puts troops and heavy weapons in Eastern Europe. Since NATO rearmament and reinforcements are continuing due to Russia's ongoing aggressions in Europe and threats of further military action, Belarus' room for independent maneuver is steadily being constrained when its ability to sustain the Lukashenka regime is declining over time. Very probably something has to give. And Putin has never been known to be in the giving vein, least of all if he suspects that with Western help Belarus is trying to jump from the Russian ship to the West for that means a quantum leap in magnitude of the threats he and his regime profess to discern.

Conclusion

While the situation in Belarus might calm down for a while and more Russian subsidies might be found so that nobody has to resort to force either domestically or by forcibly crossing borders; Belarus' condition resembles that of a pressure cooker that will inevitably boil over. Minsk cannot be independent and live off of Russian energy subsidies. It cannot defy Moscow yet remain a major pathway and base for Russian military action against NATO members and Ukraine. It cannot reform lest that trigger Russian intervention against which NATO will do little or nothing.

While the current lull or dormant crisis could last for some time; unless fundamental changes occur in Russia, Belarus, and in Europe's overall security picture (e.g. an end to the Ukraine crisis and a rollback of East-West hostility) an outcome that is quite unlikely; the structural crisis inside and around Belarus will continue. And that means that a violent resolution of Belarus', if not Russia's crisis – for the two are intrinsically connected to each other – is much more likely than not.

After all, as we have noted above, this crisis is now "structurally embedded" in the trajectory of both Belarus and Russia and cannot be averted without transforming those structures. Therefore, if ever there was a time for competent statesmanship in Europe to forge a viable solution to this if not other issues, it is now. But neither in Belarus nor in Moscow is it on the horizon. ■

Does OPEC Have a Future?

OPEC Versus US Shale Oil Revolution

Frank Umbach

The Organization of Petroleum Exporting Countries (OPEC) and non-OPEC oil producers decided about the level of conventional oil production until 2014 on the basis of oil prices beyond US\$100 per barrel and the expectation of a “peak-oil”-era with the highest global production level around 2020.

In the following decades, the global oil production level would continually decrease alongside of the decline of the remaining worldwide conventional oil reserves of around 50 years (estimated on the

oil and gas demand in Asia (i.e. China) as well as its rising import dependency from the Persian Gulf and Africa could also have far-reaching geopolitical impacts. While OPEC operates as a price cartel to

US\$70-80 per barrel. The result was a war on prices and market shares particularly in Asia, which is the world's most dynamic region of economic and oil demand growth. In November 2016, OPEC agreed on a cut of around 1.2 million barrels per day (mb/d) of its collective oil production. This cut was supported by Russia and other non-OPEC oil producing countries by contributing another 600,000 barrel per day (b/d) to shorten the world's oil production. It was also an admission that OPEC's war against the US shale oil revolution has largely failed. OPEC's production shortage, the cooperation between OPEC and non-OPEC oil producers as well as the fact that the agreed lower production quota had been followed by around 90 percent of OPEC's members by May 2017 were surprising for many observers, as the history of OPEC is rather one of non-compliance of previously agreed collective production quotas. On 25 May 2017, OPEC and non-OPEC oil producers agreed to extend their collective oil production shortages with the hope to stabilize the oil price on around US\$60 per barrel. But the contradictions of interests within OPEC as well as between OPEC and non-OPEC oil producers have been increasing. Moreover, the slightly increased oil price of around US\$50-55 per barrel until May has declined again to less than US\$45 per barrel in June.



Photo: Washington Institute for Near East Policy

Is OPEC still the “greatest show on earth” for oil traders, like some papers name it?

present global production level). It could lead to an ever increasing competition over scarce oil reserves with numerous geopolitical implications. The dynamically growing

coordinate the member states oil policies to ensure steady income and oil market stabilization, it has always been Saudi Arabia as the dominate producer, having the most geo-economic influence on the world oil markets. But with the declining oil price that fell around 60 percent from more than US\$100 per barrel to less than US\$27 per barrel since the early summer of 2014 until the beginning of 2016 – the price decline being primarily the result of expanding unconventional shale oil production in US - the role of OPEC as price setter has become increasingly questionable. Despite the dramatically declining oil price, Saudi Arabia was initially unwilling to enforce a collectively agreed freeze or even a decrease of OPEC's oil production in order to stabilize the global oil price on

Author

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OPEC in Crisis

Since the 1970s, OPEC has been the most influential actor of the old world oil market. It had a relatively stable oil production and limited spare capacity to balance the global oil markets of supply and demand. Before 2014, OPEC controlled over 40 percent of the world's oil production – already much less than the 50 percent share in the mid-1970s. In 2016, OPEC's market share has even fallen under 40 percent. In the old oil era, Saudi Arabia was not just the biggest producer and exporter of the world, it also held the largest spare capac-



Photo: John Kuhner

Marcellus Shale is an oil shale, a highly carboniferous rock formation which probably derives its carbon content from organic deposits.

ity making it “the nuclear weapon in the global oil market”. This gave Riad – as the world’s largest exporter with a global oil market share of 15 percent – an unrivalled influence in the old world oil order. But in 2016, the global spare capacity has been melting down to just 3.5 mb/d (temporarily even just to 1.5 mb/d) and is being consid-

Middle East (i.e. Yemen, Syria). Riad has no interest that Iran increases its economic power through rising oil revenues in order to dominate the region. Given the disagreements between the monarchies within the Gulf Cooperation Council about the conflicts in Yemen and Syria, the diverging geopolitical interests of OPEC’s individual

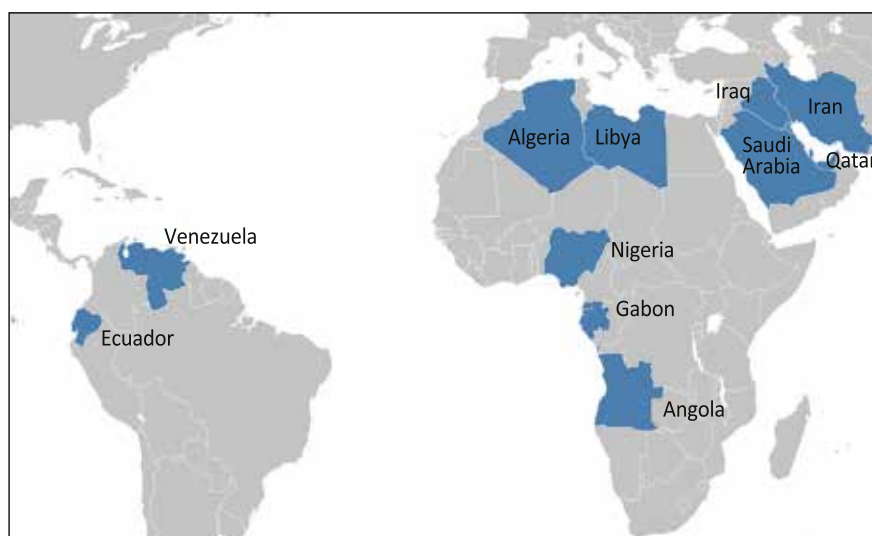
hurting high-cost producer companies and countries – in particular those, whose state budgets are highly dependent on oil export revenues and which have a less diversified economy. Even Saudi Arabia has been hurt by its own oil price war as it is running a budget deficit of US\$98 bn in 2015 (16% of its GDP) and a US\$87 bn last year, cutting government salaries by 20 percent and reducing public funding.

In the short-term future, OPEC is facing three major challenges: (1) a new dynamic of the U.S. shale oil production; (2) a substantial increase of the oil production in Iran, Iraq and others.

The US Shale Oil Revolution 2.0

The old oil era was characterized by an ever rising global oil demand due to emerging markets (i.e. China) and a conventional oil production rise with new investments in ultra-deep offshore fields (i.e. Brazil’s sub-salt fields), remote areas (i.e. Arctic, Siberia) and Canadian oil sands – all high-cost oil production options. But 2010-2015, the combined conventional and unconventional US oil production almost doubled from slightly over 5 mb/d to 9.4 mb/d at a cost range between US\$40-80 per barrel, dependent on the various reservoirs and production conditions. In 2015, 52 percent (4.89 mb/d) of total U.S. crude oil production came from shale (tight) oil – almost half of Saudi Arabia’s production. Since 2012, the U.S. has already become the worldwide biggest combined oil and gas producer in the world (ahead of Russia and Saudi Arabia).

Due to low oil prices, the number of oil rigs in the US dropped 80 percent and oil production decreased to 8.5 mb/d in 2016. More than 100 companies have gone bankrupt and some 120.000 jobs have been lost since the beginning of 2015. But the overall slowdown of the U.S. shale production has been much less than expected due to increased efficiency, squeezing operational costs and technology innovation translating into higher well productivity and resiliency. Average production costs have been reduced by 30-40 percent for US shale wells – compared with just 10-12 percent elsewhere. Around 60 percent of the US shale oil production is now considered commercially viable at US\$50-60 per barrel in US – compared with only 20 percent of conventional deep water oil output. The shale oil industry is much more price-elastic and the first to bounce back due to the short-cycle nature of drilling as it doesn’t need large upfront investment to recover quickly when prices



Graphic: mawibio

OPEC member countries

ered as insufficient in regard to the rising global oil demand to more than 92 mb/d in 2016 (which demands a spare capacity of at least 5 mb/d). Furthermore, the fact that one country acting unilaterally within OPEC as the world’s “swing producer” is questioning and undermining OPEC’s role as a price cartel.

Since 2014, Riad is less willing to maintain that role due to both economic and geopolitical reasons as the U.S. has reduced its regional engagement and Saudi Arabia facing with Iran a geopolitical rival in the

member countries have eroded trust within the cartel. It makes it more difficult to enforce collective decisions that are mutually beneficial in their short- and long-term interests.

While the old conventional oil era was based on an oil price above US\$100 and with OPEC and Saudi Arabia being the global oil price setter, the U.S. shale oil production became the new global price setter, translating into a new oil era. While much lower oil prices are benefiting consumers and importing nations, they are

rise again. By the end of 2017, production levels may rise by 600,000-700,000b/d as investors have already become interested at new shale oil projects.

Shale oil production may even double from the 2015 level of 4.5 mb/d to 8.5 mb/d by the mid-2020s as they found new cheaper oil, especially in the Permian basin of Texas with an average break-even price of US\$35-40 (some fields even below US\$30) per barrel. It added the majority of 150 new rigs in the U.S., resulting in a new present output boom. The Permian Basin is home to the largest number of drilled but uncompleted wells (DUCs) in the U.S., accounting for 1,348 of August 2016 – a large source of production coming online with rising oil

are unconventional shale oil – compared with 30 percent of the global recoverable oil reserves.

Geopolitical Implications

The real geo-economic and geopolitical losers of the new oil era are neither the U.S. nor Saudi Arabia, but high-price oil producers such as Venezuela and even Russia. Although Russia has been able to maintain the world's highest oil production rivaling with Saudi Arabia and the U.S., the low oil prices have heavily impacted its state budget in addition to western sanctions, established against its energy (i.e. oil sector) over Crimea's annexation in 2014.



Photo: OPEC

Due to declining oil prices Saudi Arabia has declared a “Vision 2030”, which aims to boost the country’s non-oil revenues.

prices. In the forthcoming years, technological innovation will introduce waterless fracking, laser drilling and others that will make the shale oil and gas fracking safer, cleaner, leaner as well as more efficient and competitive than ever.

The future U.S. position on the world oil markets is also been strengthened by a new study of Rystad Energy, which concluded for the first time in history that the U.S. holds more recoverable conventional and unconventional oil reserves (totaling 264 bn barrels) than both Saudi Arabia (212 bn barrels) and Russia (256 bn barrels). More than half of the remaining U.S. oil reserves

While Saudi Arabia as the world's lowest oil cost-producer and the globally world-wide largest oil exporter is resilient enough to survive oil prices below US\$40 per barrel (though has widened its state budget deficits and decreased its GDP growth), most other “rentier states” are not. In 2015, OPEC's total oil export revenue for its 14 member countries was US\$404 bn – 46 percent lower than the year before and the lowest net level since 2004. By adjusting inflation, net OPEC oil revenue was around US\$606 per person in 2015 - even more than 80 percent lower than in 1980. As a result, they will also lose geo-economic and

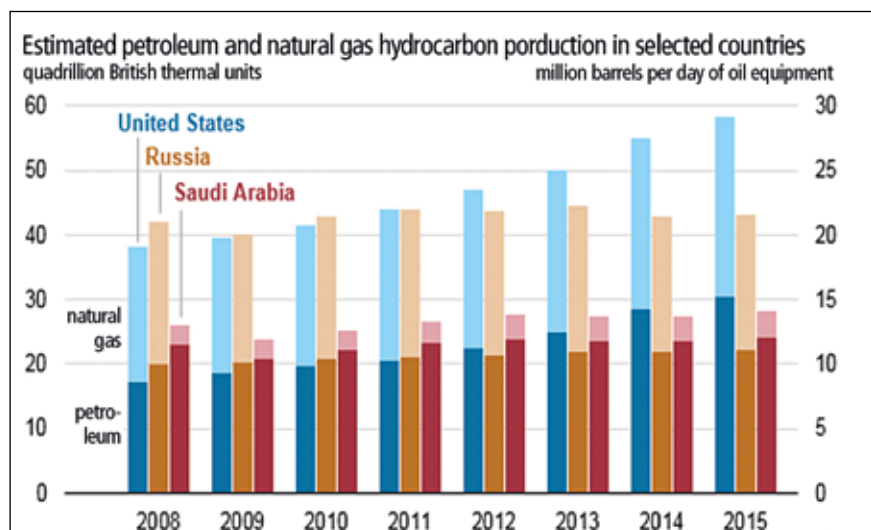
political influence in the new oil era as their constraint state budgets question their traditional domestic and foreign policies.

A “lower-for-longer” price scenario, which envisages oil no longer being a scarce resource and with a demand growth largely being balanced by low-cost production from OPEC and US shale plays, could also lead to “stranded assets” and “stranded reserves” as the result of the “carbon bubble” even without a further tightening of the global climate policy. It will hurt in particular high-cost producers and countries highly dependent on oil export revenues for their state budgets. Citigroup, for instance, estimated the value of unburnable fossil-fuel reserves could amount to more than US\$100 trillion out to 2020; and around 40 percent of current oil investments are seen as stranded at prices below US\$75 per barrel. Consultancy Wood Mackenzie even expects that the oil and gas industry will cut spending by US\$1 trillion through 2020. Other estimates concluded that the equity value of oil producers could sink 40-60 percent under a low-carbon scenario of a more tightening future climate policy. In this light, even a “peak oil demand” seems not very far from today.

While Saudi Arabia and some smaller Gulf states have a mid-term political-economic vision, the political will and funds available to diversify their economies, most other major oil producers lack those visions and having the political will as well as funds available for the transformation of their national economies for a decarbonized world. While a complete oil import independence of the U.S. appears still an illusion, it could become realistic in the North American context by including Canada. Meanwhile U.S. politicians do not only favor an „energy independence“, but even an „energy dominance“ on the worldwide energy markets. Its resulting geopolitical consequences are just looming on the horizon, complicated by the hitherto erratic foreign and security policies as well as contradicting signals of the Trump-Administration (i.e. towards Russia and China), undermining trust, reliability and predictability towards both its allies as well as geopolitical rivals.

Strategic Perspectives

As many OPEC countries are not low-cost producers, it has made it for OPEC more difficult to agree on new production limits as their interests becoming ever more diversified and competing. An effective production freeze or cut appears rather questionable or not long sustainable. Given the present oil price of less than US\$45 per barrel, most experts do not



Combined oil and gas production of the US, Russia and Saudi Arabia

expect an oil price above US\$60 through 2017 but rather a price floor between US\$30-55. The new skeptical forecasts are the result of additional oil supplied to the markets such as a new expansion of US shale oil, a higher output of Norway and the production recover of the long-delayed giant Kashagan field in Kazakhstan up to 370,000 b/d in 2017. In the next year, even by taking into account that the present

world oil fields output could decrease by 4.2 percent, new projects worldwide could add more than 2.7 mb/d of net supply to the already oversupplied global oil market. As Russia's old oil fields are beginning to deplete in the near future and being unable to expand beyond its present post-Soviet record high of 11.1 mb/d, its support for a global oil production cut obliges Moscow to nothing on its side and might prove short-

lived: An oil price above US\$55 would stimulate an even more rapid recovery of US tight oil production and result in much lower oil prices below US\$40 per barrel. Any deeper or longer lasting cut of OPEC's oil production might ultimately prove self-defeating. Reaching a price level that keeps high-cost producers out, but high enough to generate financial relief demands a micro-management of global oil prices, which seems practically almost impossible to achieve. Saudi Arabia itself appears not to trust any longer its oil reserves as its major future economic instrument and pre-condition for domestic stability and regional influence. It is a consequence of the worldwide climate protection policies and regulations, the digital revolution in the energy sector as well as the expansion of renewables in the power sector and electric as well as hybrid mobility. The worldwide transport sector is still dependent on 90 percent on oil and gasoline, accounting for 55 percent of the worldwide total oil use. The kingdom's influential deputy crown prince Mohammed bin Salman already announced a "Vision 2030", which aims to boost the country's non-oil revenues as it is currently 90 percent oil driven and thus to diversify its economy and industry away from its oil resources. ■

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Royal Norwegian Navy and Maritime Forces Overview

Bob Nugent

Norway is a maritime nation with economic and security interests covering extensive ocean areas within its Exclusive Economic Zone (EEZ). The country's sea services, made up of the Royal Norwegian Navy (RNoN) and the Coast Guard (RNCG), are responsible for protecting the country's maritime sovereignty, territory and national interests at sea. The principal task of the RNoN is to acquire, train and operate naval forces and to make maritime capabilities available in readiness for operational deployment in peacetime, crisis and war, nationally and internationally.

Norway depends on the ocean, both as a source of economic wealth and as medium for moving imports and exports. Accordingly, Norway's sea services main-

homeland defence mission, since NATO planning would require most military reinforcements and equipment to transit to Norway by sea.

between Russia and many NATO nations highlight the security issues that drive Norway's continuing focus on protecting its northern region.

In peacetime, the RNoN and Coast Guard are responsible for patrolling the nation's large and critically important EEZ. In addition, as a result of the Schengen Treaty, Norway is responsible for enforcing external border controls along its land and sea frontier with Russia on behalf of all the Schengen countries.

Norway's emphasis on participation in international peace support operations requires the RNoN to maintain ships capable of deploying to international crises anywhere in the world. This in turn requires the Navy to prepare its deployable assets for operations in a generic multi-threat environment.

In order to fulfil its national, NATO and other mission obligations, the RNoN has the following tasks:

- Intelligence collection and surveillance in Norway's maritime approaches, primarily the North Cape area;
- Sea control operations in Norway's coastal waters;
- Protection of Norway's sea lanes of communication (SLOC);
- Exercise of national sovereignty at sea;
- Defensive operations to repel any sea-borne invasion of Norwegian territory;
- Participation in international naval forces, under UN or NATO auspices in times of peace, crisis, and war.

As part of the Navy, the RNCG has the following duties:

- General surveillance and control of the continental shelf, the EEZ, and in the fisheries zones around Svalbard and Jan Mayen islands;



Photo: ESD archives

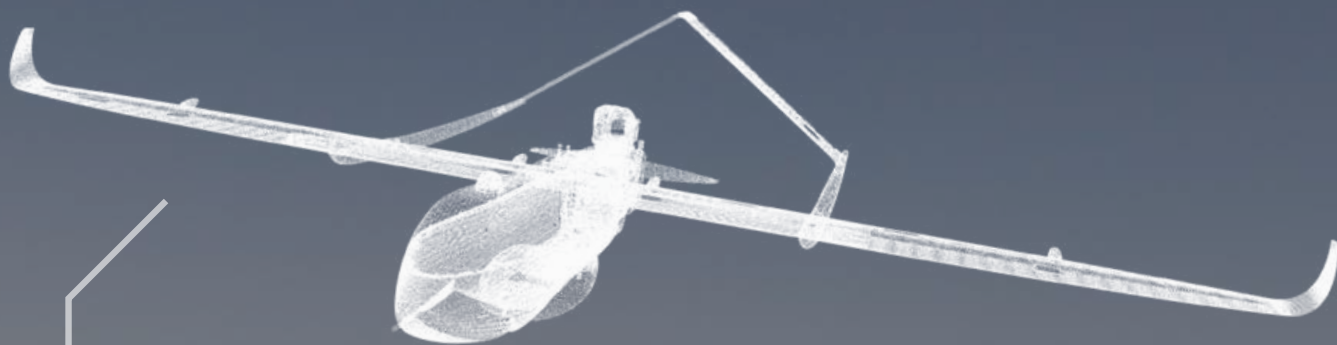
The six ULA Class submarines of the RNoN are expected to be replaced by four Type 212CDs from 2025.

tain sea and air platforms that defend its offshore economic resources and its vital sea lanes of communication (SLOC). SLOC protection is a necessary component of its

The RNoN retains the mission and trains and equips for coastal defence and anti-invasion. While less prominent than during the Cold War, the sea services' responsibility to prevent and responding to territorial incursions in its northern regions has seen renewed focus in the current security environment. Russia's occupation of eastern Ukraine, the continuing robust naval and military capability present in Russia's northern region, and ongoing political tensions

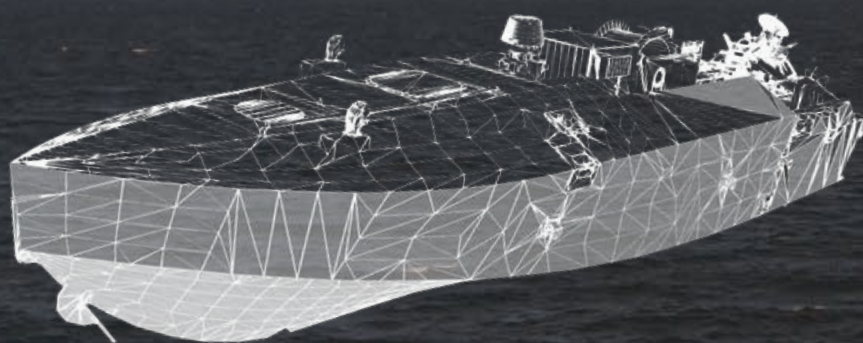
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Photo: reddit.com

The six SKJOLD Class FAC were built by Kvaerner/Umoe Mandal incorporating the SENIT 2000 combat management system as a joint development of DCNS (now Naval Group) and Kongsberg.

- Fisheries protection operations;
- Support for civilian maritime activities, including weather reporting and search and rescue operations;
- Environmental protection operations;
- Humanitarian and disaster relief operations.

Maritime Forces Organisation, Composition and Disposition

RNoN ships are identified under the NATO (English) prefix HNoMS (His/Her Norwegian Majesty's Ship). In Norwegian, vessels are identified by the ship prefix KNM (Kongelig Norske Marine (Royal Norwegian Navy)). The Navy consists of the Coastal Squadron, the Coast Guard and the academies. The Coastal Squadron is the Navy's operational force at sea and on land. The Coast Guard in peacetime is the Government's primary authority at sea and the armed forces' most important resource for handling incidents in the Norwegian territorial waters. The RNoN has 4,350 personnel.

The Coast Guard is operated by the RNoN and is organised into two squadrons with a main base at Sortland in North Norway. The Logistics Base at Ramsund provides logistics support for vessels that operate in the northern part of Norway and support the Naval Special Operations Forces in their training.

The Inspector General, Royal Norwegian Navy, supported by the Naval Staff, is responsible for force production. The Inspector General is based in Haakonsværn Naval Base in Bergen, which is the Norwegian Navy's main naval base. The RNoN's vessels are stationed at Bergen, and the base is

also assigned the tasks of education, training and exercises. A detachment of naval helicopters is stationed at Haakonsværn to support the frigates and Coast Guard operations in Southern Norway. The RNoN consists of 60 ships and craft, including:

- Six ULA Class diesel-powered attack submarines (SSK);
- Five FRIDTJOF NANSEN class frigates;
- Six SKJOLD Class Fast Attack Craft (FAC);
- One HARSTAD Class (OSC).
- Six mine countermeasures vessels (MC-MV);
- Three OKSOY Class coastal minehunters (MHC).
- Three ALTA class coastal minesweepers (MSC).
- Sixteen Combatboat 90N type landing craft, assault (LCA).
- Twenty auxiliary and support ships and craft.

Photo: wikimapia



The five FRIDTJOF NANSEN Class AEGIS frigates were ordered from Spanish shipbuilder Bazan (now Navantia) and have been in RNoN service since 2011.

The Coast Guard is operated by the RNoN. It employs some 800 civilian and regular Navy personnel and is organised into two squadrons. It has its main base at Sortland in North Norway. The Logistics Base at Ramsund provides logistics support for vessels that operate in the northern part of Norway and support the Naval Special Operations Forces in their training. RNCG vessels are given the prefix "KV" (Kystvakt (Coast Guard) in Norwegian) and "NoCGV" (Norwegian Coast Guard Vessel) in English (NATO). Coast Guard ships are painted similarly to RNoN shipping, with the addition of "KYSTVAKT" painted amidships on the hull.

The RNCG operates fifteen ships and craft, including:

Twelve offshore patrol vessels (OPV):

- Three NORDKAPP Class;
- Three BARENTSHAV Class;
- One SVALBARD Class;
- Five NOMEN class.

Three patrol boats, including:

- One HARSTAD Class;
- One ALESUND Class.
- One REINE Class.

The Coast Guard is supported by a squadron of six LYNX Mk86 helicopters from the RNoAF; however, this squadron is expected to be replaced by six NH-90 helicopters. Also, two P-3B ORION aircraft are earmarked for Coast Guard duty under the cognisance of the Air Force.

The Royal Norwegian Navy Air Service (Marinens Flyvevesen (RNNAS)) is the naval air arm of the RNoN. Operationally, it is part of the sea service; however, it is administratively a component of the Air Force (RNoAF). The RNNAS operates the Augusta-Westland NH-90 naval helicopter. The RNoAF operates 119 maritime-capable fixed and rotary-wing aircraft, including one squadron of P-3C ORION maritime patrol aircraft.

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Budgets and Sources of Military and Naval Equipment

AMI estimates the Norwegian Armed Forces (Forsvaret („Defence“ (NAF)) 2017 expenditures will exceed US\$6.1Bn, one of the highest budgets in Europe. Norway is working to build its Arctic defence and increase manpower as it focuses on its High North defences in response to the changing security environment in the region. Norway has committed to adding US\$19.6Bn to its defence budget over the next 20 years.

AMI estimates the RNoN will receive approximately 22% of the overall NAF defence expenditure in 2017-22. This amounts to about US\$1.4Bn annually, with some 21% (or about US\$281M) designated for the procurement of new platforms, systems and equipment.

Although the Royal Norwegian Coast Guard (RNCG) is subordinate to the RNoN, it is the recipient of its own funding stream from the MoD, assessed at about 2.6% of the overall NAF budget or US\$157M in 2017. Like the other branches of the Forsvaret, the RNCG appropriates approximately 22% (or US\$35M) of its allocation toward procurements.

From 2011 through 2016, Norway imported an estimated US\$1.2Bn in military equipment from foreign suppliers (about US\$1.0Bn less than from 2008 - 2013). During this time the NAF's primary suppliers were:

- Spain (US\$427M)
- US (US\$400M)
- France (US\$90M)
- United Kingdom (US\$80M)
- Italy (US\$63M).

Other suppliers of defence equipment to the RNAF include Sweden, The Netherlands and Germany.

Norway's primary domestic naval suppliers are Kongsberg Defense and Aerospace (KDA – one of the two main business elements of the Kongsberg Group) and Umoe Mandal AS. KDA produces several naval systems in service with the RNoN, including:

- Anti-ship missiles (ASMs) such as the widely exported PENGUIN and the new generation Naval Strike Missile (NSM);
- The MSI-90U Command and Weapon Control System (CWCS) for submarines. The MSI-90U is operational in Norway's six ULA Class submarines, and in the batch 1 Type 212 Class submarines built by and for Germany and Italy;
- The SENIT 2000 Combat Management System (CMS) in a teaming arrangement with DCNS. SENIT 2000 is aboard the new construction SKJOLD Class FACs.

- Sonars, through its sister company, Kongsberg Maritime AS.
- Maritime simulation systems supplied by Kongsberg Maritime.

Procurement Strategy

Norway's geographic location, membership in the European Union, NATO and other international bodies, as well as budget and other constraints all influence Norway's efforts to cooperate with other nations on defence procurement. A strategy of cooperative defence procurement also supports Norwegian companies exporting defence goods and services.

Each year, Norway's Defence Long Term Plan – Materiel publishes an unclassified overview of long-term materiel requirements. This publication does not examine each planned project in detail but creates

New Submarine Programme

Norway's largest naval procurement programme is the replacement for the six ULA Class submarines. The ULA Class will start leaving service in 2022, with one hull decommissioned each year after that.

In September 2014, the RNoN reportedly considered joining Sweden and the Netherlands in a joint submarine project. In January 2015, Saab and Damen teamed to replace the Royal Netherlands Navy's (RNLN) WALRUS Class, making it even more plausible for the RNoN's replacement submarine programme to reduce costs and bring a mature design into service with a tri-country programme based on the Swedish A26. By September 2015, the RNoN had reportedly held discussions with the Polish Navy regarding possible participation in the Project ORKA programme to acquire three



The Kvaerner Mandal-built OKSOY and ALTA Class MCMV catamarans were commissioned from 1994 and constituted the RNoN's first attempt to operate naval vessels incorporating surface effect technology.

opportunities for in-depth discussions with companies in Norway's defence and related sectors. The process provides industry with early insight on future procurement opportunities, giving them the opportunity to plan for participation in future acquisition programmes. Ensuring domestic companies remain a part of Norway's defence supplier base supports the country's defence forces and promotes contributions to the country's exports in an increasingly competitive international defence market. The success of Kongsberg and other Norwegian defence and security companies indicate this procurement strategy has generally been successful.

new construction submarines. At the time, German builder tkMS and French company DCNS were seen as the leading contenders for the Polish submarine programme.

In June 2016, the Norwegian Government short-listed the SCORPENE and the TKMS 212/214 as new submarine candidates, eliminating the Swedish A26 design (and any partnership with Sweden) from the competition. As with the original ULA programme, the programme for the replacement submarine would have some of the modules manufactured in Norway, with final assembly at the foreign partner's yard.

In March 2017, the Norwegian Defence Ministry announced that they had chosen

tkMS as a strategic partner to supply new submarines to the Norwegian Navy. The German Type 212CD (CD = Common Design) was selected over the DCNS SCORPÈNE as the preferred design. This award marked a significant award for the German submarine builder, following a string of DCNS submarine programme wins in Australia and Malaysia.

AMI estimates the final construction contract for the submarine programme will be awarded in 2019, with the first unit of the class entering service by 2025. Current planning will have the programme acquire four units (down from the original six) to replace the six ULA class hulls for Norway and two units to complement the German Class 212A. All four new Norwegian submarines are expected to be in service by 2031. The programme's total acquisition cost is estimated at \$1.8Bn.

Other Naval Procurements

AMI profiles several other naval procurement programmes now active in Norway, including:

- Auxiliaries
- MAUD Class Logistical Support Ship (LSS) (AOR)
- KRONPRINS HAAKON Class Oceanographic Research Icebreaker (AGOR)
- Offshore Patrol Vessels
- Coast Guard Offshore Patrol Vessel (OPV) (Project 6615)
- Coast Guard Offshore Patrol Vessel (OPV) (Project 3049)
- Patrol Vessels
- STRIDSBAT 90 Replacement



Photo: ESD archives

Kongsberg's NSM has been selected to equip the NANSEN and SKJOLD Class vessels of the RNoN as an anti-ship and land-attack missile. Future operators include Poland, Malaysia, the US and Germany.

Taken together, these five programmes represent approximately \$1.3Bn in new construction platforms that will be put in service through 2025.

The RNoN is also assessed as moving ahead with upgrades to their MCMV force, the six hulls of which were commissioned more than 20 years ago. Upgrades could include UUVs (such as the HUGIN series manufactured by Kongsberg). Norway may also be looking to add an unmanned surface vessel component to their MCMV force. The Textron Common Unmanned Surface Vessel, the centrepiece of the current US Navy

UISS mine warfare programme, would be a strong candidate for a potential acquisition, possibly with other Northern European navies also looking to improve their mine warfare capability.

Summary

The RNoN is a regional naval force equipped with modern platforms and assessed as capable of effectively responding to modern air, surface and submarine threats in low densities and for limited periods. The sea service continues to train and equip for conventional naval conflict scenarios and has directed the bulk of its investments in new platforms and systems towards anti-ship, anti-air and anti-submarine capabilities.

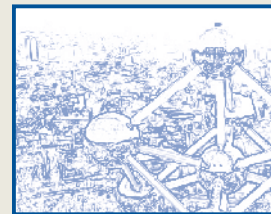
Norway has followed the trend of other European fleets since the end of the Cold War by dramatically reducing the number of maritime forces and personnel. New construction ship and programmes have concentrated resources in fewer larger platforms better capable of distant deployments and meeting the broader peacetime requirements of the country's political leadership. The NANSEN frigate programme is one example of this trend, as is the ULA replacement programme.

The Arctic region continues to remain a national security priority, and so the RNCG continues to make the region a focus of its operational effort. RNCG operations in the northern reaches ensure the country's maritime sovereignty and security of vital offshore oil reserves and other important resources (fisheries) concentrated on the continental shelf ■



As a central element of the current UISS mine warfare programme of the US Navy, Textron's Common Unmanned Surface Vessel might be considered a valuable addition to the Norwegian MCM force.

Photo: Textron Systems



Montenegro and Euro-Atlantic Integration in the Western Balkans

Joris Verbeurgt

On 5 June 2017, Montenegro joined NATO as its 29th member state. Another step as part of the integration of the Western Balkans in the Euro-Atlantic community after years of war, civil strife and instability. In a speech given on that occasion, NATO Secretary General Stoltenberg reminded the audience what NATO stands for: “An alliance of democracies”, the members of which “... unite around a common purpose, stand with each other, protect each other, and, if necessary, fight to defend each other”. Stoltenberg stressed the fact that Article V of the NATO Treaty – the pledge of collective defence – was, and will remain the core of the NATO partnership. While welcoming Montenegro into the Alliance Stoltenberg stated that the new member was now protected by the NATO shield whereas NATO would profit from Montenegro’s insights into the Western Balkans. This would foster regional stability and international peace and security.

Photo: NATO



On 5 July 2017 Montenegro became the 29th member state of NATO.

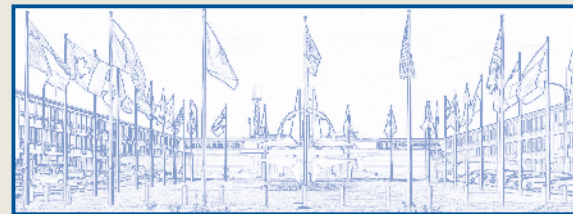
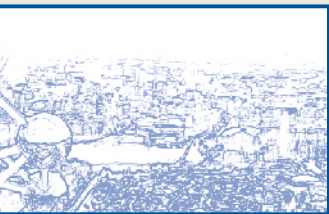
An Unlikely Ally?

Montenegro is a mountainous country (hence the name) of approximately 14.000 square kilometres and a population of around 650.000. The capital is Podgorica. Its boundaries are formed by the Adriatic Sea in the Southwest, Bosnia and Herzegovina in the Northwest, Serbia in the East and Kosovo and Albania in the Southeast – areas that were the scene of civil strife, war and atrocities during a large part of the 1990’s. Its GDP slightly exceeded \$10Bn in 2016. Montenegro is no official member of the Eurozone but voluntarily uses the Euro as domestic currency. The country is still troubled by economic, ecological and crime related problems and chronic corruption up to the highest state levels. Although progress in these fields has been made in recent years, they have been delaying full

EU membership. Montenegrin defence capabilities consist of a professional standing army (conscription was abolished in 2012), an air force and a navy, comprising around 2.000 active duty members in total. Montenegrin forces contributed to international peace operations in Somalia, Cyprus, Liberia and Afghanistan.

Historically, Montenegro was considered Serbia’s little brother for long. Ethnic Serbs count for 29% of the total Montenegrin population while ethnic Montenegrins count for only 45% of the highly diverse populace. However, ethnic Serbs and ethnic Montenegrins share the orthodox religion, an important factor in the politics of the Balkans. Tensions on the Balkans between Slav orthodox peoples, championed by Serbia and supported by Russia that tried to increase its influence on the Balkans and gain access to the Mediterranean Sea and the Austrian-Hungarian Empire, led to the fatal shot in Sarajevo in 1914 that initiated the First World War.

In the modern era, ethnicity and religion as mobilising forces and classical geopolitical concepts like the creation of spheres of influence and security dilemmas are all but dead. This became clear in the early 1990s when Yugoslavia broke apart and Serbia (and Montenegro), who played first fiddle in Yugoslavia, would not allow this to happen without putting up a fight. When a restoration of a united Yugoslavia under Serbian (and Montenegrin) dominance became illusory, Serbian president Milošević and his Montenegrin counterpart Đukanović formed a federation in 1992 (the Federal Republic of Yugoslavia) and waged war in Croatia and Bosnia and Herzegovina to maximise Slav orthodox presence and influence in these newly created states. In Kosovo, the Serbs were fighting for the integrity of their territory. The extensive bombing of Serb forces in Bosnia in 1995 and of Serbia and Montenegro in 1999 by NATO put an end to the fighting, the ethnic cleansing and atrocities that



had raged through the Western Balkans for almost a decade.

As a result, Milosevic was driven from power and later was trialled for war crimes in The Hague where he died before being sentenced. Initially enthusiastic supporters of Milosevic and his plan for a "Greater Serbia", the Montenegrin people gradually lost interest in his bloody and costly mirage. As from 1996, Dukanovic began to distance himself from Milosevic and his politics and Montenegro began to detach itself from Serbia. On 21 May 2006, an independence referendum was held and a majority of 55% decided to break up the already loose union with Serbia.

As an independent state, Montenegro joined the OSCE and the NATO Partnership for Peace programme in 2006 and the IMF in 2007. In 2010, Montenegro became a candidate country for the EU and is gradually fulfilling the conditions for full membership in the future. With becoming the 29th NATO ally, Montenegro takes another important step with regard to integration into the Euro-Atlantic community.

New NATO Expansion

The continuing outbursts of violence in the Western Balkans in the 1990s convinced the EU, the US and NATO that military intervention was necessary in order to restore peace and stability. Several peacekeeping missions under the auspices of the UN (in Croatia, Bosnia and Herzegovina, Kosovo, Macedonia and the former Federal Republic of Yugoslavia) were successful in obtaining that goal. Enormous efforts were made to stabilise and integrate the region. Euro-Atlantic integration seemed the recipe to move on from the wars that had torn up south-western Europe for a decade and to bring peace, democracy, the rule of law and prosperity. Slovenia joined NATO in 2004 and Croatia followed suit in 2009, together with Albania. Montenegro is the third former Yugoslav republic to join NATO and the Republic of Macedonia, since 1999 part of NATO's Membership Action Plan, is in the waiting room. Dialogue and cooperation with Serbia are developing while Kosovo, independent from Serbia since 2008, is dreaming of EU and NATO membership which is rather problematic, since

four NATO members (Greece, Romania, Slovakia and Spain) do not even recognise Kosovo's independence.

EU membership seems to be the next logical step following NATO membership: this was the case for Slovenia in 2004 and for Croatia in 2013. Albania, Macedonia, Montenegro and Serbia are candidates for the EU and Bosnia and Herzegovina and Kosovo both signed Stabilisation and Association Agreements with the European Union. In 2016, Bosnia and Herzegovina formally submitted an EU membership application. The necessary reforms take time but the final goal is the complete integration of the Western Balkans – and beyond, think of the Ukraine – in NATO and the EU.

Russian Suspicion

How are these developments perceived by Moscow? In the 1990s, Russia was dealing with the harsh effects of the transition from a state-led economy to a free market economy and digesting the dissolution of the USSR and the loss of world power status that accompanied it. It opposed NATO's military interventions in the Balkans and supported Serbia by diplomatic means, but with little to no effect. Russia was weak and NATO, dominated by the USA, was almost omnipotent. Our era however, is to witness a resurgent and assertive Russia, eager to defend its territory and what it perceives as its spheres of influence. President Putin is determined to defend Russia's interests and to block or hamper any further enlargement of NATO. The annexation of the Crimea in 2014 is exemplary for this attitude. The Western Balkans has become yet another theatre for the renewed rivalry between Moscow and NATO. Allegedly, Russia actively promotes its political views and bolsters anti-Western sentiments in the region. Several media outlets are indirectly sponsored by Moscow and economic ties are strengthened with Serbia in the field of energy, among others. Despite the military cooperation between Serbia and NATO, Russia is still providing Serbia with fighter jets and tanks. Serbia is Russia's most valuable ally in the region and Russia is determined to prevent further integration of Belgrade in the Euro-Atlantic community. This ap-

Photo: alic.rs



Aleksandar Vučić (left), President of Serbia since 31 May 2017, and the Russian President Vladimir Putin: Serbia seeks for EU membership while wanting to maintain its close relations to Russia.

proach is bearing fruit: Serbian president Vucic repeatedly said that his country remains committed to European integration but that it also will maintain its historic ties with Russia. After the annexation of the Crimea by Russia, Vucic declared after a meeting with the Russian Prime Minister Medvedev that: „We have proven our sincere and friendly attitude to Russia by being one of the European countries that refused to impose sanctions on Russia” and that „Serbia will continue pursuing this policy in the future”. Needless to say that on the issue of Kosovo, Russia is Serbia's strongest ally and in the UN Security Council, Russia blocks proposals that are unfavourable to Belgrade. In Macedonia, Russia systematically supported the administration of Prime Minister Gruevski in its attempt to reduce Western influence. In Montenegro, Moscow sympathises with the opposition for the same reason. Observing recent evolutions in the Western Balkans, one can conclude that Euro-Atlantic integration is slowly taking place but that the game is not yet over. It might just have started. ■

Poland – The Strategic Environment and Defence Modernisation

David Saw

Any analysis of the strategic environment that Poland currently operates within must take into account both present day realities and also the historical events that have created those realities. For Poland, past experience demonstrates the importance of having the tools and the will to defend national independence. Furthermore, the threat perceptions of today are starting to echo historical trends, providing an uncomfortable reminder of past events.

Poland now has the sixth largest economy in the European Union (EU), it is also a strong economy, surviving the 2008/2009 global economic slowdown far better than the majority of European economies. From 2014 to 2016, the Gross Domestic Product (GDP) of Poland grew at a rate in excess of 3% per annum. In the first quarter of this year official figures show GDP growth of 4.4%, with most forecasts expecting a 2017 GDP growth figure in the region of 3.6%. It is a positive economic picture, with improvements visible in terms of reducing unemployment. In 2015 the unemployment rate was 10.5%, in 2016 it was down to 9.6% and the latest figures from May 2017 show an unemployment rate of 7.4%.

There are significant issues that the Polish government must confront in an economic and social context. Government social welfare spending is increasing and will continue to do so due to an ageing population. Added to this comes an immense decline in the birthrate, only eight countries globally have a lower birthrate than Poland. Then there is the problem of emigration, as large numbers of the best and brightest young Poles seek work outside the country in the EU and further afield. In economic terms there is a requirement to improve infrastructure, diversify the energy mix and increase energy security, plus take measures to increase overall economic competitiveness.

Strategic Scenario

Poland's economic strength makes an important contribution to its strategic situation. Equally as important is that fact that unlike in the past, Poland is not isolated internationally. In 1999 Poland became a member of the North Atlantic Treaty Organisation (NATO), then in 2004 it became

Photo: US Air Force



A Polish Air Force F-16C Block 52+ aircraft moves away from a US Air Force KC-135R tanker after refuelling over Latvia in June 2017. Between 2006 and 2008, Poland took delivery of 36 F-16C and 12 F-16D aircraft as part of the Peace Sky programme.

a full member of the EU. Membership of these two international organisations met Poland's security and economic needs, and continues to do so. However, the increasing tension between the current Polish government and Brussels does not bode well for the future. Furthermore there is considerable potential for further disagreement as Brussels moves forward on its plans for a European military force.

The current Polish government of the Law and Justice (PiS) party does not have the best of relations with Brussels at the moment, that being said relations with the United States appear to be warm. This is very important, as a US commitment to Poland, plus Poland's NATO membership, is a critical component of their national defence

strategy. Polish history demonstrates that defending national independence without a reliable ally leads to negative outcomes. Poland has 3,071 km of land borders, of these the borders with the Czech Republic (796 km), Germany (467 km) and Slovakia (541 km) are not a concern. Poland has 104 km border with EU and NATO partner Lithuania, this is a concern as the three Baltic States (Estonia, Latvia and Lithuania) face increasing pressure from an assertive Russia and as a result Poland and the other NATO countries must act to protect the Baltic States.

Key areas of concern are the 210 km direct border with Russia, or to be more precise the Kaliningrad Oblast. Russia has moved 9M723 Iskander-M Tactical Ballistic Missiles

on its NATO and European partners to fulfil their treaty obligations.

Air Force Programmes

At the end of the Soviet period, the primary combat aircraft of the Polish Air Force were the MiG-21, the MiG-23, the MiG-29A/UB and the Sukhoi Su-22M4/M3K. The MiG-23 fleet was retired in the early 1990s, with the MiG-21 fleet lasting until the early 2000s. Then came the first significant acquisition of NATO standard combat aircraft as part of the Peace Sky programme, under which Poland acquired 36 Lockheed Martin F-16C Block 52+ and 12 F-16D Block 52+ aircraft, with deliveries from 2006 to 2008. The MiG-29A/UB fleet has undergone a limited upgrade and fleet numbers have been sustained via transfers of MiG-29 aircraft from the Czech Republic and Germany, currently some 16 upgraded aircraft are in service (over the years Poland has acquired 44 MiG-29). As regards the Su-22 fleet, there are currently 18 aircraft in service, with the fleet having undergone a minor upgrade. The MiG-29 provides a credible fighter capability, with the Sukhoi being a rugged and reliable attack aircraft. It should also be noted that the Ukraine was reportedly a major source of spares to sustain the Polish MiG and Sukhoi fleets. The problem for the Polish Air Force is that the Sukhoi Su-22 entered service in 1984 and the MiG-29 entered service in 1989, and unless Poland wants to embark on an upgrade programme to extend fleet service lives, the only option is to acquire a replacement fighter aircraft. The objective would be to have a new fighter type enter service by 2025 at the latest, on the other hand there is no doubt that such a programme would be very expensive and would be politically complex, in the context of buying either a European or a US solution. In the end, Poland has no choice but to embark on a new fighter acquisition, for the simple



Photo: US Army

A BWP-1 (BMP-1) IFV of the Polish Army during the SABER STRIKE 2017 multinational exercise held in Orzysz, Poland, in June 2017. The Polish Army has some 800 BWP-1 vehicles that it is looking to replace with an indigenous IFV solution.

(TBM) into Kaliningrad, these have a range in excess of 400 km and can be fitted with conventional or nuclear warheads. Also deployed in Kaliningrad is the Bastion coastal defence missile system, in addition air defence capabilities in the area have been enhanced, reportedly, with the deployment of the S-400 system. Poland also shares a 418 km border with Belarus, again this is an area of concern as Russia has the capability to pressure the Minsk government to bend to its will.

Poland also has a 535 km border with the Ukraine and this presents a major strategic challenge. Prior to 2014 relations with the Ukraine were generally good and at worst not that problematic. The Euromaidan democracy movement and the February 2014 Revolution that toppled President Viktor Yanukovich were welcomed by Poland, but subsequent events have not been greeted in the same manner. The Russian annexation of the Crimea in February/March 2014 and the emergence of pro-Russian separatist movements in the Donbass from April 2014, the resulting conflict, and the subsequent involvement of Russian forces in military operations are a major strategic issue for Poland.

From the perspective of the Warsaw government a resurgent and aggressive Russia is a truly unwelcome development, after all the history of Poland is full of disasters caused by the emergence of a resurgent and aggressive Russia. This time though, Poland has more tools at its disposal to deter this threat, the most obvious one being the US and NATO. Equally as important is the deterrent value of the Polish Armed Forces, as we shall see current capability is being upgraded and new capability is on course to be acquired. Another important contribution to the Polish deterrent capability is its defence industry, with the ability to properly support in-service equipment, to produce equipment under licence and to innovate while designing, developing and producing equipment to meet the present and future needs of the Polish military. In the immediate post-Soviet period, Poland faced no real external threats, it then joined NATO and the EU which added to its perception of inhabiting a secure strategic environment. As things stand at present, there are real security challenges facing Poland and to confront these challenges Poland will have to enhance its own defence capabilities, while at the same time relying



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Photo: Polish Ministry of Defence

The Polish Navy Project 820 corvette ORP KASZUB, built in Gdansk and commissioned in 1987, fires RBU-600 ASW missiles during an exercise in the Baltic Sea in 2016. Poland hopes to acquire three new submarines and two Australian ADELAIDE Class frigates as a part of its modernisation plans.

reason that the existing MiG and Sukhoi aircraft cannot last forever and they make up a sizeable proportion of Polish combat aircraft strength.

Helicopters

Poland has allocated significant sums to fund its defence modernisation programmes, the difficulty comes when the process starts to acquire a new system to meet military requirements. Poland has its own offset requirements for major defence purchases that look to bring in defence technologies and the ability to support the equipment it is purchasing. In addition, Poland also has to take into account the interests of its own defence industry in these major procurements. The Polish government will also come under intense political pressure from US and European governments seeking to support their own industries in the competition for Polish defence contracts.

Just how complicated all of this can be is illustrated by Polish efforts to acquire new helicopters to meet a range of requirements. Poland has a helicopter industry in the form of PZL Mielec, owned by Sikorsky, and PZL Swidnik, which is owned by Leonardo, creating a very strong lobby to protect domestic industry. The initial Polish helicopter requirement was to replace the Mil Mi-8, with an initial quantity of 50 helicopters required. Sikorsky and PZL Mielec offered the S-70i, Leonardo and PZL Swidnik offered the AW149, while Airbus Helicopters offered the H225M. In April 2015 it was announced that Airbus had

been selected as the preferred bidder for the US\$3.5bn contract.

While negotiations continued to finalise the helicopter contract there was an election in Poland in October 2015, leading to a change of government. The new PiS government was much less wedded to the Airbus deal than its predecessor, even so negotiations continued until 4 October 2016 when the Polish government announced that it was not going to proceed with the helicopter programme and that the H225M acquisition was cancelled. French government reaction to the contract cancellation was extremely hostile, leading to a rupture in relations between Paris and Warsaw.

Now there is a new helicopter acquisition programme for a total of 16 helicopters, eight for Combat Search and Rescue (CSAR) for Polish Special Forces and eight for the Polish Navy for the ASW and SAR mission. Respons-

es to this Polish requirement were received from industry at the end of March 2017, although it is believed that the numbers of helicopters required for the ASW/SAR mission are not yet settled and that price will be the key factor in determining numbers. PZL Swidnik is offering the AW149 for the CSAR requirement and the AW101 for the ASW/SAR mission, Airbus Helicopters are reportedly offering the H225M for both requirements, while PZL Mielec has only responded to the CSAR requirement offering the S-70i. Winning this competition would place the successful candidate in prime position to win any subsequent Mil Mi-8/Mi-17 replacement contracts.

Other Major Programmes

The Polish Navy currently operates a single Project 877 Kilo class submarine, ORP Orzel, commissioned in 1996 and four ex-Royal Norwegian Navy KOBLEN class submarines (originally commissioned between 1964 and 1967) that were transferred in 2002 and 2003. By 2025 the Polish Navy expect to have replaced the Kilo and the KOBLEN boats with a new class of three submarines, with the requirement having seen ThyssenKrupp Marine Systems, Saab

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Photo: US Army

The bulk of the Polish Army tank fleet consists of T-72M1 and PT-91 TVARDY (an indigenous T-72 development) tanks. While the T-72 is reaching the end of its useful life, upgrade possibilities exist for the PT-91, perhaps using options developed for the Polish PT-16 tank programme.

and DCNS all expressing interest in the programme. Poland has also enquired about acquiring two of the last three ADELAIDE class frigates currently in service with the Royal Australian Navy.

One of the most significant Polish Army programmes is the acquisition of a new tracked IFV to replace the legacy BWP-1 (BMP-1) fleet. Poland acquired 1,447 vehicles from 1972 onwards and currently some 800 are in service. A number of different indigenous

IFV options have been explored, but thus far no programme is finalised.

In terms of tanks, Rheinmetall will be working with Polish industry to upgrade 128 LEOPARD 2A4 to the LEOPARD 2PL configuration, with the upgrade complete in 2020. There are some 150 T-72 tanks in service and over 300 in storage, these are in need of replacement or upgrade. In addition Poland acquired 232 PT-91 TVARDY, an enhanced local development of the

licence-produced T-72M1, the indigenous PT-16 programme offers a potential upgrade path for these tanks, but no official programme exists at this point. What is certain is that the tank fleet will need more modernisation investment.

Another major effort is the WISLA Medium-Range Air Defence programme, here the budget is up to US\$7.6Bn and first deliveries are planned for 2019, with deliveries complete by 2026, with the contract award due this year. Raytheon and Patriot are in the lead for this programme, with the primary missile being the SKYCEPTOR (based on the STUNNER jointly developed with Rafael for the DAVID'S SLING system), with some PAC-3 MSE missiles being acquired as well. Talks are also continuing with Lockheed Martin on MEADS as an alternative solution for WISLA.

Poland is making a serious and well funded commitment to defence modernisation, it feels that its strategic situation makes this essential. The difficulty in all of this is that necessary modernisation requirements are so extensive that they will potentially outstrip available funding. The challenge for Poland will be finding the right balance between modernisation programmes and the funding needed to pay for them. ■

WHAT CAPABILITIES ARE EASTERN EUROPE MODs LOOKING FOR?



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From COIN Back to Combat Operations

Michael Johnsson

This article focusses on some of the challenges the Danish Army is facing, especially on the fire support issue, after several years of being on international deployments coping with a technologically inferior adversary.

Today, the security policy in Europe has changed dramatically in the wake of Russia's annexation of the Crimean Pen-

insula and, among other things, Russia's general position in the security game. After Denmark withdrew its combat troops from Afghanistan in 2014, one can ask the question: Is the Danish Army ready to deal

with the new threat from an adversary who is technologically equal – perhaps even superior in several areas and who can fight

Initially this development started with missions in the Balkans under the UN flag, which largely had the known traits from the participation in the UN Mission on Cyprus and elsewhere around the world.

After 9/11 the Danish Forces changed from the deployments in the UN frame to deployments in coalition frames led by the strategic partners in NATO.

This shift also led to a gradual change of intensity in the deployments of units, which went from urban warfare and ambushes in Iraq to fierce battles and coordinated attacks in the Helmand province in Afghanistan in coordination with the UK Task Force Helmand.

Fire Support Cut Downs

In line with the absence of a direct threat against Denmark, an increased focus on the "fighting of the battle far away from the Danish domestic borders", and the fact that the Danish contribution has always operated as part of a larger coalition, the focus on the division and the brigade as combat units were downsized in the domestic structure. Today the division and the brigade HQs act only as a frame for the national training of battalions.

The shortcomings in the deployed battalions' combat power (e.g. logistics, air defence, air support, fire support, MEDEVAC, etc.) have been covered by the strategic partners (primarily the UK and US).

In the absence of the Danish brigades level, Estonia, Latvia and Lithuania have brigades affiliated to the Danish Division. These constitute a significant factor in the context of training the Danish Division HQ. This cooperation has been strengthened further in the context of the security tension in Eastern Europe.

The core of a Danish contribution to the international missions has always been a battalion-sized unit.

These battalions have over time varied in size and their combat power has been configured according to the mission tasks. When leaving Afghanistan, this contribution had grown into a battle group of approximately 900 men comprising capabilities that are usually provided at the brigade and division level.

With this one-sided focus on battalion battle groups, which should be embedded in a coalition led by other major strategic



Photo: Danish Army

Mortar sections were re-introduced to the infantry companies at the beginning of 2006. They were immediately put into service from forward operating bases or patrol bases, supporting the COIN operations in the Danish AOR in the Afghan Helmand province.

insula and, among other things, Russia's general position in the security game. After Denmark withdrew its combat troops from Afghanistan in 2014, one can ask the question: Is the Danish Army ready to deal

asymmetrically as well as symmetrically with well-armed and well-trained units?

Post-Cold War

After the fall of the Berlin Wall in 1989, Denmark has increasingly participated in military operations far away from the Danish territorial borders.

This development has been made possible because of the diminishing threat from the former USSR and thus the direct threat against the Danish territory.

Author

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(Foto: Archiv ES&T)

A PIRANHA from Swiss GDELS-MOWAG. With CARDOM 10 the system will be fast and autonomous. The crew will take advantage from the APC's level 4/4 protection. It is expected to enter service in 2020.

partner nations, the road towards implementing significant savings in the Danish Army was paved. The personnel-intensive and expensive capabilities that belonged to the brigade and division level could now be closed down. The released funds should make it possible to have a larger contribution of professional soldiers deployed to international missions.

Particularly in the area of fire support, great savings were made possible:

- In 2004, all 60, 81 and 120 mm mortar systems were removed from infantry battalions. (In 2006, new 60 mm mortars were reintroduced and organised in sections attached to the infantry companies.)
- The Division's MLRS (US M270 MLRS) units were deactivated in 2004.
- In 2005, the Division's UAV capability (SPERWER (Sagem)) was deactivated.
- In 2005, all the Division's towed artillery units were disbanded (US 155 mm M114/39).
- All brigade units with 155 mm artillery M109A3 were decommissioned in 2005 and only one unit was kept with a small number of M109s. At the same time, the main part of the 105 mm towed howitzers were donated to Lithuania in order to build a Lithuanian fire support capability.
- In 2009, the Ground Based Air Defence units (STINGER) in the Danish Army were closed down. A few radar systems were transferred to the Air Force and have been deployed to assist the control of the air space above Kabul International Airport.

- After a successful effort in Afghanistan, the Danish Army's Weapons Location Radar capacity (ARTHUR (SAAB/Ericsson)) was closed down in 2010.



Photo: Stig Grønfeldt

The Danish Army's new artillery system is the CAESAR mounted on an 8x8 truck from TATRA and produced by French NEXTER. The system is completely autonomous and the crew is supported by a semi-automatic loading system for both charges and rounds. The system is expected to be operational at the end of 2019.

Because of this, the Danish Army was left with a single artillery unit in 2014. Due to the attrition of the M109A3 capacity, the Danish Army has not had a combat-ready

deployable artillery capacity at its disposal since 2014.

In fact, the Danish Army has not had an artillery capacity at its disposal since 2005, when the Danish International Brigade (High Readiness Brigade) was decommissioned. A few systems were retained in support of the domestic training of artillery observers and the like.

A New Threat

After Denmark, along with the US and UK, had withdrawn most of its combat units from Afghanistan by the end of 2014, the Danish Army was left with three large, heavy battalion-sized battle groups. These battle groups were trained to fight from fixed installations against an adversary that was technologically inferior and were forced to fight an asymmetrical war with small units. The division and the two brigade HQs only had just enough magnitude in the structure to be able to represent an educational framework for the battalions. All the division and the brigade capabilities were either dismantled or decentralized to the battalions (e.g. battle tanks and reconnaissance units).

Shortly thereafter, the confrontations in Eastern Ukraine started to make headlines in the media. It quickly became clear to everyone that the adversary Ukraine faced had

a clear doctrine and had not “forgotten” how to fight a symmetrical war against a well-organised adversary. The use of – and cooperation between – target acquisition units, drones and massive fire support, was just one part of what was hitting Ukrainian units. In addition to this, electronic warfare was used in conjunction with cyber warfare. The reports coming from Ukraine described an adversary who was not looking like the “dish dash” dressed warriors with an AK47 or a RPG in their hands against which the Danish soldiers carried out COunter INsurgency (COIN) operations in Helmand.

Brigade 2024

Like most of the countries in NATO, Denmark has deprioritized training for COIN operations and is now focusing all training against Combat Operations (CO). The Army remains focused around the battalion level, but right now work is going on in the political circles to get a decision for rebuilding one of the two brigades to a combat capable unit that can fight independently. The goal is to have a medium brigade ready in 2024 and provide additional capabilities in order to upgrade it to a heavy brigade in 2032.

This will require major investments in both new technology and more personnel. Denmark does not have the capacity – or the economy – to establish a national division and will for many years to come be dependent on contributions and support from other nations.

The first step in creating a brigade artillery unit has already been taken with the recent decision to acquire 12-18 new artillery pieces of the type 155 mm CAESAR 8x8 (Nexter). In addition, the decision to buy the 120 mm mortar CARDOM 10 (Elbit) to be fitted into the new APC PIRANHA 5 (Mowag), provides each battalion with a platoon comprising four systems.

Both systems share the quality of being 100% autonomous and partially automated, which is necessary when you are paying attention to the fighting in Eastern Ukraine. In the absence of Danish target acquisition technology, the adversary's combined use of drones, target acquisition and heavy counter-artillery fire creates high demands for short-term exposure on the battlefield. Both visually (multispectral), in order to avoid detection by drones, but also to avoid counter-artillery fire, if the adversary has linked the detectors, the decision maker and the effectors into one system. This fact is also applicable to the fire support systems on the lower echelons (60-81 mm mortars). In addition

Photo: ELBIT



The CARDOM 10 is an upgraded version of the Israeli CARDOM 120 mm mortar which is in use with US STRYKER brigades and the IDF. It is fully automated, supported by a semi-automatic loading system, and has a longer barrel to improve range. It will be integrated with the Danish Army's new PIRANHA APC.

to the armour of vehicles, the “Shoot n’ Scoot” capacity is an essential part of the solution to survive and it is best achieved by building weapons platforms in/on the combat vehicles.

In order to take advantage of the new technology, improve own decision processes and increase security, the new fire support systems will be linked to a new fire control system, which is an application to SYSTEMATIC's C2 systems Frontline and SitaWare HQ. Thereby, it becomes possible to a greater extent, to utilise and allocate the new systems in combat. How resistant these systems will be facing an adversary fighting on a very high level when it comes to the use of EW to support his campaign remains unanswered, and this issue should have a significant focus when moving forward in the build-up of Brigade 2024.

“Are You Ready?”

The procurement of the new 155 and 120 mm fire support assets will certainly close part of the fire support gap. However, the absence of target acquisition units is obvious. If the army really wants to benefit

from the new CAESARs' 40 km (+) range, it is of most importance to be able to track the adversary's artillery and mortar units. Otherwise, the CAESARs will be forced to “Shoot n’ Scoot” all the time. This will keep the artillery on the run and not on the offensive.

With the recent developments in Eastern Europe in mind, there is no guarantee that the next battle Denmark might participate in will be with coalition air superiority. Not only the traditional air threat, but also the increasing use of drones of all sizes, is a threat that must be handled – one way or the other. Ground Based Air Defence for the brigade is a top priority requirement.

Whether Denmark will be able to counter an adversary equipped and trained to implement the full scale of operational patterns at brigade level and higher, depends on a high degree of the political will to reinvest in the disbanded capabilities the Danish Army needs in order to win the battle. When you look around Europe, it is hard to locate any nations with surpluses of these capabilities – therefore, it is hard to see where the help should come from. ■



End of the Peace Dividend

Czech Republic Joins the Ranks in Modernising the Armed Forces

Thomas Bauer

From the strategic point of view, the Czech Republic may be named one of the biggest winners in the eastern expansion of NATO and EU. While the Baltic States, Poland, Hungary, and Slovakia are still confronted on their eastern borders by difficult neighbours or crisis regions, the eastern expansion has put Prague in a comfortable inland position. The country is making honest attempts to maintain and expand their security policy to a serious dimension, but the real possibilities seem to be limited, not only because of a tense budgetary situation.

In the automobile sector, the term “middle class” represents the best-seller segment for the manufacturers. It is the part of the portfolio with which the most durable and most trusted market sectors are served. That means that the middle class models are also happily designated as the bread-and-butter cars, the ones in which technological innovations are not introduced until they have proven themselves in the upper classes.

If this perspective were to be transferred to the European Union and its Member States, then the Czech Republic could, with a clear conscience, be defined as middle

class and representative of this reliable tried and trusted segment. In almost all comparison tables in the European Union, the Czechs occupy the middle. With a population of 10.5 million, a total surface area of 79,000 square kilometres and a gross domestic product of US\$193 billion, it is one of the most robust and stable Member States from the economic point of view. Unfortunately, though, the middle class label also seems to apply when it comes to introducing innovative technologies to the Czech Armed Forces. There is still a lot of old materiel, dating from the days of the Warsaw Pact, which has come to the

end of its useful service life. In the past few years, however, a good number of programmes have been started, aimed at ensuring the value and interoperability of the Czech Armed Forces in the future, despite of the scaled down manpower.

Mixed History

The security policy of the Czech Republic is shaped by the experiences the country went through in the 20th century. Established in 1918 as part of Czechoslovakia from the decayed Habsburg monarchy, it took less than 20 years for the country to

Photo: NATO



Czech Air Force JAS-39 GRIPEN during air policing in the Baltics



bow before a new aggressor, and to be integrated as the Protectorate of Bohemia and Moravia into Nazi Germany. In particular, the lack of support from the victors of World War I in the struggle against incor-

country from outside. Despite this, or, perhaps, precisely because of this, the country paved the way, with the Velvet Revolution of 1989, to the fall of Soviet domination in the States of Central and Eastern Europe,

decision. Membership of the Czech Republic in the European Union finally took place in 2004. The aims pursued by Prague with acceptance in the Union and integration into the European Common Security and Defence Policy (CSDP) can be summarised as follows:

"...to ensure adequate participation of the Armed Forces of the Czech Republic in the EU military structures and operations, to use the lessons learned and to avoid the mistakes made during the process of integration into the NATO structures, to achieve a position in the EU military structures and operations which would reflect the significance of the Czech Republic."

These aims become clear in particular with the Czech contribution to the concept of the EU Battlegroup. As early as 2005, together with Slovakia, the country had made its stand with regard to the establishment of a first EU Battlegroup. In 2009, there were 2,200 soldiers of the Czech Armed Forces, together with 400 from Slovakia, ready for action. In the first six months of 2016, for the first time, an individual EU Battlegroup was formed by the four members of the Visegrad Group (Poland, Slovakia, Czech, Hungary), under the leadership of Poland, fit for service, to which Prague committed 700 soldiers. All four countries have stated that the V4-EU Battlegroup will be combat ready in the second half of 2019, with the aim of establishing a long-term structure on the command level and operational level, in order to intensify military cooperation still further.

Consequences of the Peace Dividend

The concept of the Peace Dividend is always eagerly used in the literature for the Federal Republic of Germany or the other



Photo: NATO

Miloš Zeman, at that time Czech Prime Minister and now the President of the Czech Republic, greeted by the NATO ambassadors after joining the Alliance

poration by the German Reich left a lasting impression on Prague. But the end of the Second World War and the liberation from Nazi occupation did not end the period of foreign dominion. Soon after 1945, in the wake of the success of the Communist Party in the 1946 parliamentary elections and the final seizure of power by the Communists in 1948, the country was incorporated into the Moscow-dominated Eastern Block, and the Armed Forces brought under the command of the Warsaw Pact. The Prague Spring in 1968 and its suppression by troops from the other Warsaw Pact states, led to a brief period of radical reconsideration on the Soviet ideal, forced on the

and to their democratisation after the end of the Cold War. One special development in comparison with Poland or Hungary in this context was undoubtedly the separation of Czechoslovakia into the two independent republics of the Czech Republic and Slovakia in 1992. By 1999 the young Czech Republic, together with Poland and Hungary, was already a member of NATO. As with all the countries which, in the framework of the eastward extension, became members of the Transatlantic Alliance, the inclusion of the USA as an active participant from outside Europe into the security architecture of Central and Eastern Europe represented a central factor in this

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The Czech Armed Forces have seen a decline from more than 200,000 soldiers of the Czechoslovak People's Army to a present 21,300 soldiers.



Photo: Central Intelligence Agency

Prague 1968: Protest of Czechoslovak citizens against the Soviet invasion

states of Western Europe after the end of the Cold War, and is supposed to help describe the reduction in the defence budget, as a consequence of the cessation of direct military confrontation, towards an effective contribution to budgetary consolidation in these countries. The fact that the restructuring and conversion costs have eaten into the desired savings effect is conveniently overlooked. For the states of the former Eastern Block, this term is also to be used with certain restrictions. This applies above all to the Czech Republic. With more than 200,000 soldiers, the Czech People's Army represented the third largest armed force in the Warsaw Pact. After 1992, the total strength of the Czech Armed Forces still

numbered 90,000 soldiers, which constituted a not inconsiderable burden in financial and national economic terms for the young Republic. In a number of phases, the total strength was significantly reduced to a present 21,300 soldiers. Since the abolition of compulsory military service in 2004, the Czech Armed Forces of today are a purely professional army. Women represent some 13% of the strength, and in May 2017 the first woman was promoted to the rank of a general.

At US\$2.1 billion (2015), the national defence budget does not even account for

1.1% GDP, which puts the Czechs among the last quarter in defence expenditure on a cross-NATO comparison. The 21,300 soldiers, too, are only enough for a place in the last third, as does national per capita defence expenditure (US\$190). It would undoubtedly be misleading to deduce from these figures that, in comparison with the general economic, output, and structural data, security and defence policy is being neglected. For such a judgment, a more specific assessment of the quality and interoperability of the forces would be needed, which would go beyond the bounds of this article. The country is at present in the midst of a comprehensive process of modernisation. In this context, the issue is also that of the future role of the national armaments industry resources, which are organised within the framework of the Defence and Security Industry Association of the Czech Republic (DSIA). The DSIA functions as the representation of interests as well as the central point of contact for discussions with the relevant structures and bodies in NATO (NIAG) and the EU (EDA). During the Cold War, Czechoslovakia was regarded as one of the biggest arms exporters. This applied not only to hand-held firearms, but also to heavy equipment. The industrial capacities, however, were for the most part located in the Slovakian part of the country, and since 1992 have therefore no longer been available. The painful conversion process for the other commercial concerns led to the situation in which, by the turn of the millennium, the primary focus was on the modernisation of the old weapons systems from Soviet era. With restructuring and

Photo: NATO



First Czech flag raising ceremony at NATO headquarters in 1999



modernisation of the armaments industry being supported by the political establishment, the past ten years has seen impressive export successes achieved by the Czech armaments industry, which delivers 90% of production abroad. Since 2004, the value of armaments exports has increased practically by more than ten times.

Strategy and Conception

A more substantial consideration of and with DISA is called for with regard to domestic industrial capacities for the pending modernisation of the Czech Armed Forces. This may well lead to difficult negotiations in the procurement of new weapon systems. As well as new combat and transport helicopters as replacements for the Mi-17 and Mi-24 – under discussion are models from the manufacturers Agusta Westland, Bell, Sikorsky and Airbus Helicopters – Prague is also seeking a comprehensive re-equipping of the Czech Land Forces. In an interview with Defence24 from 2015, the present Deputy Minister of Defence Daniel Kostořal, in his then position as Head of the Armaments and Acquisition Division in the Ministry of Defence, summarised the ambitious plans as follows:

“Czech Republic currently has two brigades at its disposal – light one and heavy one. The initial one uses ‘wheeled’ PANDUR vehicles, and vehicles of a similar class. The second brigade uses the track-chassis vehicles. This one needs to be modernised as a whole unit. The modernisation shall include infantry fighting vehicles, command vehicles, the whole communication system and the support equipment. Once we are able to do it, we are willing to create one more brigade, so that we have three such units at our disposal, light one, using the Cayman and Iveco vehicles, medium, using



Photo: U.S. Army

Czech BVP-2 deployed to Afghanistan

the PANDUR vehicles, and heavy one, using the infantry fighting vehicles and track-chassis carriers. Next, we are willing to develop and modernize the armoured units, so that we have a single main battle tanks battalion at our disposal. However, it would be best to have two such units at hand.” Behind the comprehensive, and also cost-intensive, efforts, there are clear strategic aims to equip the Czech Republic with a force projection capability which is to be taken seriously, and in order to be taken seriously politically, too, in the transatlantic Alliance as well as in European security and defence policy, as a reliable and capable member. The time frame for these modernisation efforts is set at 10 years, and should be concluded by 2025. This time frame was chosen with care, because the operational service lives of many of the ground and air systems have definitively come to an end,

and can now only be extended by elaborate and cost-intensive programmes.

The core of Czech security and defence policy is the security strategy of the country from 2015. Prime Minister Bohuslav Sobotka emphasised in the preface of the Security Strategy the significance for his country to have a serious security and defence policy dimension within the NATO and within the framework of the European Union:

“Today, more than ever, the Czech Republic’s security depends on our ability to keep NATO and EU multilateral mechanisms operational. The North Atlantic Alliance and a functioning collective defence system are the main sources of our security. We can expect that the guaranteed level of security we enjoy will directly depend on how we honour our commitments towards our allies.”

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Another central document is "The Long Term Perspective for Defence 2030" from the Ministry of Defence. This provides the foundation for the country's security strategy, and is regarded as the basis for the already mentioned modernisation programme "Concept of the Czech Armed Forces Development 2025". The defence strategy was updated in 2017. The government has paved the way for modernisation with strategy papers and concepts, as well as with the appropriate legal initiatives and orientation decisions. A slight increase in defence expenditure to 1.4% of GNP is planned as a first step to address the issue of personnel and recruitment. The aim is to raise total strength to 26,000 active soldiers. This would achieve a substantial element of the defence strategy and of the "Concept of the Czech Armed Forces Development 2025". The difficult decisions in new procurements and modernisation of the weapons systems still remain. The basis for the planning is an assumed economic growth of over 2% per annum. This figure might be clearly exceeded, at present. However, the involvement of the domestic armaments industry in the individual programmes may well prove more complicated. The readiness of foreign manufacturers to invest in the country has been

somewhat marred in the wake of a number of corruption scandals in the past few years. The solution put forward by Prague for the exploitation of existing platforms, for example in the new procurement of infantry fighting vehicles, is not exactly being supported by this situation. Given the limited budgets, domestic new developments cannot be financed.

Conclusion

In the past three years, the government in Prague has convincingly mastered the difficult task of continuing with the new orientation, initiated as far back as 2012, of Czech security and defence policy, while at the same time taking account of the enormous investment requirement for the comprehensive modernisation of the Armed Forces. This is even more impressive if one bears in mind the many backpedalling issues, the agreements based on trust which have come to grief, and the contentious announcement of the resignation of Prime Minister Sobotka, withdrawn shortly afterwards. The corruption scandals, resulting from a forced amalgam of economics, politics, and bureaucracy, have also impinged on security and defence policy, and, in this context, in particular on the sector of procurement.

The projects referred to in the conception, however, can only be made a reality in co-operation with third-party states or in the framework of the Visegrad cooperation, and if the balance is achieved of continuous economic growth, domestic discipline, and a positive investment climate. This point was already raised in the Defence Strategy 2017 as an essential precondition:

"The success of the Czech national and military ambitions is reliant on (1) the medium-term financial perspective of the resource framework for the defence budget and an adequate annual budget, (2) a stable environment for the Czech Armed Forces personnel development, (3) support to the Czech defence industry and utilization of the research, development and innovation outcome, which in turn will help the Czech Armed Forces to achieve its required capabilities, and (4) an amendment of legislation with respect to the Act on Public Procurement."

The building of a new basis of trust and a sustainable guarantee of structural and political stability should therefore be the key aims of the next government, after the parliamentary election in October 2017. To what extent this will have an effect on the readiness to invest in the pending tasks and projects remains to be seen. ■

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Fundamental Transformation in the Past Decade



Josef Bečvář

The security environment in the whole of Europe, including the Czech Republic, has been undergoing dynamic changes in the last few years, to which we cannot turn a blind eye. Unfortunately, we cannot say that these changes are for the better – quite the opposite is true; our situation is becoming very unstable and hard to predict in the long-term run.

Experience from the east of Ukraine and Crimea very clearly shows us that military conflicts in Europe cannot be entirely ruled out anymore. The probability of a direct military threat to the territory of the Czech Republic with armed attack continues to be low; it cannot be ruled out however that such a situation, especially in one of the forms of a hybrid attack, could strike one of our allies, to whom we are tied by coalition obligations. What is alarming in this regard is mostly the speed with which such conflict could break out.

In addition to the situation Europe is facing in the East, tensions on the Southern flank cannot be overlooked either; that flank continues to face destabilisation by long-term internal conflicts in Syria, Iraq, Libya, increasing penetration of society by radical Islamism, and also by the continuation of an acute migrant crisis with all its negative impacts. The ever-growing threats in cyberspace are a separate chapter.

We therefore have to place higher demands on a fast and well-coordinated reaction and on a unified national approach within NATO, the EU and the UN. After all,

the new security situation has recently led to changes in demands placed on NATO and EU capabilities as such. NATO summits in Wales, Warsaw and recently in Brussels have confirmed that we need new capabilities such as effective and efficient forces with a high readiness level that will be capable of an adequate and fast response in case of an arising conflict, as well as new capacities to be gained in cyberspace – a new and fully fledged operational domain as recognised at the Warsaw summit.

Understandably, the Czech Republic reacts to these changes, too. The Security Strategy of the Czech Republic which has recently been authorised, identifies eleven security threats in this situation. From the perspective of the armed forces, the most risky ones seem to be: the potential weakening of international legal obligations; instability and regional conflicts in the Euro-

Atlantic region; terrorism; the proliferation of weapons of mass destruction; cyber attacks; negative aspects of international migrations; extremism; and the growth of interethnic and social tension.

The above-mentioned Security Strategy of the Czech Republic, the Defence Strategy of the Czech Republic, and the Czech Armed Forces Development Concept, authorised by the Government, are now our groundwork for the long-term strategic assignment for ensuring national defence. Those policy documents address in a fundamental way the existing and expected future security risks and potential threats and specify procedures to maintain and gain new capabilities of the Czech Armed Forces and envisage changes from the perspective of force development with the focus on equal development of capabilities of all types of forces to create fully-fledged



Photo: US Army Europe

Czech soldier in heavy snowfall during a military advisory team training exercise at US Army Europe's Joint Multinational Readiness Center in Hohenfels, Germany

Author

General Josef Bečvář, Chief of the General Staff of the Armed Forces of the Czech Republic.



and fully functional task forces in the form of light and heavy brigade task force to be used in and outside the territory of the state in accordance with our declared level of ambition.

Czech Armed Forces Development Concept

The Czech Republic, as other countries, uses its armed forces to provide security. The primary mission of the armed forces is, in accordance with the Act on the Armed Forces of the Czech Republic, to prepare for the defence of our homeland and defend it against external attacks. The armed forces also of course fulfil tasks that stem from international contractual obligations of the Czech Republic on common defence against attacks. Military units and components of the Czech Armed Forces can be, in accordance with the mentioned act, further used for instance for the guarding of critical defence infrastructure; for missions of the Police of the Czech Republic in cases where its forces and resources are not sufficient to ensure internal order and security; for rescue works during natural disasters or other critical situations and for



Photo: US Army

A Czech Army soldier providing security during a patrol outside Dihl Babi village, Parwan province, Afghanistan

nisation of the development of the Czech Armed Forces with the needs of collective defence started. In the process of transformation to all volunteer force after 2004, the Czech Armed Forces have shifted its focus also on the strengthening of its capabilities necessary for deployment on foreign operations and on fulfilling its NATO obligations. All of this was of course connected with significant changes in human resources. The target numbers of military professionals are now set in the Czech Armed Forces Development Concept to approximately 26,000 persons. After years of reductions, our manning level is now at 85% and the

the full professionalization of the Armed Forces meaning the end of mandatory conscription, it has remained in the Czech law but its performance is now suspended.

The core of the reserves available for the Czech Armed Forces is represented mostly by members of active reserves, nowadays. It is therefore also this component of our armed forces that has undergone fundamental changes in the past years. It is now possible, in peacetime, not only to train active reservists as part of military exercises, the length of which has been slightly increased with the aim to provide them with higher quality training, but also to deploy them, in case of need, to fulfil a whole range of missions of the armed forces within service in so-called operational deployment, be it in the territory of the Czech Republic or, with the active reservists' consent, also abroad.

At the same time, active reserve component units are developed, both with territorial forces and support components of the Czech Armed Forces, and with combat units of land, air and special forces. Thanks to a comprehensive amendment of defence laws, the interest to join the active reserve is on the rise. We plan that the number of active reservists should reach approximately 5,000 personnel by 2025.

Transformation and modernisation of the Czech Armed Forces is not reflected just in personnel, but also intensively in armaments and materiel procurement, which is fully in line with the above-mentioned policies. Following on the Czech Armed Forces Development Concept, subordinate concepts have been drafted to cater for building individual branches. Their conclusions have been specified into concrete major armaments projects.

Projects of the Land Forces

The following projects are prepared for the Land Forces:

- In 2020, we plan to physically start equipping the 7th Mechanised Brigade with a new type of infantry fighting vehicle. The procurement of a total of 210

Photo: US Army



Czech soldiers conducting react to contact training during exercise ALLIED SPIRIT II

consequence management after natural disasters and the removal of any impending danger using military technology; to secure air medical transport; and last but not least, to fulfil humanitarian missions of civil defence.

The Czech Armed Forces have undergone a fundamental transformation in the past decade as far as the achieved capabilities are concerned. Whereas until 1999 emphasis was put on capabilities securing national defence, after joining the NATO, harmo-

recruitment process is taking care of more intensive increases. In line with the Security Strategy of the Czech Republic, the personnel strength of professional military will be increased by additional approximately 5,000 soldiers and airmen in the near future.

As any other professional military, however, to fulfil tasks connected with national defence, we would not succeed without the existence of an adequate number of trained and armed reserves. That is why even after



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vehicles in seven variants will replace the obsolete BMP-2 vehicles, which will increase the firepower, mobility and force protection across the full spectrum of operations. At the same time, the platform will also equip some combat support and combat service support units as well as training support components.

- The preparatory phase has been underway for the modernisation of four artillery batteries equipped with the calibre 152mm model 77 DANA self-propelled howitzer, which was already authorised by the Government and the pre-acquisition phase for the procurement of 155 mm self-propelled guns for additional two artillery batteries. The modernisation of guns will include the procurement of new automated artillery fire control systems, including vehicles.
- The project is ongoing to introduce additional command and control as well as communication vehicles on two wheeled PANDUR platforms and universal wheeled platform derived from well-proven TATRA platforms.
- Replacement has been underway of Czech-made TATRA trucks, including special variants such as recovery and maintenance vehicles for logistic support.
- We plan to procure additional systems to reinforce force mobility with engineer units.
- We have efforts underway to enhance the capabilities of the Czech Armed Forces CBRN defence service, which will focus on reinforcing the capabilities in the domain of detection, identification and analysis with the intended introduction of new light armoured vehicles including special modifications.
- New advanced hand weapons, especially the Czech-made BREN assault rifles, are continuously introduced to use.
- After 2020, there is an intention to replace the existing T-72M4CZ tanks with a new type of Main Battle Tank. The T-72M4CZ will be kept operational until their full replacement after 2025.

Projects of the Air Force

With the Air Force, our primary focus is on progressive planned realisation of the following strategic projects:

- Continuation of the lease of JAS-39 GRIPEN aircraft and expanding its air-to-ground capabilities.
- The project of introducing new multi-role helicopters, which will progressively replace the Russian-made Mi-24/35 machines.
- We consider options to renew and increase our capabilities in the domain of air transport fleet.

- The procurement is planned of the RBS-70NG modernised man-portable air defence systems, which was already approved by the Government and the subsequent replacement of the SHORAD air defence system roughly in 2020 through 2024.
- The negotiations to conclude the contract for delivery of mobile 3D radars.
- Already in this year, deliveries will be realised of the first new airfield surveillance radars.

Projects of the Support Forces

In the domain of support forces, that concerns the following projects:

- Ensuring interoperability of data transmission in Federated Mission Networking (FMN) operations.
 - Building of the global data network.
 - Ongoing replacement of vehicle fleet.
- Guarantees of the growth of defence expenditures today represent the basic

therefore use this financial framework as a point of reference for the calculation of all above projects.

Czech Contribution to Collective NATO Defence

In accordance with the NATO Capability Targets, the CZE assigns assets for NATO up to one medium type Brigade task force equivalent. Following on the above-mentioned modernisation projects, we plan to contribute a heavy brigade task force in the future. As to the Air Force, we support not only the protection of our own airspace, but also air policing for the Baltic States and Iceland on rotational basis as part of the NATINAMDS system.

We are also very active in the development of the eNRF land components and the VJTF spearhead forces. As part of reinforcing our partners in the Baltics, the Czech Armed Forces started the Training Bridge



Czech soldier during exercise AMPLE STRIKE

precondition for the development of the whole defence system in the Czech Republic, much like in other NATO nations. Realisation of individual modernisation projects as well as recruitment of new personnel is primarily conditioned on stable funding and economic resources.

NATO Summit in Brussels appealed for increasing defence spending up to 2% GDP. The President of the Czech Republic Miloš Zeman fully supported the achievement of that goal at the Summit and the Government promised us that the Czech Republic will increase defence spending to 1.4% GDP in 2020 and will subsequently approximate to the target of 2% GDP by 2024. We

2017 exercise already in the first quarter of 2017 as part of the V4 training activity. At the same time, we are involved in building the defence capacity of the 3B states and Poland by means of the Transatlantic Capability and Enhancement Training (TACET) initiative, which focuses on longterm enhancement of defence capacity building including field training activities and academic training courses. We are also a part of the NFIU development process.

A direct involvement of the Czech Armed Forces in eFP until 2018 is presently in the approval phase of the relevant mandate which will authorise the deployment of up to 290 service personnel. Specifically, the



Czech Armed Forces will contribute into the eFP upon approval of the mandate with two units. The first one will be a company task force built on the basis of a mechanised company, which will be included in the German-led battle group in the territory of Lithuania. It will comprise roughly 250 service personnel for the period from 1 May 2018 till 31 January 2019. The other unit will be a mortar platoon, which will become a part of the Canadian-led battle group in the territory of Latvia. It will comprise a maximum of 40 service personnel for the period from 1 January 2018 till 31 January 2019.

We also actively participate in the NATO command structures. We have almost 50 Czech service personnel in Germany in various locations. Specifically in NAEW (NATO Airborne Early Warning) in Geilenkirchen, AIRCOM (Allied Air Command) in Ramstein, RD GE/NL corps (Rapid Deployment German/Netherlands Corps) in Münster, MNC JHQ (Multinational Corps) in Ulm, CAOC (Combined Air Operations Centre) in Uedem, NATO SCHOOL in Oberammergau and in additional NATO command headquarters and components.

With Germany as the framework nation, we have also joined the Framework Nation Concept as part of the total number of 15 Capability Clusters, we have actively joined

8 of them. In the Chemical, Biological, Radiological and Nuclear defence domain, the Czech Republic fulfils its role of the Leading Nation (LN) for training and education.

Last but not least, I should also mention affiliation, which is not a multinational formation, but it provides joint exercises and increases interoperability and integration. Our 4th Rapid Deployment Brigade has affiliated with the German 10th Armoured Division and we plan to affiliate the other 7th Mechanised Brigade with the newly built Multinational Division – North East (MND-NE) as part of the Multinational Corps (North – East) in Szczecin, Poland.

Our cooperation with Germany also specifically reflects in the European Union's security projects. That involves contributions into the German-led EU Battle Groups, and our joint operations in foreign operations of the EU.

Czech Contribution to Current NATO and International Operations

The current operational deployment of the Czech Armed Forces comprises more than 400 soldiers. On a sustained basis, the Czech Republic assigns forces and assets into Operation Resolute Support in the territory of Afghanistan.

Over the past 13 years, multiple types of units joined the international operations in Afghanistan, including the field hospital, guard units, CBRN defence unit, provincial reconstruction team, operational military and liaison team, training and advisory teams. More than 8,500 service personnel have served operational tours there in 2002 – 2015.

Today we are still one of the largest contributors in Afghanistan as to the participation of our men and women in uniform. At present, the Czech deployments in Afghanistan include a force protection company at the Bagram airfield, Air Advisory Team for Mi-17 and Mi-35 helicopters, field surgical team in US led multinational military hospital at HKIA in Kabul and we also have a representation at various command headquarters in Kabul and Bagram.

In Africa, we have been actively involved in Operation EUTM Mali in the total number of 41 personnel. Three senior non-commissioned officers are assigned to mission headquarters in Bamako, 36 personnel are involved in the performance of missions associated with the protection of HQ EUTM Mali and with escorting convoys. Two instructors perform training missions for Malian armed forces as part of the German Infantry Training Company in the Koulikoro and Sikasso training centers. A Czech spe-

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Photo: US Army

US, Czech and Georgian soldiers during a mission brief prior to a security patrol in Afghanistan

cial forces unit also deployed in that country as part of the UN MINUSMA mission and we continue to be represented in the staff. Last year we renewed our engagement in Iraq. Based on a bilateral agreement with Iraq a Czech mentor unit supporting the L-159 ALCA aircraft delivered from the Czech Republic to Iraq have been stationed at Balad air force base in the order of battle of the OIR. The intention for the unit is to be there till the end of 2018. From November 2016, the Czech

Field Surgical Team was stationed in the order of battle of the US ROLE 2 field medical team at Al Asad base in Iraq. The FST handed over operational assignment at the turn of May and June and redeployed.

Three Czech officers and an air unit with C-295 CASA aircraft comprising 15 personnel have performed missions at HQ MFO at Sharm el Sheik (Sinai, Egypt).

The Czech Republic is engaged in EUFOR ALTHEA with two officers who fulfil tasks

associated with the training of the Armed Forces of Bosnia and Herzegovina at operation headquarters at BUTMIR in Sarajevo. After the withdrawal of operation reserve forces battalion from Kosovo in 2011, the Czech Republic has continued its participation in KFOR with representation at the headquarters, where there are currently 9 Czech service personnel. Two officers have served at operation headquarters EUNAVFOR MED in Rome from June 2015 and we have one senior non-commissioned officer at operation headquarters on an aircraft carrier. In July 2017, we are assigning a CIMIC specialist to the aircraft carrier. We are also engaged with two officers and a non-commissioned officer in operation EU NAVFOR ATALANTA. All have performed tasks arising from their assignment at Operation Headquarters (OHQ) in Northwood, United Kingdom. From July 2015, the Czech Republic has been involved in UNDOF with 3 staff officers stationed at camp ZIOUHANI on the Israeli part of the Golan Heights. Last but not least, the Czech Republic has also contributed military observers into UN missions (UNAMA, UNMIK, MONUSCO, MINUSCA and UNDOF).

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The Czech Republic – A Defence Market Overview

Stephen Barnard*

Considering the former Warsaw Pact countries that subsequently joined NATO it is easy to infer that only Poland, out of nearly all the central and eastern European countries, is worth treating as a potential market, or as a source of potential industrial partners. However, many of the attributes of Polish defence and security establishment – by which we encompass the military, industrial/commercial and political environments – are found and indeed improved upon elsewhere in the region: the Czech defence “scene” is a good example.

Many of the Warsaw Pact companies suffered catastrophic market loss, leading to staggering numbers of workers being laid off, and to a collapse in terms of innovation and quality that has taken decades to reverse. Now, however, partly led by the automotive sector, countries such as Poland and the Czech Republic – and Romania, Ukraine and Bulgaria, for example – offer some of the highest-quality products with cutting-edge technological innovation, and can reliably reach and support the global market. The Czech Republic stands out in its political solidity and the clarity and logic behind

cantly in real terms (by 11.1% and 10.2% in 2015 and 2016 respectively) and is forecast to continue to increase at well above the European norm.

The defence industry of the Czech Republic also stands out for its quality and vibrancy: while the VOP organisation continues to be state-owned, it does not have the dominant position of PGZ in Poland: the Czech political leadership appears to be happy to leave the business to function as a business instead of some kind of political football.

The biggest recent re-organisation of companies in the Czech defence and security domain has been the establishment of the

Vodochody, Ceska zbrojovka, Interlink CS, LOM Praha, Omnipol, Retia, STV and SVOS, to name but a few – and even the smaller companies like Evpu, Meopta, Oritest and Velka Bites – they are vibrant, successful, thriving companies prospering on the sea of free market forces, very different from the prevailing currents elsewhere in Europe.

Aircraft Programmes

The Czech government joined the 16-nation NATO E-3A airborne warning and control system (AWACS) in December 2009 as a fully-fledged member, after signing

Photo: British Army



Firing exercise with a JAVELIN anti-tank guided weapon

its defence planning. A relatively limited national defence budget has grown signifi-

* This analysis is based on material provided by and in cooperation with Forecast International and Hawk Associates. More details and a wider range of their extremely detailed reports are available through their website www.hawk.co.uk and their offices in Paris and London.

Czechoslovak Group (CSG) which encompasses a dozen companies, including some well-known names such as Tatra and Excalibur: but while CSG offers many benefits to its subordinate companies its biggest challenge lies in the PR and Marketing Communications areas. For the rest of the major Czech defence companies such as Aero

up in September 2009, and since January 2010 has paid €290,000 (US\$391,000) per year as part of the programme. The Czech government spent CZK120 million (US\$9.22M) from 2011 through 2013 on modernisation of the NATO Airborne Early Warning and Control (NAEW&C) system, and they contribute CZK90M



(US\$4.88M) annually to a pool of funding that finances the system's operation.

The Czech military had considered retirement of its L-39ZA ALBATROS training/light ground attack aircraft by 2012, but after purchasing five new engines at a cost of CZK42M in the Autumn of 2011, they retained four re-engined models through 2016. Five other aircraft were retired in

The government was inundated with offers. Belgium and the Netherlands both offered second-hand F-16 MLUs; Canada offered used CF-18s. The US Defense Security Cooperation Agency (DSCA) offered to support all three bids, as well as submitting an unsolicited bid for non-MLU-standard F-16A/B aircraft. Additional offers included France's MIRAGE 2000s, Germany's F-4

The FMV continued to press the Czechs regarding a full purchase of the GRIPENs, but to little avail. Instead, the lease became a source of controversy in February 2007 when Swedish television broke a story regarding alleged corruption surrounding the deal. British police later prosecuted Austrian businessman Alfons Mensdorff-Pouilly on suspicion of corruption (a fine was ultimately levied in exchange for halting the investigation).

Unfavourably disposed towards the GRIPEN, and spearheading an anti-corruption push, Prime Minister Petr Nečas announced in November 2010 that the government would hold an international tender before the GRIPEN lease expired. In June 2011, Nečas stated that a simple extension of the lease was not an option unless the ongoing Czech investigation of the original lease agreement turned up no evidence of corruption.

Momentum began to pick up in Prague to decide on the best solution for the country's airspace defence going forward and by the autumn of 2011 all relevant parties seemed agreed that the fighter fleet would provide the best Czech airspace protection. However, budgetary limitations and economic reality stepped in: on 1 February 2012, Defence Minister Alexandr Vondra began negotiations with the Swedish government regarding a bridging solution that could lead to an extension of the existing lease agreement.

By November 2012, the negotiations between Sweden and the Czech Defence Ministry appeared to be coming to a head. Vondra publicly confirmed that the ministry was preparing to launch a tender for new fighter aircraft and was prepared to entrust its purchase to the NATO Support and Procurement Agency (NSPA): by going through the NSPA, the Defence Ministry hoped to avoid the controversies and entanglements it had experienced in purchases of the CASA C-295M airlifters, PANDUR II armoured personnel carriers, and Tatra multipurpose trucks.

Following Vondra's statements, Sweden came back with a counteroffer, lowering its asking price on an extended lease of its GRIPENs. Negotiations continued and by 11 September 2013 the Czech Defence Ministry announced the renewal of the GRIPEN lease.

On 12 March 2014 the Sobotka government signed the renewed agreement, wherein the new lease runs from 2015 through 2027. During this period the cost will be CZK21.4Bn (US\$1.08Bn), of which CZK1Bn will be used to procure additional aircraft systems, including encrypted communications suites, NATO-compatible da-



Photo: Czech Air Force

JAS-39D GRIPEN of the Czech Air Force

June 2011. Although the L-39 is generally used for the training of supersonic fighter pilots, the L-39ZA can be also be used to support ground troops.

Combat Aircraft Gripen Remains Core Platform

The Czech Republic continues to rely upon its GRIPEN combat aircraft as its pre-eminent air superiority platform. The Czech GRIPEN lease dates back to 10 December 2001, when the Ministry of Defence decided to purchase 24 GRIPEN aircraft for some CZK58.5 billion (US\$1.59Bn), plus additional funding for spare parts, engines, and armaments. The Cabinet approved the deal on 28 January 2002: it was later approved by the Chamber of Deputies, but was rejected by the Senate in May 2002.

Before the deal could be reworked, the Czech Republic was hit with the worst floods in a century, in August 2002, and the plan was shelved. A new tender was issued to acquire an interim solution, under which the Czech government reduced its planned acquisition to 14 NATO-interoperable aircraft.

PHANTOMS, and the UK's surplus TORNADO F3 aircraft. The Saab/BAE Systems consortium made the only offer of new aircraft, again proposing its JAS 39C/D aircraft. In December 2003 a committee recommended pursuit of the GRIPEN option and on 14 June 2004 the Czech Defence Ministry signed the lease agreement with the Swedish Defence Materiel Administration (FMV). That initial lease period ran from 2005 to December 2014; the agreement was valued at CZK19.65Bn (US\$749M).

Deliveries followed the maiden flight of the first GRIPEN JAS 39D on 16 April 2005 and were completed in August 2005 with the arrival of two dual-seat GRIPEN JAS 39Ds at Čáslav Air Base.

With the delivery of the GRIPENs, the FMV also delivered a tactical support and training system called PETRA (Planning, Evaluation, Training, Rehearsal and Analysis), and in April 2006 the FMV agreed to upgrade the 14 GRIPENs to allow them to utilize the Raytheon AIM 9M8/9 SIDEWINDER short-range air-to-air missile. The upgrades were completed over the summer of 2006.



talinks, and helmet-mounted pilot night vision goggles, plus additional training for air and ground crews. Under the new lease agreement, the annual payments are almost a third lower than the instalments paid on the earlier contract.

Photo: Czech Air Force



The domestically produced L-159 family (shown here is the L-59 ALBATROS) is one of the backbones of the Czech Air Force.

Aero Vodochody L-159

The domestically-produced L-159 family is one of the backbones of the Czech Air Force. Built by Aero Vodochody, the L-159 is a light attack and lead-in trainer version of the L-59 ALBATROS, which is itself a derivative of Aero Vodochody's popular L-39 for training purposes). In 1997, the Czech government contracted with Aero Vodochody for the production and delivery of 72 single-seat L-159A aircraft. After a series of financial delays, all of the platforms were delivered by late 2003.

In 2004 it was decided to only keep 24 of the L-159s in service due to the increasing costs of maintenance and support. The remaining 47 jets (one was written off) were marked for sale. A tender launched in the autumn of 2012 for eight L-159s priced at CZK30-CZK60M (US\$1.5-\$3M) failed to generate offers meeting the asking price. In 2014, US company Draken International signed a contract to buy up to 28 L-159s. The Ministry's sale of these L-159s will help shed the annual CZK30

million cost of depositing and mothballing each aircraft.

The Ministry was able to swap five surplus L-159s for one EADS CASA (now Airbus Group) C-295M transport (one of these L-159s was returned by Airbus Military in May 2012 as compensation for delays in addressing technical problems related to the Defensive Aids Suite (DAS) on the Czech C-295s, with a second returned for the same reason on 30 August 2013).

Under a Czech Air Force / Aero Vodochody contract, four surplus L-159As were converted to the two-seat L-159T1 version and were delivered on 23 November 2007.

Transport Aircraft (kleinere ZÜ)

In November 2005, the government decided to release CZK850M to buy two new military transport planes to replace the Air Force's ageing Antonov An-26 transports. In 2006 the Czech Republic and Slovakia

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Photo: Alan Wilson



Recently retired from the Czech Army, this indigenous SOJKA III UAV is now on display at the Vyskov Air Museum, Czech Republic.

began considering a project for a joint military transport fleet that would ensure sufficient air transportation capacity for both countries. A few years earlier, they had made similar noise about a common purchase of fighters, but Slovakia modernised its Soviet MiGs, while Prague leased a batch of JAS 39 GRIPENS.

For the Czech Republic the issue remained pressing: in 2002 Prague had promised NATO it would have a large transport fleet. In April 2006, the Ministry produced a short-list of four aircraft meeting its requirement: the Alenia C 27J SPARTAN, the EADS CASA C-295, the Lockheed Martin C-130J HERCULES, and the Antonov An-74. Of these only the C-130J was able to lift the new PANDUR II APCs, so it was considered the early favourite. The initial list of four gradually expanded to include the still-in-development Airbus A400M and the Antonov An-32.

By March 2007, the Czech evaluations had found the cost of the C-130J and A400M to be excessive, and the Antonov An-32 and An-74 were determined to be unsuitable for multiple reasons. The EADS CASA C-295M fell by the wayside because it failed to meet the range and payload specifications, leaving the Alenia C-27J SPARTAN as the remaining option.

However, in early 2008 the Czech MoD once again approached the same manufacturers and in April signed a draft Memorandum of Understanding with EADS CASA that involved swapping five L-159A aircraft for a single C-295M. Alenia Aeronautica formally protested the MoD's move on 20 June 2008 arguing that the MoU was signed without a competitive bidding process and lacked transparency. Alenia also questioned why its C-27J SPARTAN solution

was overlooked despite being the favoured platform of the Czech general staff.

Finally, after the MoD voiced its intention in April 2009 to push forward with the C-295M acquisition, the government gave its approval. Three of the four C-295Ms were acquired under a €132.8M (US\$179M) contract signed with Airbus Military in May 2009; the fourth aircraft was part of a swap of five Czech L-159s.

Delivery of the first new C-295M occurred in January 2010 – the remainder of the deliveries followed through year end 2010 – but delivery of the aircraft did not end the controversy surrounding the programme.

The European Commission charged that the contract violated European Union

standards as it was undertaken without a tender, and the EC then launched proceedings against the Czech Republic, claiming the Czechs failed to demonstrate why a public tender for unarmed aircraft would pose a risk for its security interests. Proceedings were finally halted in December 2011 after Czech rules regarding military procurement were altered.

Then there were public revelations regarding the intermediary in the deal, domestic firm Omnipol, who received a service contract worth CZK700M to CZK1 billion, even though any work performed over the first three years of the planes' operation would already be covered by EADS CASA's warranty. The MoD was also alarmed that the previous government had purchased the C-295Ms for well over twice the price per plane paid by Portugal.

The Czech Defence Ministry hired international law firm White & Case to review its procurement contract with Omnipol and EADS during the summer of 2011 as it considered levying fines on Omnipol for failure to correct problems involving the aircraft's missile warning systems. Further troubles emerged after the last of the planes was delivered in late 2010, and the aircraft was grounded three separate times in 2011: in February following a sharp drop in altitude during mid-flight, in May after problems with the avionics systems, and in October after navigation display and engine problems occurred on two of the aircraft. There remained issues with the aircraft's defensive aid suites, onboard software, and radar early warning systems.

Finally, on 13 February 2012 after a week's worth of testing, Czech Army Chief of Staff

Photo: Diehl Defence



IRIS-T Surface Launched (SL) could be an interesting choice for the Czech missile defence programme due to its ability to include a variety of different assets, like domestic radars or vehicles, without requiring a long integration process.



Photo: Czech Ministry of Defence

PANDUR II 8x8 armoured personnel carrier in service with the Czech Army

Army General Vlastimil Pícek decided that the C-295Ms were finally ready for use by the military. The Czech Defence Ministry, tired of the constant faults found, had threatened to cancel the deal by June if the aircraft were not found to be in perfect airworthy condition. Pícek's conclusion was supported by Defence Minister Vondra, but issues related to the aircraft's DAS remained to be rectified.

The two-year delay in rectifying the problems resulted in compensation whereby Airbus Military returned two of the five L-159A aircraft previously exchanged for one of the four C-295M aircraft. While the Czech Air Force operated the aircraft on routine assignments, it was not until July 2013 that the C-295Ms could fly the full spectrum of operational requirements, including serving in combat missions over dangerous territory.

Meanwhile, the Czech MoD continues to show interest in acquiring four second-hand C-130 HERCULES from the US Air Force: two would supplement the current transport fleet, and two would be used for spares. A more likely option may be the procurement of two additional C-295Ms, whose purchase would allow the Army of the Czech Republic (ACR) to supplement its existing four-unit fleet while enabling the service to retire its ageing YAK-40s.

UAVs

The Czech Army 102nd Reconnaissance Battalion operated SOJKA III unmanned aerial vehicles purchased in the early 1990s until 2011, when they were decommissioned. The SOJKA provided long-range surveillance, but is large and requires vehicle deployment, unlike the newer, smaller handheld UAVs. With the pressing need for more and newer UAVs within the Czech Afghan deployment, the Defence Ministry

made two UAV purchases in November 2009: one for six AeroVironment RQ-11 RAVEN miniature UAVs at a cost of CZK20M, and another for two Israeli Elbit Systems SKYLARK II medium-altitude UAVs at a cost of CZK50M.

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. Budget dictates that the reshaping of the helicopter force will not be done on a one-for-one basis. The core helicopter programme involves the ACR replacing its remaining Mi-24/35 attack helicopters – slated for retirement in 2017 and 2018 – with up to 35 new light, multi-purpose helicopters. 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 have been ruled out altogether. 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. New utility-type helicopters would be procured in several batches between 2016 and 2020 under ACR plans, with the first procurement – a 12-unit buy – announced in May 2016. The government hopes to select the winning platform for this initial purchase in 2017, with the requisite funds (CZK8.6Bn) already earmarked for the project.

The Czech Defence Ministry would also like to begin replacing the Soviet-legacy Mi-17 and Mi-171 transport helicopters, but this requirement appears have been merged with the aforementioned multipurpose helicopter requirement as a means of maximizing limited capitalisation funds.

The four Mi-8s used in the VIP transport role will be retired by 2018 at the absolute latest.

Missile Programmes

The Czech close-range air defence component is the self-propelled STRELA-10 (SA-13 GOPHER), which was last upgraded in the late 1990s.

The land-based air defence component is the 40+-year-old SA-6 GAINFUL (2K12

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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, an acquisition of fewer than 10 batteries costing roughly US\$246M is being pursued. The Czech MoD issued a Request

to 19. The military then purchased 90 additional Iveco LMVs at a cost of CZK3.62Bn (US\$188M) in December 2009. Deliveries were to run through 2013. A follow-up order for 30 LMVs was made in January 2010, bringing the total procurement to 120 units. The cost of the 30-unit order



Photo: Czech Ministry of Defence

The TITUS (Tactical Infantry Transport and Utility System) can be configured to suit a variety of military missions.

for Information to five companies in the autumn of 2016: Lockheed Martin, MBDA, Kongsberg, Rafael and Diehl.

Meanwhile, the Czech MoD intends to retain the SA-6 surface-to-air systems through 2018, which means their service lives will need to be extended as they are currently expected to expire between 2018 and 2020. Options such as replacing their 3M9 missiles on a one-for-one basis are being considered. In December 2015, the Defence Ministry announced its intention to procure Raytheon FGM-148 JAVELIN anti-tank guided weapons (ATGWs) from the US via the government-to-government FMS channel. The ministry has earmarked CZK254 M for the purchase.

Vehicle Programmes

Saddled with old Soviet- and Warsaw Pact-legacy materiel following independence and military missions in Afghanistan, the Czech Ministry of Defence 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 kit, orders were placed 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

was CZK1.2Bn (US\$64M); deliveries were expected in 2011, whereupon the vehicles were to be deployed to Afghanistan.

Prague then purchased three armoured ambulances from Iveco in 2010. Like the LMV purchase, the procurement was done without a tender. The vehicles were bought indirectly from Iveco through Czech company Praga-Export, the same intermediary used in the 90-unit LMV buy. Critics charge that the lack of a tender process resulted in the Czechs paying higher-than-normal rates for the LMVs.

The Czech military was rumoured to be considering the withdrawal of its fleet of T-72CZ main battle tanks from service with the 7th Mechanised Brigade as part of a cost-saving measure. Some 30 T-72CZs were modernised early in the 2000s, at a cost of around US\$2.5M. Another 134 were to be modernised as well, but due to budgetary concerns and altered force structure plans, the reformation of the Czech Army into a lighter, more deployable force took precedence. Instead, the MoD will sell off those remaining 100+ tanks, while the 30 T-72M4 CZs will remain in service until 2025.

In November 2012, the Defence Ministry announced it would begin seeking the acquisition of 30 new armoured wheeled Mine Resistant Ambush Protected (MRAP) vehicles, worth several hundred million Czech korunas, between 2015 and 2017.

That requirement has now grown to 42 units, with the Defence Ministry recommending the Nexter Systems TITUS 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 a 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 CZK136.M (US\$65.5M) order from the Defence Ministry for 18 N3G-V trucks.

The Czech Defence Ministry hopes to procure 62 6x6 Nexter TITUS armoured infantry wheeled vehicles in 2017, at a cost of CZK3.86Bn (US\$154M). Deliveries would be made between 2018 and 2023. This procurement may be made in tandem with Poland, as discussions regarding such a purchase were ongoing in 2016.

The drama surrounding the on-again, off-again APC contract with Austrian producer Steyr Spezialfahrzeug appeared finally to be nearing an end in 2009, with an agreement calling for Steyr to deliver around 107 PANDUR II 8x8 wheeled armoured personnel carriers to the Czech Army. Prague had withdrawn from the original CZK23.6Bn (US\$1.0Bn) contract with Steyr in December 2007. The APC contract – the most expensive contract in the history of the Czech Army – called for the delivery of 199 8x8 wheeled PANDUR II infantry combat vehicles, with an option for an additional 35. But in February 2008 the government threw a lifeline to Steyr, stating there was still time to resurrect the original contract: for the Czech MoD a solution was essential, because its OT-64 8x8 wheeled armoured vehicle fleet was old, outdated and insufficient for modern operations.

The APC requirement was an ongoing and convoluted battle within Prague dating back to 2002. The MoD planned to acquire some 400 new wheeled armoured vehicles, including armoured infantry fighting vehicles, reconnaissance vehicles, armoured command posts, communications vehicles, and military police vehicles. The goal was to purchase about 300 8x8 vehicles and about 100 smaller 6x6 vehicles that could be more readily deployed in urban areas.

Facing severe budget cuts, the MoD announced in June 2003 that it had cut the programme to just 100 vehicles. However, by October 2003 the number had been increased once again, to 250-300. The reason for the about-face was a faster-than-expected decline in the serviceability of the OT-64 8x8 wheeled armoured vehicle fleet.

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Photo: CZUB

The BREN 805 assault rifle from CZ has been in Czech military service since 2011. It is also under consideration in the Slovak Republic as a SA vz 58 replacement.

Finally, in December 2003 the Czech Parliament approved the acquisition of 240 8x8 wheeled armoured vehicles in five configurations, earmarking US\$965M towards the project. The tender, expected to be placed in early 2004, was then delayed when the Czech MoD decided it wanted to streamline the requirements for the new APCs. Final bids were submitted to the Czech Defence Ministry on 14 November 2005. The final two bidders were Finnish Patria Vehicles with its two types of AMV, and Steyr with its PANDUR II. The bids were reviewed by an interministerial commission, which made its recommendation to the government in January 2006. The Steyr PANDUR II was finally chosen as the winner of the competition in January 2006. But the government did not immediately sign the contract, partly due to the intense campaign season and closely contested elections of 2 June 2006. When Defence Minister Karel Kuehnl finally signed the contract on 6 June 2006 it was a politically controversial move, as his party had lost the elections four days earlier, leaving critics to charge that Kuehnl did not have the mandate to finalise the agreement. Further issues over the programme cropped up when delivery of the 17 vehicles expected to arrive in November 2007 was halted because the vehicles did not meet several testing criteria set forth by the Czech Army. The Czech MoD gave Steyr 30 days to correct these flaws, but ultimately the PANDURs failed to meet 24 of the 93 criteria outlined in the original purchase contract. A series of unsuccessful negotiations with Czech Defence Minister Vlasta Parkanová up to January 2008 left Steyr empty-handed. But once again a new agreement was painstakingly reached after the Defence

Ministry agreed in September 2008 that tests of the PANDURs were successful. The new contract, signed in March 2009, called for the delivery of 107 PANDUR IIs in six variants, at a cost of CZK14.4Bn (US\$750M). Czech industry benefits from indirect off-sets worth about 90% of the value of the deal. Czech arms maker VOP 025 supplied components for the PANDUR. The first delivery, comprising 17 new PANDUR IIs, was completed on 30 September 2009. This initial lot was produced in Austria; the remainder were assembled in Nový Jičín. Deliveries of the remaining 90 PANDURs ran through 2013. 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 in August 2015 the MoD announced plans to purchase 20 of these vehicles. However, funding pressures forced the Defence Ministry to delay the procurement until 30 January 2017, when a CZK2.07Bn (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 ballistic missile 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.

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 (ZUZANA). Both of these were developed and brought into service in the former Czechoslovakia more than 30 years ago. In an effort to upgrade the ACR's artillery capability, the Czech MoD announced in the summer of 2014 that it intends to procure 19 81mm mortar systems via the NATO Support Agency.

New Assault Rifles and Small Arms for the Czech Army

On 18 March 2010 the Czech Defence Ministry selected domestic company Česká zbrojovka (CZ) as the winner of its competition to provide new assault rifles for the Czech Army.

The CZK1.1Bn (US\$59M) competition was launched in November 2009. It aimed to provide 7,937 new 5.56mm assault rifles for the Czech Army as part of an effort to bring its side-arms up-to-date and comparable with NATO allies' equipment. These would in particular be used by troops deployed to Afghanistan and by NATO and EU rapid response units. The assault rifle competition was part of a larger CZK2Bn competition that also called for the procurement of almost 400 CZ805G1 40mm grenade launchers.

Originally, the Defence Ministry had earmarked CZK1.5Bn for the assault rifles, but the bidders began to lower their prices in an effort to win the tender. Česká zbrojovka, fully referred to as Česká zbrojovka Uherský Brod (CzUB), beat FN Herstal of Belgium, which offered up its SCAR-L assault rifle. Heckler & Koch and Beretta also reportedly submitted bids to the Czech Defence Ministry.

Česká zbrojovka presented its CZ 805 BREN modular assault rifle as an alternative. This weapon now equips the 601st Special Forces Group, the 102nd Reconnaissance Battalion, and elements of the 4th Rapid Deployment Brigade. The new weapons replaced the old MAG-58 machine guns that had been in Czech service since the 1950s. Deliveries of the new CZ805A1 assault rifles and A2 shortened carbines ran from July 2011 through 2013. In November 2010, the MoD announced that a six to 12 month delay in deliveries of the CZ805 BRENS would be necessary due to budgetary shortcomings; however, on 2 February 2011, First



Deputy Defence Minister Jiří Šedivý stated that deliveries would start in July 2011. Still, it was not until late 2011 that Czech Army forces serving in Afghanistan received their first CZ805 BRENS.

The MoD ordered additional weapons from CZ on 22 March 2010, under a CZK129.8M (US\$7M) contract. These included 5,570 CZ 75 PHANTOM 9mm semi-automatic pistols and 572 CZ SKORPION EVO3A1 9mm fully automatic personal defence weapons. These small arms were delivered throughout 2011.

In January 2016, CZ was awarded a contract to provide a second-generation iteration of the CZ805 BREN, the CZ806. The CZK417M (US\$17M) contract calls for the delivery of 2,600 of the new CZ806 BREN2 rifles plus 800 CZ805 G1 underbarrel grenade launchers and associated equipment.

Electronics Programmes

In October 2014, the Defence Ministry announced its intention to launch a global tender for a new anti-aircraft radar system to replace ageing Soviet-legacy platforms, including the 1970s-legacy P-37 BAR LOCK 2-D analogue radar and PRV-17 altimeters built in the 1980s.

On 14 December 2016 the Ministry announced a purchase of eight Israeli-made IAI Elta Systems EL/M-2084 multimission radars. The new 3-D mobile radars are identical to those used by the Israel Defence Forces (IDF) on their IRON DOME and DAVID'S SLING anti-missile defence systems. They are able to identify and locate incoming rockets and missiles, as well as track up to 1,000 aerial targets simultaneously, out to a 250-kilometre (155 mile) radius.

The cost to the Czech Republic will be around US\$100M. Contract signature is expected in 2017, with delivery between 2019 and 2021. Local firm Retia will produce 30% of the new radar's critical components.

This Czech procurement is stand-alone, rather than jointly purchased with Poland, Hungary, and Slovakia, as had been considered (a bilateral agreement with Slovakia was signed on 29 October 2012 for joint procurement of new military surveillance radar systems). Unilateral procurement was necessary due to the differing specifications of a jointly-developed system.

VOJÁK (Soldier) 21

Much like its fellow NATO partners, the Czech Republic is developing its own future soldier system. The Czech project, referred to as Voják 21 (Soldier 21 or V21), is being led by the state-controlled VOP 026 enterprise. A first demonstrator, known as VOJBUD, was completed in 2006. After the demonstrator was built, the Czech MoD had VOP 026 focus on integrating V21 with different platforms. The project now involves incremental improvements, starting with an order placed by the MoD in March 2010 for new pistols, assault rifles, and grenade launchers from CZ and night sights from Meopta.

Conclusion

As can be seen from the foregoing, the Czech Republic offers a plethora of requirements and potential partnerships. The political will is strong and stable; the society is entirely admirable, and both industry and the military have a very clear-eyed view of their respective roles. That being said, while there are many imminent requirements to be met – consider the range and numbers of rotary-wing platforms reaching their end-of-service life in 2018 – it is likely that there will continue to be financially-determined delays that might lead to exploitable gaps in defensive capabilities and the means to employ them. ■



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PUMA AIFV Impresses During Trials in the Czech Republic



The PUMA AIFV demonstrated its superior capabilities during six-weeks of comparative trials in the Czech Republic. These rigorous trials form part of the procurement programme by the Czech Republic for new armoured infantry fighting vehicles to replace the aging BMP1 and BMP2 fleet. The Czech Republic plans to buy 210 vehicles in seven variants with the delivery of the first infantry fighting vehicles scheduled for 2020.

In addition to the PUMA AIFV, four other AIFVs were invited to participate in the Czech trials: Rheinmetall's LYNX, BAE with two CV90 variants and General Dynamics' ASCOD. During the static trials, the vehicles were measured and weighed; their basic functionalities tested; weapon systems, protection and sensor technologies explained. Czech soldiers practiced rapid mounting and dismounting as well as emergency procedures including rescuing the driver through the rear crew compartment. The purpose of the dynamic trials was to confirm the mobility claims as stated by industry. Some of these trials took place at a military airport where maximum speeds and braking distances were verified. Off-road, the vehicle speed and ergonomics for the crew were tested. Most off-road terrain driving was conducted fully laden including the entire

military crew. The soldiers had to evaluate comfort and functionality after each exercise. Furthermore, the vehicles demonstrated their mobility by crossing ditches, wading through deep water, climbing steps, driving up and down steep slopes. The fuel consumption was measured after each task. Also, the reconnaissance and firing capabilities were tested. The firing trials included the fighting of static targets at different

distances ranging from 1200 to 1800 metres and sideways moving mobile targets. These trials were conducted with 5-round bursts in static position and while driving. According to high ranking Czech participants at the VIP day hosted by the Czech Department of Defence, the PUMA AIFV was judged as the vehicle with the highest firing accuracy compared to the other trial vehicles, achieving 100% accuracy





also during dynamic firing exercises. Also the PUMA AIFV's impressive cross country mobility was highlighted by senior Czech militaries.

The trialled PUMA AIFV is a fully tested, qualified and fielded system. The vehicle was supplied and fully supported by personnel from the German Bundeswehr throughout the trials.

The PUMA AIFV is neither an upgrade of an old vehicle platform nor of a previous concept, but a completely new development with the aim of providing soldiers with the best vehicle for close combat operations in symmetric and asymmetric warfare.

The PUMA AIFV is the only of the trialled vehicles which surpasses the highest protection levels in accordance with NATO Standards. The PUMA AIFV's protection system includes complete mine protection against the largest known anti-tank mines, 360° RPG protection and has the only integrated self-defence system against modern guided anti-tank missiles qualified in a

NATO country. Due to the extremely high protection level, the PUMA AIFV was also the heaviest vehicle during the trials in the Czech Republic. Nonetheless, the PUMA AIFV was still one of the fastest vehicles in off-road terrain and can compete with any modern main battle tank because of its 1,100 hp engine and innovative decoupled running gear.

From the beginning the PUMA AIFV was designed with maximum growth potential in mind. Among other features, this is evident in the systematic use of open interfaces, enabling electronic connection of new systems in the future as well as integration of alternative protection modules in response to emerging threats. The design concept ensures that the PUMA AIFV will remain the most modern armoured infantry fighting vehicle for many decades to come.

The highly protected 9m³ volume compartment enables the integration of a range of mission systems. The intelligently designed floor mine protection does not impact on

the flexible usage of the vehicle interior. The AIFV PUMA offers variants such as reconnaissance, ambulance and recovery, to name a few.

In June 2015, the German Bundeswehr took formal delivery of the PUMA as the world's most advanced AIFV. The first PUMA AIFV have been in service with mechanised elements of the German Army for over two years now. Training and fielding are in full swing. Today, more than 135 systems have been delivered with the final delivery of all 350 vehicles scheduled for 2020. The German Bundeswehr plans to order further AIFV PUMA variants.

The German PUMA AIFV industry has committed to cooperate with Czech companies in developing, manufacturing and to provide after sales services in the Czech Republic, should it be awarded the contract. Electrical cables for the PUMA AIFV are already being manufactured in the Czech Republic, as well as the sensors for the fire suppression and fire extinguishing system. Furthermore, considerations to also manufacture the tracks for all PUMA AIFV in the Czech Republic are well advanced. The German and Czech customers will both benefit from a joint production and the common use of the system in their armies. This cooperation could become the nucleus of a growing international user community for PUMA AIFV similar to the international user groups for the LEOPARD 2 MBT.

The PUMA AIFV is the result of an exemplary partnership between the German defence companies Krauss-Maffei Wegmann and Rheinmetall. PSM, a joint venture in which both groups hold a 50% stake, is the prime contractor for the German PUMA AIFV and responsible for development, manufacturing and after sales service as well as international sales.

Headwinds Continue for European Air Lift

Andrew Drwiega

While Airbus has won European orders with its A330 MRTT, its “achilles heel” A400M continues to cause concern, giving Lockheed Martin’s C-130J a latent opportunity for additional sales.

According to a study printed in the Joint Air Power Competence Centre’s (JAPCC) journal in the autumn/winter 2014 edition, Europe’s strategic airlift shortfall was significant. A study conducted by Major Lee Hages, US Air Force, Chief core Joint Forces Air Component exercise branch (based at

with the acquisition of a pooled fleet of Airbus A330 Multi Role Tanker Transport (A330 MRTT) aircraft. The initial order was for two aircraft with options for six more, and other nations were expected to commit to the project. The deal also included the first two years



Photo: Author

Jean-Yves Le Drian (French Minister of Defence from 2012 to May 2017, now Foreign Minister) and Ursula von der Leyen (Minister of Defence, Germany)

Ramstein Air Base, Germany), found that “given capabilities, initiatives and priorities stated by NATO and the EU, a substantial gap exists between what is available and what is desired. This research supports the projected 2020 fleet of European aircraft to meet strategic airlift goals.”

In July 2016, the Dutch Ministry of Defence signed a Memorandum of Understanding (MoU) with Luxembourg to move forward

of initial support for the aircraft. On 29 June 2017 the European Defence Agency (EDA) announced that both Germany and Norway had signed an MoU to join. Other nations currently in discussions over joining the multinational MRTT include Belgium and Poland.

The EDA, Organisation Conjointe de Coopération en matière d’Armement (OCCAR), NATO Support and Procurement Agency (NSPA) and Airbus Defence and Space (Airbus) represent the collective driving force behind the Multinational Multi-Role Tanker Transport Fleet (MMF) programme which aims to provide European nations with a modern military air transport and air-to-air refueling capability. The two initial Airbus

A330 MRTT aircraft are scheduled to be delivered in 2020 and will be operated by The Netherlands and Luxembourg.

The MMF Programme was facilitated by EDA within their European Air-to-Air Refuelling Initiative which began in 2012. The Netherlands and Luxembourg have established a support partnership with in the NATO Support and Procurement Organisation (NSPO) to acquire the NATO owned MMF and to support operation and sustainment of this fleet. OCCAR is managing the MMF acquisition phase on behalf of NATO/NSPA. NSPA will be responsible for managing the subsequent support and operations support phase and lifetime fleet management. The contract for the MMF Acquisition Phase was signed on 28 July 2016 and the OCCAR-EA MMF programme division was subsequently established.

The MMF programme is funded by the four nations who will have the exclusive right to use these NATO-owned aircraft which will operate in a pooling arrangement. The aircraft will be configured for inflight refuelling, the transport of passengers and cargo, and medical evacuation flights. The first two aircraft will be delivered by Airbus’ tanker conversion line at Getafe near Madrid in 2020. According to OCCAR director, Arturo Alfonso-Meiriño: “The MMF programme has broken new ground in bringing together the combined capabilities of the EDA, NSPA and OCCAR as one team, with each organisation working within its particular sphere of expertise.” He added that the option was open for other countries to participate in the project.

EDA chief executive Jorge Domecq considers the MMF project to be “a prime example of European defence cooperation which shows that once a capability shortfall has been jointly identified, European nations can pull together, work on a common project aimed at filling the gap, and eventually deliver.”

Boosting European Airlift with C-130Js

Where there is desire, reality does not necessarily follow. Airbus is not so popular with some of the same countries who have committed to the A400M develop-

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Photo: Airbus

When proposed, the A400M was a relatively popular concept.

ment to boost their heavy lift capabilities. The programme has been blighted by one problem after another, including a fatal crash in Spain on 9 May 2015. When proposed, the A400M was a relatively popular concept with aircraft having been ordered by Belgium, the United Kingdom, France,

Germany, Luxembourg, Spain, Malaysia and Turkey.

Announcing the Airbus 2016 financial results in February 2017, Tom Enders, Airbus Chief Executive Officer plainly stated his organisation's main headache: "We have delivered on the commitments

that we gave a year ago and achieved our guidance and objectives, with one exception, the A400M, where we had to take another significant charge totalling €2.2 billion in 2016. De-risking the programme and strengthening programme execution are our top priorities for this aircraft in 2017."

While the annual financial report stated that deliveries in 2016 had increased to 17 aircraft from 11 deliveries in 2015, it worryingly noted: "Cash retentions by customers will continue to weigh significantly in 2017 and 2018 in particular. Challenges remain on meeting contractual capabilities, securing sufficient export orders in time, cost reduction and commercial exposure, which could be significant. Given the size of the cumulative A400M programme loss, the Board of Directors has mandated management to re-engage with customers to cap the remaining exposure." By the end of June 2017, Airbus had still only delivered seven A400Ms.

Enders also said that Europrop International (EPI), the engine consortium comprising Rolls-Royce, MTU, Safran and ITP would need to continue to work towards fixing the gearbox issues.

At the Paris Airshow, EPI announced that its TP400-D6 engines "has achieved more than

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A European vision: Airbus A330 Multi Role Tanker Transport (A330 MRTT) aircraft conducting a refueling mission

100,000 engine operating hours, a milestone reached through the delivery of 46 Airbus A400M owned by France, Germany, Great Britain, Malaysia, Spain and Turkey." Over 210 engines have been delivered to operators. However, the propeller gearbox issue has still not been completely overcome. The French Government has been more lenient on the company, with France's new President Emmanuel Macron arriving at the Paris Airshow in June onboard an A400M in a bid to show support for Airbus. French Air Force General André Lanata has also supported the beleaguered manufacturer, although he admitted that there were still technical issues that needed to be resolved. The French have received 11 A400Ms, with just over half fully operational. Another 15 are due to be delivered by 2019. The German government has criticised Airbus for delivering initial models that did not meet stated requirements and has been a leading nation in keeping the application of penalties on the manufacturer. News agency Reuters references a German defence ministry report that talked of "under-financing" of the programme and the damage that compensation payments by customers would do in terms of hampering the manufacturer's ability to continue to problem solve on a tight schedule. The report suggested that further delays would be likely in order to resolve outstanding issues. Improvements that have been publically aired include a gearbox problem and the aircraft's parachutist deployment abilities. However EPI has been working on fixes both temporary and longer term. But the late delivery of the full German requirement of A400s has meant that it perceives a capability gap when its fleet of C-160 Transall aircraft are retired in 2021. This has led to an unexpected op-

portunity for C-130J manufacturer Lockheed Martin.

Rallying Around the C-130J

As stand-in for the late arrival of the A400Ms, France and Germany are cooperating to establish a joint military airlift capability based on Lockheed Martin's C-130J SUPER HERCULES transport aircraft. Back in 2015 France planned the acquisition for two C-130Js and KC-130J tankers from the US government through the For-



A US Air Force C-130J over Mont Saint-Michel on the occasion of the 73rd anniversary of D-Day

up to eight pallets, 128 combat troops or 92 paratroopers. In March 2017, Reuters reported that the German government was looking to make an acquisition of six C-130Js at a cost of around €900 million starting in 2019. The aircraft would be used through a joint operating agreement with France. There is an expectation that 12 C-130Js may eventually be purchased by Germany. Potentially these aircraft could be divided operationally between Germany and France.

Airbus A400M customers and deliveries, as of 14 July 2017

Country	Ordered	Delivered
Belgium	7	0
France	50	11
Germany	53	10
Luxembourg	1	0
Spain	27	1
Turkey	10	4
UK	22	16
Malaysia	4	4
Total	174	46

eign Military Sale (FMS) process. The deal was valued at around \$650M. Another two aircraft are future options. The contracts are for a pair of stretched C-130J-30 aircraft and two KC-130J tankers. All four aircraft are scheduled to be delivered by the second half of 2020. The C-130J-30 is longer by 4.5 metres which allows it to carry up to two additional pallets of equipment in the cargo compartment. This means nearly 20,000 kg (around 44,000 lbs). Internally this means

At a NATO meeting in February both the German Defence Minister Ursula von der Leyen and her French counterpart Jean-Yves Le Drian confirmed the agreement to establish joint C-130 operations through a broad plan. This adds to the wider EU commitment aimed at increasing European defence co-operation as promoted by the EDA. The initial cost for the C-130Js together with infrastructure support and training simulators sourced from Canadian company CAE was expected to be around €110 million.



Photo: US Air Force

According to reports the German finance ministry would request the procurement in 2019.

Evreux in France has been selected as a joint operating base which will service both countries. France is expected to invest a similar amount to Germany which will initially go into infrastructure improvements and the training simulators. The joint fleet should be formed and operational by 2021.

Although Germany has announced a commitment to operating a fleet of around 53 Airbus A400M transports, it perceives that there will be a lack of overall air transport capacity when it begins to retire its fleet of Airbus C-160 transports starting in 2021. The setbacks to the A400M programme with delays, a crash and cost escalation has been a significant contributing factor in the decision to procure the widely used and available C-130Js.

The troubled A400M recently announced that it was making a €2.2 billion (\$2.3 billion) provision to account for recent cost overruns. The initial order book for the A400M was for around 180 aircraft which would have been worth around €20 billion to Airbus.

Spanish Airlift Training Centre Opens

On 8 June 2017, a new European Tactical Airlift Centre (ETAC) was opened in Zaragoza, Spain. This establishes a permanent operational base for the European Air Transport Fleet (EATF) Training Programme, and is the largest transfer of a project from the European Defence Agency (EDA) where the ETAC has resided since its establishment in 2011.

Its purpose is to increase the European Union's airlift capabilities by addressing shortages while increasing interoperability. Eleven nations will share the responsibility of planning, organising and enacting the advanced airlift courses and training. These will not be restricted to Spain however, and are likely to be staged in France, Italy, Bulgaria, Portugal and Sweden although Zaragoza will provide the leadership. The first staff members will be taken from Spanish, Italian, German and French forces, and will be replaced every three to four years by officers from the remaining signatory nations.

EDA Chief Executive Domecq stated that the transfer represented a "significant moment for European defence cooperation and the EDA. This new centre is the culmination of six years of development in the EDA." He added, "ETAC demonstrates exactly how the EDA enables positive defence collaboration and delivers real capability improvement for our member states."

Masthead

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Air and Missile Defence Alternatives

Doug Richardson

For many nations, the days when air threats to their national territory consisted only of fixed-wing aircraft are over. Today's attacker may be armed with long-range ballistic missiles, and prepared to use these to attack military facilities or even cities. However, today's military budget seldom allows the procurement of dedicated anti-missile systems such as Israel's IRON DOME and ARROW. Procurement of a long-range system able to engage both aircraft and missile targets is a more realistic solution.

But what classes of missile need to be engaged? Cruise missiles are an obvious threat. Although most fly at subsonic speed, they tend to have a small radar cross section (RCS). The most advanced designs may have enough range to fly an indirect flight path, approaching not from the main threat sector, but from the side or even from the rear. Given good flight planning, several can be programmed to fly simultaneous attacks from different directions in the hope of saturating the defences. The international Missile Technology Control Regime (MTCR) has had some success in limiting the range of exported ballistic missiles to less than 300 km, the performance class of the ubiquitous Soviet-era R-17 "SCUD B", but tactical ballistic missiles of greater range have been developed by several countries. While most of these longer-range designs are not available on the export market, Iran and North Korea have a record of supplying ballistic missiles and their associated technology. So for some nations, an anti-missile capability that is restricted to countering SCUD-class threats is not enough.

PATRIOT Update

For countries that face the threat of SCUD-class missiles, Raytheon would offer its PATRIOT system, which has been progressively updated to match evolving threats. The most recent user to order a PATRIOT upgrade is Kuwait. Six fire units are due to be modernised to the Configuration 3+ standard by mid-March 2022 under a USD523 million contract awarded to Ray-



Photo: Doug Richardson

Displayed at the 2016 Farnborough Air Show, this PATRIOT radar vehicle incorporates two smaller radar antennas as well as the main antenna – a modification that would give the system a limited 360 degree coverage. In combat, the main antenna would be directed toward the anticipated direction of likely threats.

theon by the US DoD. The changes include adding a Modern Manned Station (MMS) interface, a Radar Digital Processor, and the Modern Adjunct Processor (MAP). They will allow the system to fully exploit the potential of the PAC-3 Missile Segment Enhanced (MSE) version of the Patriot missile. Kuwait is planning to construct two additional PATRIOT fire bases in order to improve its defences against Iran. The new installations will be at Ahmed al-Jaber Air Base and Ali al-Salem Air Base. Under the same programme, the current Air Operations Centre south of Kuwait city is also due to be upgraded.

Initial operational capability (IOC) of the PAC-3 MSE version of the PATRIOT missile was announced by the US Army in early July 2016. A Saudi Arabian order for the new variant followed in March 2016. The developmental test phase of the Post Deployment Build (PDB)-8 standard of PATRIOT ended in early July when a test

launch successfully engaged a manoeuvring QF-4 PHANTOM target. This version will undergo operational testing in 2017. Intended to improve performance against aircraft, cruise missiles, and tactical ballistic missiles, PDB-8 includes upgrades to the missile's seeker and the inertial measurement unit, an improved datalink, and changes to the ground equipment.

Although PATRIOT's initial combat record against Iraqi SCUDs and SCUD-derivatives in 1991 was not as good as had initially been thought (it was originally reported to have intercepted 51 of the 53 SCUDs that had been targeted on PATRIOT-defended areas), identified deficiencies were swiftly addressed by modifications.

A Saudi-led coalition has successfully handled what Ralph Acaba, Raytheon's vice-president for Integrated Air and Missile Defense described as "well over a couple of dozen intercepts" of SCUD missiles over the last year. Speaking at the recent Farn-

Author

Following an earlier career in engineering, **Doug Richardson** is a defence journalist specialising in topics such as aircraft, missiles, and military electronics.

Image: MEADS Intl



This MEADS Multifunction Fire Control Radar (MFCR) was built to the configuration planned for Germany. Italy and the US – the other two nations that co-developed MEADS – have no plans to procure the system.

borough Air Show, he claimed that every SCUD that was engaged was destroyed. As a result of this ongoing combat experience, Raytheon has been able to refine PATRIOT's guidance algorithms, offering updated software to the system's users.

MEADS

Development of the tri-national (US, Germany, and Italy) Medium Extended Air Defense System (MEADS) was intended to create a system able to replace PATRIOT. It uses vertically-launched PAC-3 MSE missiles, teamed with a UHF Surveillance Radar (SR), an X-band Multifunction Fire Control Radar (MFCR), and a Battle Management, Command, Control, Communications, Computers, and Intelligence (BMC4I) Tactical Operations Center (TOC). All of these are truck-mounted, and interconnected by a wireless network intended to give "plug-and-fight" capability and connections with non-MEADS sensors and shooters.

Progress was slow, and in February 2011 the US announced that although it would remain an active member of the programme until the design and development phase had been completed, it would not procure the system. Testing would be confined to two flight intercept tests, a launcher/missile characterisation test, and a sensor characterisation test.

In June of last year, Germany selected MEADS as the basis for its planned "Taktisches Luftverteidigungssystem (TLVS)" air and missile defence system. Between eight and ten batteries are due to be taken into service, and will use vertically-launched IRIS-T SL missiles to deal with less stressing

threats that do not warrant the launch of an expensive PAC-3 MSE.

MEADS in Poland

Lockheed Martin has offered MEADS as a candidate for Poland's WISLA medium-range air defence requirement as well as for a similar requirement in Turkey. Both offers seem to have been overtaken by events. On 6 July, in the context of a visit by President Trump, Poland signed a Memorandum of Intent (MOI) reconfirming their plan to procure up to eight PATRIOT batteries. Poland plans to modify PATRIOT by the eventual integration of Northrop Grumman's "Integrated Battle Command System" (IBCS) and Rafael's STUNNER interceptor. Turkey seems to be making progress in acquiring the Russian S-400 and forming a joint venture with Eurosam to develop a new system in order to satisfy all aspects of their future air and missile defence requirements.

SAMP/T

Development of the Eurosam SAMP/T (Sol-Air Moyenne Portée/Terrestre) long-range air defence system was started in the late 1980s, and a production contract for systems to equip the French Air Force, French Army, and Italian Army signed in 2003. The system contractor is Eurosam, a joint venture of MBDA and Thales.

In 2006 France decided that the system would be operated only by the French Air Force, so the planned acquisition of twelve SAMP/T batteries (six for the army and six for the air force) was reduced to ten. Production deliveries ended in February 2016,

Photo: Lockheed Martin



The PATRIOT PAC-3 MSE (Missile Segment Enhancement) incorporates a more powerful rocket motor that provides increased range and greater agility.

Photo: Diehl BGT Defence



Germany intends to deploy the Diehl BGT Defence IRIS-T SL missile as a lower-tier component of its planned TLVS surface-to-air missile system.

when the French Air Force's Escadron de Défense Sol-Air (EDSA) 02/950 "Sancerre" took delivery of its final SAMP/T system, which it designates as the "Mamba". Deliveries of five batteries to the Italian Army had already been completed.

A battery typically consists of four transport erector launchers armed with up to eight ASTER 30 missiles, a Thales ARABEL 360 degree multifunction X-band radar, a command and control vehicle, plus support vehicles. The ASTER 30 missile has a maximum range of around 100 km, and



Photo: MBDA

Test launch of an MBDA ASTER 30 missile. In the final stages of the development programme, the missile scored several fuselage-to-fuselage strikes against target drones.



Photo Greek MoD

This test firing of an Almaz-Antey S-300PMU-1 system was conducted by the Greek Air Force in December 2013. The system had originally been purchased by Cyprus, but was later transferred to Greece.

a maximum altitude of around 65,000 ft. In its present form, the ASTER 30 Block 1 missile used by SAMP/T can only engage



Photo: Lockheed Martin

The 10th test launch of Lockheed Martin's THAAD missile

SRBMs – threats whose relatively low velocity limits them to a maximum range of around 600 km. ASTER 30 B1NT is expected to be able to engage ballistic missiles with ranges of 1,000 km or more – the upper range limit has not been specified. An important feature of the improved missile will be a new Ka-band (26.5-40 GHz) active radar seeker. This will replace the current Ku-band (2-18 GHz) seeker fitted to the ASTER 30 Block 1 missile, and is intended to provide a longer target-acquisition range, and better angular resolution.

Made in Russia

When the former Soviet Union first fielded the S-300 (SA-10 "GRUMBLE") in 1979, it introduced a system intended to overcome many of the limitations of the earlier S-75 (SA-2 "GUIDELINE") and S-200 (SA-5 "GAMMON"). It was to prove an export success, being procured by around 15 ex-

port customers.

Early variants of this missile were all intended for anti-aircraft use, and offered no significant capability against ballistic missiles. First displayed at the 1992 Moscow Air Show, the S-300PMU1 (SA-10c "GRUMBLE") could use the anti-aircraft missiles first offered with earlier members of the S-300 series, but introduced the 48N6 missile. This allowed the engagement of ballistic missiles with ranges of up to 1,000 km and velocities of up to 10,000 km/h (2,800 m/s). Production of the system has probably ended, but as the earlier S-300PM is withdrawn from Russian service, it is likely to be refurbished to the FAVORIT-S standard (broadly similar to the S-300PMU1 and PMU2), and offered for export. The follow-on S-400 TRIUMF (SA-21 "GOWLER") maintains backwards compatibility with the older missiles of the S-300 series, including the 48N6 missiles, but its anti-missile capabilities are significantly up-

graded by the new 40N6 missile. Two further new missiles designated 77N6-N and 77N6-N1 were announced in 2012. Both are kinetic hit-to-kill weapons. The system can engage ballistic targets flying at speeds of up to 4.8 km/sec at ranges of up to 60 km. Against aircraft, it has a maximum range of 400 km.

The S-400 attained notoriety in November 2015 when Russia's president Vladimir Putin ordered the deployment of a battery to Hmeimim airbase south-east of the Syrian city of Latakia as part of his response to the downing of a Russian Air Force Su-24 strike aircraft by Turkish F-16s. The deployment was of concern to NATO, given that it added to the amount of NATO airspace that already lay within the coverage of other forward-based S-400 units deployed to Crimea and the Kaliningrad enclave between Poland and Lithuania. This challenge cannot go unanswered, so NATO is devising the hardware and tactics that will be needed to defeat the system.

HQ-9

Marketed by the China National Precision Machinery Import and Export Corporation (CNPMEIC), the HQ-9 seems to be based on the Russian S-300PMU/PMU1, but may incorporate some PATRIOT. The missile is cold launched from vertical launch tubes carried by a transporter-erector-launcher (TEL). Similar in configuration to the Russian 5V55 and 48N6 missiles, it uses inertial guidance in the initial stages of flight, with radio command mid-course correction. A seeker based on track-via-missile guidance is used for final homing. The most obvious external difference between the Chinese missile and its Russian counterpart is that the thrust vector control vanes are located aft of the nozzle, rather than being within the nozzle.

Aircraft can be engaged at ranges of up to 125 km, and at altitudes from 25 m up to 27,000 m. Against cruise missiles, the maximum range falls to 15 km. A maximum range of 25 km and maximum engagement altitude of 15,000 m have been specified for ballistic missile targets, but the range classification of the latter is not stated. North Korea and Iran are developing their own S-300 class weapons in the form of the PON'GAE-5 (KN-06) and BAVAR-373 respectively. Both systems use missiles that seem to draw heavily on S-300 and/or HQ-9 technology, and use vehicle-mounted vertical launch tubes, and a vehicle-mounted search/guidance radar, but neither seems close to becoming operational.

To fill the coverage gap between the systems we have been describing and the strategic missile-defence systems such as the US Ground-Based Missile Defence system and land-based Standard, the Russian ABM defences around Moscow, and Israel's ARROW 2 and 3, the US and Russia operate upper-tier anti-missile systems able to defend against intermediate-range ballistic missile systems.

THAAD

In the case of the US, this is the Lockheed Martin THAAD. Seven US Army batteries have now been authorised, and the service has a requirement for an eighth and ninth.

The first battery to be deployed overseas is stationed at Guam in the Pacific, but an announced plan to deploy a US THAAD battery to South Korea as a counter to North Korean ballistic missiles has raised the ire of China, which sees this move as being directed (at least in part) against its own offensive missiles.

2016 the South Korean government announced that the THAAD unit would be stationed near the town of Seongju in the south-eastern part of the Korean peninsula, and would become operational 2018. However, it is reported to have insisted that the system must be operated autonomously, and not be integrated with other US missile-defence assets. In March 2017 the first THAAD

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Photo: Russian MoD



This 92N6 GRAVE STONE fire-control radar and vehicle-mounted vertical missile-launch tubes are part of the S-400 system that Russia deployed to Syria in November of last year.

systems arrived in Korea. Details of their eventual station and their mode of employment remain under discussion.

The first export sale is now being discussed with the United Arab Emirates, and the company reports significant interest from Europe, the Middle East and the Asia-Pacific region.

Lockheed Martin is promoting an improved and longer-ranged version of the THAAD missile. Known as THAAD-ER, this replaces the current single-stage propulsion system with a two-stage configuration incorporating a first stage of increased diameter. The extra range would allow earlier engagements, and give more time for multiple shots against high-priority threats.

New Russian Developments

Since 1986 Russia has operated the Almaz-Antey S-300V (XA-12a "GLADIATOR" /SA-12b "GIANT") anti-tactical ballistic missile (ATBM). Designed to meet a Soviet Army requirement for an anti-ballistic missile (ABM) able to counter the US developed PERSHING Ia ballistic missiles in service in what was then West Germany, it was seen as an upper tier complement to the Soviet air-defence force (PVO) S-300 (SA-10 "GRUMBLE").

Several variants are known to exist – the S-300V1 using the 75 km range 9M83 missile, the S-300V2 armed with the 100 km range 9M82 missile, the upgraded S-300V3 (export designation ANTEY-2500) with 9M82M and/or 9M83M missiles and the further-improved S-300V4 (reported to have entered service in 2014). Known users

are Russia, Belarus, Ukraine and Venezuela. A reported Egyptian order has never been confirmed.

Russian sources are tight-lipped concerning the Almaz-Antey S-500 PROMETHEY system (also known as the 55R6M TRIUMFATOR-M), which is currently in the late stages of development. Although the developer has released drawings that show some of the



This artwork depicting a launcher for the Almaz-Antey S-500 system shows ducts leading to the top end of the launch tubes. These may be part of a cooling system for the missile's terminal homing seeker.



Fired from a US Army Multi-Mission Launcher (MML), this TAMIR missile from Israel's IRON DOME programme successfully engaged and destroyed an unmanned aerial vehicle (UAV) target.

vehicles that make up the system, including the launcher, details of the system are being kept under wraps.

All the indications gleaned by US intelligence suggests that it is a short-ranged ABM system, Russia's equivalent to the US THAAD. Expected to reuse some technology from the S-400, its armament may include the 77N6-N and 77N6-N1, as well as the new 45T6 anti-ballistic missile. The maximum range is reported to be 600 km, and the system may have a secondary anti-aircraft role against stand-off systems such as airborne-early-warning aircraft.

Image: Almaz-Antey



Photo: US Army

An artwork illustrating the launcher shows the presence of a duct running almost the full length of each vertical-launch tube, and terminating near the top. This suggests that the missile may use a terminal-homing seeker that needs to be cooled prior to launch.

IRON DOME and DAVID'S SLING

Israel's IRON DOME and DAVID'S SLING systems fall into a different category. These are not intended as upper-tier systems, but were designed to deal with mass attacks by unguided rockets and short-range ballistic missiles – low-cost threats that could saturate the defensive coverage provided by systems such as PATRIOT if fired in large numbers.

Developed under a "crash" programme that largely eliminated "red tape", Rafael's IRON DOME entered service in 2011, and within a month had successfully intercepted a GRAD rocket fired into Israel from Gaza. During military conflicts with Gaza in 2012 and 2014, the system was credited with 421 and 735 successful interceptions of incoming rockets respectively, with success rates of 85-90% being reported.

Brigadier General Zvika Haimovich, commander of the Israeli Air Force's air defences, predicted that in any future conflict, Hizbullah and Hamas were expected to use salvos of between 50 and 100 rockets in an attempt to overwhelm IRON DOME. The missile is already being manufactured on two production lines, but Israel wants to increase the production rate.

Jointly developed by Rafael and Raytheon, DAVID'S SLING is designed to intercept shorter-range ballistic missiles and heavy rockets with ranges of 70 – 250 km. The first battery is currently being integrated into Israel's rocket and missile-defence system, and is expected to become operational later this year. IRON DOME uses a radar-guided missile, but the two-stage interceptor used by DAVID'S SLING uses a combination of radar and electro-optical homing. ■

"The Framework Nation Concept might also be a success story in the air defence arena."



Interview with Thomas Gottschild, CEO, MBDA Deutschland GmbH

ESD: What are the operational requirements for surface-to-air missile defence systems in the future?

Gottschild: Already at the end of the 1990s it became apparent that the air defence systems in service were no longer fully able to cope with the growing threats constituted by cruise missiles, new-generation tactical ballistic missiles and UAVs. Besides, the requirements for global deployments have grown. The forces need a new air defence architecture which allows for flexible response to diverse threat environments. This

can only be provided by an air defence system with an open system architecture. Depending on the situation a modern command and control system can integrate and control additional sensors and launchers. Other essential requirements include interoperability, high mobility for fast relocation, 360° protection, mission effect, plug & fight, air-transportability, and a low intensity level with regard to personnel, maintenance and repair. Systems currently in service cannot offer these capabilities to the extent they are required.

ESD: How are these capability features assessed from a political perspective?

Gottschild: The performance features mentioned above are directly derived from the defence- and security-political demands. Military cooperation in international security alliances such as the UN, NATO and the EU is a pillar of the German security policy. Effective cooperation with allies in different constellations requires interoperability and an open system architecture. The air defence article in this issue considers that there are numerous systems in our defence communities, the development of which took place in the 1970s and 1980s - thus in an early phase of digitisation. A modern air defence capability has to support interoperability between legacy and future systems to the best possible extent. Only then armed forces can effectively cooperate across borders, or as a quotation from the White Paper of the German Ministry of Defence: "Security in the 21st century can only be guaranteed in an integrated network of all security actors and instruments."

Another pillar from the foreign and security-political perspective is the Framework Nation Concept, which Germany has been successfully expediting since 2013. This concept is to significantly improve the sustainability of military capabilities within NATO. Partner nations are offered the option of integrating their capabilities with an existing security architecture, the core of which is provided by the framework nations. The 2020s and 2030 are earmarked for a renovation of the air defence systems - when conventional systems will have been in use for 50 years. In the years ahead Germany has the chance to take the lead in this area and to show that the Framework Nation Concept can be a success story in the air defence arena, too. TLVS/MEADS features an open and flexible system architecture and therefore constitutes an essential prerequisite.

ESD: What is the time schedule for introduction and operation of new systems in NATO countries?

Gottschild: Air defence systems are complex technical systems and thus require long periods for planning, development and fielding. On the other hand, they provide a long life cycle. At present there is no system in service which can entirely live up to the expectations of the users. When taking the investment decision you have to consider that the largest cost share is in the future: maintenance, personnel, upgrade and obsolescence management. As a result, important NATO partners or close allies are retiring their current system, for which these expenses are increasing exponentially. They are planning investments in a new defence architecture. These nations include the United States, Germany, Italy, Switzerland, Sweden, Turkey and partners in Eastern Europe like Poland, the Czech Republic and Romania. According to German plans the introduction of a new tactical air defence system is to commence in five years and to subsequently replace the existing systems. With the decision for TLVS/MEADS Germany is part of the leading nations and can act as a framework nation in air defence in the future.

The questions were asked by Jürgen Hensel.

Naval ASW Sonar Review

Bob Nugent

Sonar is a key technology in naval warfare that is still widely used – from navigating a single ship or craft to oceanographic research on a global scale by fleets of sonar-equipped manned ships and unmanned vehicles.

As suggested by its name (actually acronym), SoNaR, or Sound Navigation and Ranging, uses the propagation, reflection and transmission of sound energy through water to sense, detect, classify and identify objects in and on the water. Sonar is also used to communicate using underwater telephones and other acoustic devices. In this respect, given the relatively constant and opaque nature of salt water as an operating medium for navies (more on this below), the sonar remains an enduring and relevant naval technology. This is especially true in two naval mission areas: mine warfare (MiW) and anti-submarine warfare (ASW).

This article will look at one specific naval sonar application – sonars on surface combatants used for ASW. It starts with a brief summary of the evolution of the surface ship ASW sonar and the impact of technological change on the current generation of sonar systems. Next, using AMI's proprietary data on current fleets and forecasted acquisitions of naval ships and their equipment, the article reviews current sonar ship fits and specifications for different types of platforms and across regions. This is followed by an analysis of future surface ship sonar procurements over the next 20 years by types of sonars (hull, towed array, variable depth). The article will close with a detailed look at some recent contract awards and other market developments affecting the surface ship sonar market.

Background

Sonar is not a new naval technology. British active sonar systems (ASDIC) were tested in the late stages of WWI. By WWII sonar had developed sufficiently to play a key role in

several navies' ASW operations in both the European and Pacific theatres. As a result of its demonstrated wartime effectiveness, sonar became standard fits in naval surface forces. With the growth of the Soviet submarine force in the 1960s and 70s, ASW became a focus of effort in NATO campaign plans. The result was a significant investment in a variety of ASW sonar systems during the Cold War. Sonar expanded beyond surface ships to subsurface (mobile and fixed) and aerial platforms. Surface ship sonar expanded from the traditional bow and hull mounts to systems that trailed behind and/or below often noisy deploying platform. This configuration allowed operators to place active sound generators and passive receivers to more effective locations below thermoclines (acoustic barriers) and thereby extend submarine detection ranges. These towed arrays and variable depth sonars, together with hull-mounted sonar, are the main elements comprising naval surface ship sonar fits today.

Technology Trends

Improvements in technology in the quarter century since the Cold War ended have advanced the state of the art far beyond Cold War-era systems. The US Navy's SQS-23 hull-mounted ASW sonar, first deployed in 1958 and widely used up through the 1990s, weighed some 30 tons with a transducer then 20 feet in diameter. Improved materials have cut the weight of today's sonar arrays, including the transducer "domes," hydrophones and sound receivers as well as data transmission and load-bearing cabling. More efficient designs have also reduced the power demands placed on the host platform operating (and deploying in the case of variable depth and towed arrays) the sonar system. These improvements have expanded the numbers of platforms that can mount and operate ASW sonar to smaller ships (corvettes and patrol craft) and even unmanned surface vehicles.

That said, weight and power demands continue to constrain naval surface ship sonar. Even modern systems such as the Thales UMS-4110 bow-mounted sonar designed for medium and large combatants weighs some 10 tons and company information states the system's height and diameter is 2.2 metres and 2 metres respectively.

Photo: Thales



Thales UMS-4110 bow-mounted sonar has been selected for the new FREMM Class frigates of the French and Italian navies.

Improvements in the information processing and related technologies have also advanced surface ship sonars significantly over the same period. A survey of current naval sonar offerings from industry leaders such as Lockheed Martin, Raytheon, ATLAS ELEKTRONIK, Ultra Electronics and Kongsberg and others describe sonar sets as elements (modules) in a broader capability offering usually centred on sonar data processing and command and control systems. An example of this design approach is the ATLAS Modular ASW Combat System (AMACS) in which the bow-mounted sonar (ASO), Towed Array (TAS) and Variable Depth Sonar (ACTAS) can be integrated separately or together.

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Environmental Changes: Sonar Performance in Warmer Waters

Cold War ASW focused generally on colder waters of the northern European littoral

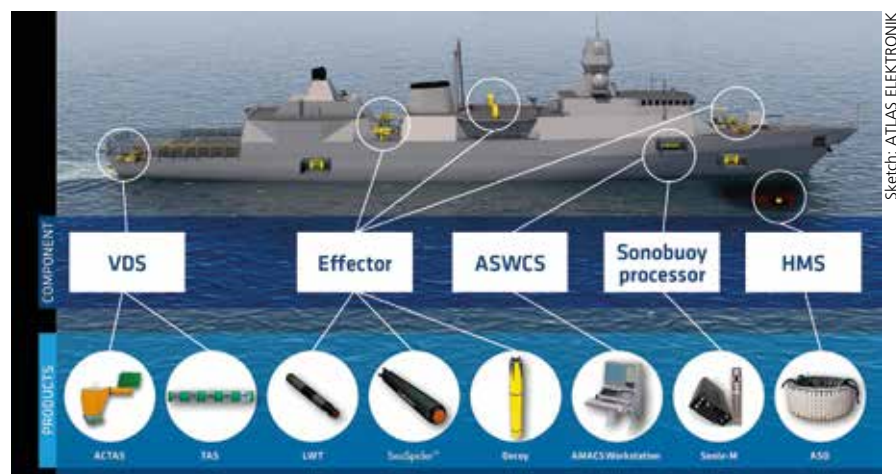
over the past decade**, this “multistatic” approach to ASW, a network of sonar-capable platforms that present multiple active and passive sources in the same operational space, places an even greater premium on sonar system flexibility, effective informa-

Asia-Pacific region and NATO nations. With submarine acquisitions accelerating in the Asia-Pacific and the continuing advances in Russian submarine capabilities, ASW surface ship acquisitions are keeping pace in both areas. The table below also highlights how surface ship ASW sonars remain concentrated on frigates and destroyers, which remain the “go-to” ships for surface ASW.

Current Surface Combatant Sonar Systems

AN/SQQ-89V (Lockheed Martin) is the primary ASW system equipping OLIVER HAZARD PERRY (FFG 7) Class frigates (foreign navies), ARLEIGH BURKE (DDG 51) Class destroyers, and TICONDEROGA (CG 47) Class cruisers. The V15 version of the system is designed as open architecture with regular software (bi-annual) and hardware upgrades (every 4 years). The system consists of active and passive sonar (AN/SQS-53) and towed arrays (AN/SQR-19 TACTAS, AN/SQR-20 (TB-37U) Multifunction Towed Array – MFTA). The SQR-20 is succeeding the SQR-19 TACTAS, providing improvements in coverage, detection capability, and reliability over the “19” first introduced in the early 1980s.

AN/SQQ-90 (Raytheon), equipping the ZUMWALT Class DDG-1000, includes the AN/SQS-60 hull-mounted mid-frequency sonar, the AN/SQS-61 hull-mounted high-



and Arctic regions, although Soviet Navy deployments in the warmer climates of the Mediterranean and Indian Oceans complicated sonar performance.

With the end of the Cold War, and the proliferation of submarines to navies operating in warmer waters such as the South China Sea and Persian Gulf, sonar systems performance is affected. Temperature is the major variable affecting the movement of sound in water. As detailed in our earlier article on the future submarine market, more nations are acquiring submarines. Those submarines are harder to detect, using relatively quiet diesel-electric and even quieter air-independent propulsion systems. Operating in areas where ocean temperatures have warmed measurably in the past 15 years* makes those platforms even harder to find. The result is an operating environment in which ship-mounted ASW sonars are increasingly challenged to meet ASW detection, classification, and target tracking requirements. Countering quieter submarines in warmer waters will drive ASW practitioners to employ an even wider array of sonar transmitters and receivers operating simultaneously. As US and NATO organisations have noted

tion management, and superior command and control systems.

Current Platforms and Systems

An analysis of major naval sonar systems equipping most of the world's leading navies (excepting Russia and China) shows that the systems are concentrated in the

Region	Country	Total (Hulls)	Frigate	Destroyer	Cruiser	Corvette	OPV	Amphib
Asia-Pacific (38%)	Japan	47	6	38	1			2
	Taiwan	24	20	4				
	India	23	15	8				
	South Korea	13	4	9				
	Australia	10	10					
	Indonesia	6	6					
	Thailand	2	2					
	New Zealand	2	2					
NATO (30%)	Pakistan	1	1					
	Italy	14	12	2				
	Canada	13	12	1				
	UK	13	13					
	Spain	10	10					
	Turkey	10	8			2		
	Denmark	9	5				4	
	France	7		7				
	Greece	6	6					
	Norway	5	5					
	Germany	4	4					
	Poland	3	2			1		
	Belgium	2	2					
	Netherlands	2	2					
	Portugal	2	2					
US (25%)	US	85		63	22			
Rest of World (7%)	(Latin America and MENA)	26	22			4		
Totals		339	171	132	23	7	4	2

frequency sonar, and the AN/SQR-20 multi-function towed array sonar and handling system.

CAPTAS (Thales) is the Low Frequency Active VDS equipping NATO countries and other navies. At least forty systems have already been ordered:

- 2 installation variants for CAPTAS 4:
 - 3 UK frigate
 - FREMM frigate (France, Italy)
- Royal Malaysian Navy (CAPTAS-2 on SGPV LCS)
- Royal Moroccan Navy (CAPTAS-4 on FREMM)
- Royal Norwegian Navy (CAPTAS-2 on NNF)
- Royal Saudi Navy (CAPTAS-2 on F4000)
- UANavy (CAPTAS-2 on ABUDHABI Class)

Modular ASW Combat System (AMACS – ATLAS ELEKTRONIK) consists of a sonar suite with hull-mounted sonar (ASO713/723), variable depth sonars (ACT-AS), diver detection sonar (CERBERUS) and sonobuoy processing (SONIX) systems and the unifying sensor and weapon management system. More than 100 of the ASO 713/723 active and passive hull-mounted sonars have been sold over the past 30 years.

Future Procurements

AMI's naval market forecast for the period 2017-2037 identifies almost 2000 new sonar procurements globally. As the tables below highlight, almost 500 new frigates and destroyers are projected to enter service with the world's navies over the same period. As noted above, most of the world's

Future Naval Platform Procurements		
2017-2037	Procurements	%
Corvette	117	10%
OPV	313	26%
Frigate	311	26%
Destroyer	133	11%
Submarine	315	26%
Total	1189	

Future Naval Sonar Procurements		
2017-2037		
Sonar Type	Procurements	%
Hull-Mounted	1124	61%
Towed Array	217	12%
Variable Depth	504	27%
Total	1845	

navies operate ASW sonars primarily on frigates and destroyers. This means that frigates and destroyers will continue to see multiple sonar installations (hull, variable depth and towed array) on the same hull.

The hull-mounted sonar remains the centre-piece of future surface ship sonars, making up over 60% of all projected new system procurements forecasted for the next two decades. Variable depth sonars, usually smaller and lighter than towed array systems, are therefore able to be fitted on a wider array of ships. This help explains why

almost 30 percent of future sonar procurements are VDS. Towed arrays, being heavier and typically found on larger surface combatants, make up a little more than 10% of the future surface ship sonar market.

Recent Sonar Awards of Note

In 2017, several key surface ship sonar contracts were awarded, in the US, Europe, and other regions. Of note, the decision on the VDS for the LCS class would appear to mark the end of a long



Lockheed Martin's AN/SQQ-89V is the primary ASW system for the US Navy's surface combatants. Shown here are the consoles on board the ARLEIGH BURKE Class destroyer DDG 92 (USS MOMSEN).



Photo: Raytheon

The Variable Depth Sonar (VDS) from Raytheon is part of the LCS ASW Mission Package selected for both the FREEDOM and INDEPENDENCE Class vessels.

competition to equip the programme's ASW Mission Package. Thales' CAPTAS series continues to show strength in the world market, despite not being selected for LCS. Finally, an award to ATLAS ELEKTRONIK for a USV-based ASW sonar system highlights the next step in the technological development of ASW sonar options beyond the traditional surface combatant host platform.

May 2017: The U.S. Navy awarded Raytheon a \$27.9 million contract to provide a new variable depth sonar solution for the Littoral Combat Ship. The VDS is part of the LCS ASW Mission Package and the same system will be installed on both the FREEDOM variant (LCS-1) built by Lockheed Martin/Fincantieri Marinette Marine and the INDEPENDENCE variant (LCS-2) built by Austal USA. The contract followed full scale demonstrations of the Raytheon

systems and competing LCS ASW variable depth sonar solutions, notably the Advanced Acoustic Concepts (DRS/Thales) entry based on the Thales CAPTAS-4 VDS. The contract includes options for production which, if exercised, would bring the total contract value to more than US\$300M.

April 2017: The French government awarded DCNS (now Naval Group) a contract to construct the FTI, which includes the Compact CAPTAS-4 sonar. The first frigate is scheduled for delivery in 2023 and would enter service in 2025. At Euronaval in October 2016 Thales introduced a new Compact CAPTAS-4 aimed at the LCS and the French Navy's new Frégate de Taille Intermédiaire (FTI) programme. Thales states the Compact version reduces weight by 20 percent and shipboard space required by 50 percent.

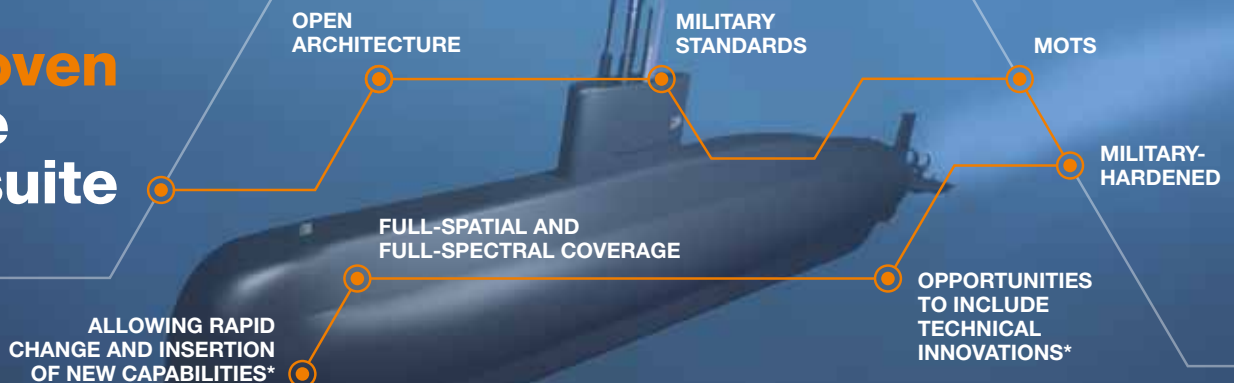
February 2017: At IDEX 2017 in Abu Dhabi ATLAS ELEKTRONIK UK (AEUK) announced (another) major export contract award for its ARCIMS Mission System, likely to a customer among the GCC countries. This variant of the ATLAS ARCIMS, originally designed for MiW, is modified to perform ASW surveillance against submarines, mini-submarines and diver delivery vehicles. This is one of the first operational ASW sonar systems that deploys the sensor from an unmanned surface vehicle rather than a surface combatant. As such the system is optimised to operate from shore facilities or fixed locations afloat. The system uses the ATLAS family of variable depth active and passive sonars. ■

Footnotes

* https://www.eurekalert.org/pub_releases/2016-05/aso-a-tfo051316.php

** See the NATO Research Center Paper "Multistatic sonar: a road to a maritime network enabled capability" published in 2007 and available at www.cmre.nato.int

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Rocket Propulsion for Guided Missiles

Doug Richardson

With the exception of short-range guided projectiles fired from guns or mortars, most guided missiles rely on rocket power either throughout their powered phase or as a method of bringing them up to the operating speed of an air-breathing sustainer motor.

There are two main types of rocket propulsion system, based on solid and liquid propellants respectively. While liquid-based systems offer higher levels of performance for a given mass of propellant, solid-propellant solutions are closing this performance gap, and being of relatively simple configuration, they tend to be more reliable than their liquid-propellant counterparts.

Solid Propellants

Solid propellant rocket motors consist of a casing, a mass of propellant (known as a grain) and one or more nozzles from which the thrust-producing gas created when the grain is ignited can escape. In many types of tactical missile the main part of the motor

There are two main types of solid propellant. The older form is known as double-base propellant and consists of a homogeneous mixture of two explosive compounds – usually nitroglycerin and nitrocellulose. Most modern motors use a composite propellant consisting of a powdered metal that acts as fuel, a crystalline oxidiser, and a polymer binder.

Motor cases are made either from high-strength metals such as steel, aluminium, or titanium alloys, or from wound-filament reinforced plastics, but in some cases externally wound filaments are applied to a metal case in order to provide extra strength. Grains can either be manufactured separately (either by extrusion or by casting) then inserted into the case, or are cast directly into the case. The former technique is suit-



The second stage of Raytheon's proposed Network-Centric Airborne Defense Element (NCADe) air-launched anti-missile system contained two tanks for the hydroxylammonium nitrate (HAN) liquid monopropellant used by the four-nozzle axial thruster and by four divert thrusters positioned at 90° intervals around the mid-point of the fuselage.

(that which contains the grain) is located close to the missile's centre of gravity, and a blast tube connects to a nozzle at the missile's aft end.

Author

Following an earlier career in engineering, **Doug Richardson** is a defence journalist specialising in topics such as aircraft, missiles, and military electronics.

able for small to medium-sized motors, but the latter solution is used for many tactical missile motors and for large ballistic missiles. Since any accidental ignition or explosion of a rocket motor would be a hazard to hardware and personnel, modern solid-propellant motors are expected to meet insensitive munitions requirements. These will require that the motor remains safe when exposed to fast or slow cook-off conditions, the detonation of nearby munitions, and impacts by bullets or fragments from exploding enemy artillery projectiles.

Photo: Missile Defense Agency



Israel's STUNNER hit-to-kill missile is reported to use a three-pulse rocket motor. The first two motor pulses are used in mid-course flight, while the third is used in the late stages of flight to maximise the missile's impact velocity.

For insurgent and terrorist organisations seeking to make artillery rockets, these established propellant technologies are impractical to manufacture, so improvised solid-propellant technology based on that used by amateur rocket enthusiasts tends to be used. The Qassam rockets that Hamas have fired into Israel use a propellant made from powdered sugar and potassium nitrate fertiliser, and casings made from water pipes, but these solutions restrict the rocket's range to a maximum of around 15 km.

Hamas' use of a 75-km-range rocket variously referred to as the "M75" or "M-75" should not be taken as evidence that the organisation has mastered the manufacture of double-base or composite propellants in its Gaza workshops. A video released by Hamas in 2014 to illustrate manufacturing

Photo: Doug Richardson

of the M-75 showed rockets being painted and fitted with warheads and fuzes. The relatively simple nature of the tail fins raises the possibility that these may be the only parts of local manufacture, and that the rocket motors, warheads and fuzes may all be imported.

The geometrical configuration of the grain determines the thrust characteristics of a solid-propellant motor. By shaping the grain and its burning surfaces, the thrust can be made near-constant over the length of the burning period or tailored to increase or decrease with time. For many missile applications, a high thrust is used to apply initial acceleration, but this can then decrease either to limit the maximum acceleration of the missile or to maintain missile velocity for as long as possible.

A more sophisticated method of tailoring motor performance to missile mission involves the creation of a multi-pulse motor. This requires that two or even three separate grains be contained inside a single casing. Each has its own igniter and is separated from the other(s) by some form of structural bulkhead or insulation layer. Each grain can be designed to have its own thrust level and burn time, being initiated by its igniter at a time that will allow optimal energy management of the missile's flight. This can be used to maximise the velocity of the missile during the end-game when engaging a manoeuvring target. Development of the SIDEWINDER Mission Optimised Kinematic Enhancement (SMOKE) was begun with the intention of improving the kinematic performance and lethality of the missile by developing and integrating a two-pulse end burning rocket motor able to extend the no-escape range and decrease the time of flight to target. Initiation of both rocket motor pulses would be handled by a new multi-function Integrated Energetic Safety Device (IESD) that would also act as the safe-arm-device for the missile's improved warhead.

One example of a missile powered by a three-pulse motor is the Rafael/Raytheon STUNNER used by Israel's DAVID'S SLING anti-missile system. The first pulse launches the missile, the second is used during mid-course flight, and the third is initiated prior to interception of the target.

The use of a pintle in the nozzle throat could allow the internal pressure within a solid-propellant motor – and thus the thrust – to be varied, or could even be used to drop the pressure below the minimum needed to sustain combustion in order to shut off the motor while some propellant remains unburned. If adopted for an operational weapon, throttling could allow trajectory shaping, a faster flight and longer range.

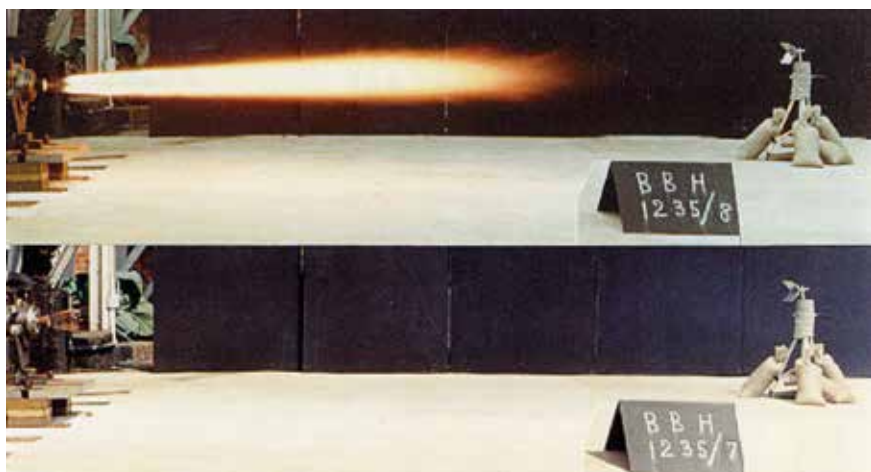


Photo: Roxel UK

While a conventional solid-propellant rocket motor has a highly-visible efflux, two test firings conducted by Roxel UK show that that from a reduced-signature motor can be near-invisible.



Photo: US Air Force

Technicians at Arnold Air Force Base's J-6 Large Rocket Motor Test Facility check a solid-propellant rocket motor for the MINUTEMAN III intercontinental ballistic missile prior to conducting a ground test firing. Conducting this sort of trial with rocket motors drawn from the inventory allows engineers to assess the remaining service life of the in-service motors.

Some applications require the use of thrust vectoring. This can be done either by a movable nozzle, or by using tabs or vanes that dip into the motor efflux and deflect part of the flow. The first technique is the most efficient but is also complex, while the second is simpler to engineer in a small tactical missile but reduces thrust and motor performance.

If the combustion process creates visible levels of smoke, this could be spotted by the enemy as evidence that an attack is under way. It could also betray the location from which the missile was launched. Smoke can also prevent a missile operator or launcher-based guidance system from tracking the missile. The efflux from a solid-propellant rocket

consists of hot gases and in many cases also contains entrained small particles. It emits high levels of radiation energy in the infrared regions of the spectrum and, to a lesser degree, in the ultraviolet and visible regions.

Many modern missiles use low-smoke motors, and designers are working to reduce the visibility of the efflux plume, particularly in regions of the spectrum used by missile-approach warners.

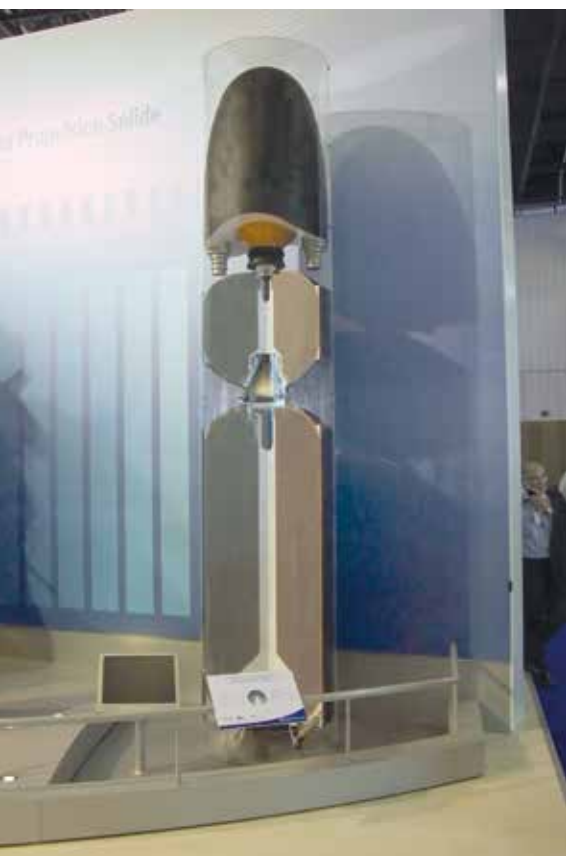
Remotoring

The useful shelf or storage life of a rocket motor is hard to predict, since it will depend on factors such as the thermal and other storage conditions. A programme of regu-

Photos: Doug Richardson



The complexity of liquid-propellant rocket engines is such that their use is largely confined to ballistic missiles and satellite-launch vehicles



Like tactical missiles, modern strategic missiles developed by the nations with nuclear capability are all based on solid-propellant motors. This cutaway model by Snecma Propulsion Solide shows the location of the solid-propellant rocket motors of the M51 submarine-launched ballistic missile.

lar test firings can be used to determine the point in time at which the motor is not safe to use and faces a high probability of failure. The long service life of some missile systems has required that these be remotored.

In 2000, the proposed closure of the plant that manufactured sustainer motors for the Aerospatiale (now MBDA) MM38 EXOCET led to nine export users ordering replacement motors. By 2009 the motors of Brazil's EXOCETs had become life-expired, but MBDA signed an agreement with two Brazilian companies to upgrade these missiles. This programme included installing new booster and sustainer motors of Brazilian manufacture.

The RIM-66E Standard (SM-1MR Block VI) surface-to-air missile is no longer in service with the US Navy, but some export users plan to keep the system in service until 2020. On 13 May 2005, Raytheon won a contract to provide extended support for the SM-1MR systems operated by Bahrain, Egypt, France, Italy, Japan, Netherlands, Poland, Spain, Taiwan, and Turkey. This work would include a regaining of the missile's MK 56 rocket motor.

Similar remotoring programmes have been created for Russian missiles. For example, the Serbian company EDePro offers an RM-R60 motor and GG-R60 gas generator that can be used to refurbish the Soviet-era R60 (AA-8 'APHID') air-to-air missile, and a replacement motor for the S-125 NEVA/PECHORA (SA-3 'GOA') surface-to-air missile system.

Liquid Propellants

Although widely used by first and second-generation strategic and tactical ballistic missiles, including the Soviet-era 'SCUD' and its derivatives, liquid propellant powerplants are now less common. Normally these are of the bipropellant type, in which two separate liquid propellants (an oxidiser and a fuel) are stored separately in tanks within the missile and fed into one or more thrust chambers. As its name suggests, there is a little-used

Photo: Defence Research and Development Organisation



India's PRITHVI II ballistic missile is powered by two side-by-side gimbaled liquid-propellant motors that are based on the 720 rocket motor used in the Russian S-75 (SA-2 'GUIDELINE') surface-to-air missile.

technology called monopropellant, in which a single liquid such as hydrazine or hydrogen peroxide can be made to generate hot gas in a combustion chamber, but this tends to be used only in specialised applications such as spacecraft thrusters.

The simplest method of delivering liquid propellants to the thrust chamber(s) is to use high-pressure gas to force the propellants out of the tanks. However, the pressure in the tanks needs to be higher than that within the thrust chamber(s), so the tanks need to have walls thick enough to withstand pressures of anything between 15 to 125 kg/sq cm.

A better solution is to use a turbopump to feed the thrust chamber(s). With this scheme, the propellant tanks need only to be pressurised to less than 2 kg/sq cm, so can be of much lighter construction. The turbopump is usually driven by a turbine fed by hot gas created by burning a fuel-rich combination of the propellants. The efflux from the turbine can either be discharged overboard or fed into the thrust chamber(s).

The use of liquid propellants is largely confined to long-range ballistic missiles. Early ICBMs and IRBMs used a cryogenic propellant in the form of liquid oxygen. This must be stored at a temperature of less than -183 °C. (For space-vehicle applications it is sometimes teamed with liquid hydrogen, which boils at -253 °C.) Propellants were not loaded into the missile until a launch was imminent, a process that had to begin at least 15 minutes prior to launch.

For military use, cryogenic propellants rapidly gave way to propellants that are liquid at ambient temperature, so are easier to store. If the missile is based in a silo, these propellants can be stored for long periods in the missile's tanks. But for many transportable systems, propellants have to be loaded once the missile and launcher had reached the planned launch site. In the case of the Russian R-17 (SS-1 'SCUD') and its many derivatives, the pre-launch preparations took about an hour.

One problem with storable liquid propellants is that most are highly toxic, so require extensive precautions by personnel tasked with handling. Many useable combinations are hypergolic (self-igniting), so even a minor leak of both propellants can have disastrous consequences. This was demonstrated on 18 September 1980 when a dropped tool caused a propellant leak from a US Air Force TITAN II ICBM. The resulting destructive explosion killed a technician and destroyed the missile and its launch complex.

Another potential problem is that some storable liquid propellants may have a limited temperature tolerance, so would be impractical for a mobile missile system that must be deployed off-base. The combination of unsymmetrical dimethyl hydrazine and inhibited red fuming nitric used in the 'SCUD' and its derivatives have boiling points of 63 and 85 °C, respectively, but the more effective nitrogen tetroxide oxidiser used in missiles such as the Russian R-36M (SS-18 'SATAN') ICBM and R-29R (SS-N-18 'STINGRAY') SLBM boils at only 21 °C, so is not suitable for outdoor use in most regions of the world.

Although the US phased out the TITAN II (its last liquid-propellant ICBM) by 1987, China and Russia still maintain a number of liquid-

propellant ballistic missiles. Iran, Pakistan, and North Korea all saw this type of propulsion as the prime candidate to power their early ballistic missiles, but have focussed more recent development efforts onto solid-propellant designs. The only major liquid-propellant ballistic missile currently under development seems to be the Russian RS-28 SARMAT (SS-X-30 'SATAN 2') heavy ICBM, which is being designed by the Makeyev Rocket Design Bureau as a replacement for the ageing R-36M (SS-18 'SATAN').

Two other forms of rocket propulsion exist, but neither has seen significant use as a missile powerplant. In a hybrid rocket,

one of the two propellants is liquid, while the other is solid. This allows the motor to be throttled or even started and stopped as necessary. In the other scheme, one or even both propellants are stored as a thixotropic material that can be made to flow, but that is less likely than conventional liquid propellants to rapidly spill or leak.

For some demanding current and future missile missions, air-breathing powerplants such as the ducted rocket, the ramjet, and even the scramjet may be required. But even in such instances, rocket propulsion will still play its part in boosting these exotic powerplants to speeds at which they can begin to function. ■

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Armour Evolution in Poland

David Saw

One advantage that Poland has in seeking to meet its defence modernisation needs is the possession of a capable defence industrial base. This is particularly true in the context of the design, development and manufacture of armoured vehicles. Polish industry will play a key role as the Polish Army looks to upgrade existing systems and introduce new armoured vehicles to meet evolving operational requirements.

The growth of the automotive sector in Poland also plays a role in bringing new skills and technologies into play that can also be exploited by the defence sector. Since Poland joined the European Union (EU) in 2004, the automotive sector, including vehicle and parts manufacture, has grown at a tremendous rate. Today the sector employs 175,000 people and accounts for 8% of the Polish Gross Domestic Product (GDP). Foreign automotive countries present in Poland include Fiat, General Motors, Iveco, Volkswagen and Volvo amongst others.

part of ZM Bumar Zabedy, which is in turn part of Polska Grupa Zbrojeniowa (PGZ), the Polish Armament Group. Initially Gliwice built the T-34/85 under license, manufacturing 1,380 tanks up to 1954. Then manufacture of the T-54 commenced with 3,000 built to 1964, at which point production of the T-55 started, continuing until the end of the 1970s. It is believed that Gliwice produced between 8,000 and 10,000 T-54/T-55 tanks for Poland and for export. Between 1986 and 1989 Bumar upgraded 630 Polish tanks to the T-55AM MERIDA configuration, this features the locally de-

at Gliwice in 1982, with the T-72M1 starting production in 1983. In total some 1,610 T-72 were manufactured, with the majority (900) being exported. By the mid-1980s interest was developing in upgrading the T-72 along the lines of the T-55AM MERIDA programme. At the same time the Polish Army was also looking to acquire a new tank and had discussed the acquisition of an export model of either the T-72B or the T-80 with the Soviet Union. However, the end of the Soviet era and the foundation of the Polish Third Republic in 1989 halted progress on a foreign tank acquisition and on a basic T-72 upgrade.

First Steps

Poland was now independent and the Polish Army could act in its own interests rather than be told what to do by external actors. In the context of the tank fleet they knew that the T-72M/M1 had significant deficiencies in all three of the primary tank design criteria: mobility, protection and firepower. As far as mobility was concerned they felt the tank was underpowered, protection levels were unsatisfactory and the installation of an ERA package was necessary and regarding firepower, the installation of a new FCS with a serious day/night capability and ballistic computer was essential.

In mid-1991 work started on a tank, based on the T-72 produced at Gliwice, that would correct the problems experienced with the T-72 with the integration of Polish designed systems to create a new tank that would be classified as the PT-91 TVARDY. The PZL Wola S-12U engine, a 840 hp version of the Soviet V46-6 engine used in the T-72, was installed to solve the mobility issues. Protection was resolved with the installation of the Polish ERAWA ERA system, while firepower was enhanced with the installation of the indigenous DRAWA FCS. Between 1995 and 2002 a total of 233 PT-91 tanks were built at Gliwice, one tank was retained for display in a museum, while 232 tanks were delivered to the Polish Army. Of these tanks, 97 were new pro-



Photo: US Marine Corps

A Polish Army PT-91 TVARDY tank leads a US Marine Corps M1A1 ABRAMS tank during Exercise SABER STRIKE 17 at the Adazi Training Grounds, Latvia. The PT-91 is a Polish-designed evolution of the T-72 and consideration is now being given to upgrading the PT-91 fleet.

Poland had a tank and light armour manufacturing capability prior to 1939, but it was in 1951 that the modern Polish armoured vehicle industrial capability was born with the establishment of a tank manufacturing plant at Gliwice. The Gliwice facility is

signed MERIDA FCS, improved armour, uprated engine, laser warner and smoke dischargers.

The last Soviet tank to be manufactured in Poland was the T-72, production of the T-72M (export version of the T-72A) started



Photo: Polish Ministry of Defence

Between 2013 and 2014 Poland received 105 LEOPARD 2A5 and 14 LEOPARD 2A4 tanks from Germany. Prior to that, in 2002 and 2003, Poland received 128 LEOPARD 2A4 tanks from Germany, these are now going to be upgraded to the new LEOPARD 2PL configuration with work to be completed by 2020.

duction PT-91, while 135 were PT-91MA, an upgraded variant of the T-72M/M1. Plans to further develop the PT-91 made little progress primarily due to the opportunity to acquire state of the art tanks and other vehicles from German Army surplus stocks. This led to the acquisition of 128 LEOPARD 2A4 tanks, other armour including BERGEPANZER 2 ARVs, M113 command and ambulance vehicles, plus supporting B-vehicles. All of this equipment was delivered between 2002 and 2003, allowing the Polish Army to raise and equip a new Armoured Brigade.

The next significant armour acquisition again saw Poland turn to German Army surplus with the intention of acquiring an equipment package that would allow them to raise another new Armoured Brigade. Between 2013 and 2014, Germany supplied Poland with 105 LEOPARD 2A5, 14 LEOPARD 2A4, 18 BERGEPANZER 2 and a quantity of B-vehicles. Separately Poland acquired two LEOPARD 2NJ driver training tanks.

The latest stage in the evolution of the Polish LEOPARD 2 tank fleet is the LEOPARD 2PL upgrade programme awarded to PGZ and Bumar Labedy, with Rheinmetall acting as the strategic partner. In total 128 LEOPARD 2A4 tanks are to be upgraded to the new standard, currently the programme is in the prototype phase, next year Rheinmetall will upgrade six tanks in Germany, with all of the remaining tanks

being upgraded in Poland, with deliveries complete by 2020. After that, the 14 LEOPARD 2A4 delivered in the second batch of vehicles from Germany will be upgraded. Weight was a significant issue in the LEOPARD 2A4 upgrade, with the Polish Army setting an upper weight limit for the tank of 60 tonnes. Exceeding this limit would have required suspension modifications to the

tank and that was an undesirable outcome in the scope of the upgrade programme. According to the Canadian Forces the empty weight of the Leopard 2A4 is 55,150 kg, while their standard combat load is given as 57,200 kg, all of which gives an idea of the weight constraints in the Leopard 2PL upgrade.

The primary upgrade elements are the installation of IBD Deisenroth modular armour on the turret, commander's sight upgraded to PERI R17A3L4, integration of Polish KLV-1 ASTERIA thermal camera and new electric drives for the gun and turret replacing previous hydraulic systems. The L/44 gun will now be able to support the DM63A1 APFSDS nature and the programmable DM11 nature. Also fitted is a new Deugra fire and explosion suppression system. To cope with increased electrical demands a Steyr 17 kW APU has also been installed.

Next Steps

The Polish Army had been working on a concept to initially replace the T-72 and then the PT-91 fleets, at first the objective was to develop a successor vehicle with a weight of under 40 tonnes. However, it soon became apparent that improvements in threat tanks such as the new T-14 ARMATA and upgrade and modernisation programmes for the T-90 and T-72B tanks made the plan to opt for a lighter combat solution unfeasible. The new plan is to opt for a two-stage solution, the first is to upgrade existing assets and the second, and



Photo: Polish Ministry of Defence

In 2002 Poland selected the PATRIA AMV as the basis for its future wheeled Light Armoured Vehicle (LAV) programme. Known as the ROSOMAK in Poland, current orders amount to 997 vehicles with all to be delivered by 2019. The IFV version shown here mounts a 30 mm Mk44 BUSHMASTER II cannon in an OTO Melara HITFIST turret.

more long-term solution, is to look towards the acquisition of a new main battle tank. The upgrade solution will focus on the PT-91 fleet and on the T-72 fleet, with the Bumar Labedy PT-16 proposal providing the starting point for an upgrade programme. PT-16 looked to significantly enhance protection, firepower and mobility. It sees the addition of a modular armour package, modified turret with a new 120 mm NATO compatible gun, new autoloader located in the turret bustle, new fire control system and a higher power engine. The engine could be acquired from Germany or Serbia, because manufacture of tank engines in Poland has ceased some years ago.

solution will be to join an international programme. With Poland requiring in excess of 200 tanks as a minimum it would make an attractive partner, the question is would it look to join the European effort developing between France and Germany, or look outside Europe to meet its needs?

ROSOMAK

The Polish Army developed a requirement for a wheeled Light Armoured Vehicle (LAV) to replace the locally designed OT-64 SKOT APC and some of the BWP-1 IFV fleet. After evaluating the Mowag PIRANA, the Steyr PANDUR (both companies are

ROSOMAK WRT reconnaissance vehicle, ROSOMAK WSRiD reconnaissance and command vehicle and the ROSOMAK NJ driver training vehicle.

The latest variant of the ROSOMAK mounts the 120 mm RAK mortar system developed by Huta Stalowa Wola (HSW), part of PGZ. The system is a turret mounted breech-loading 120 mm mortar with an automatic loading system, maximum range of the mortar is given as 10 km. In April 2016 Poland ordered 64 RAK mortar vehicles and 32 artillery command variants of the ROSOMAK. At the end of June 2017 the 17th Mechanised Brigade was the first unit to receive the RAK system with the delivery of



Photo: U.S. Navy

A Polish Army BWP-1 (BMP-1) taking part in the NATO BALTOPS 2016 amphibious landing exercise in Ustka, Poland in June 2016. The Polish Army operates some 800 BWP-1 IFVs and is now looking to replace them with a new Polish designed and manufactured IFV.

Once they have settled on an upgrade specification they can then upgrade the 232-strong PT-91 fleet and make a decision of the number of T-72 that they wish to upgrade, currently there are nearly 500 T-72 in Poland though the majority are in store. In parallel with the PT-91/T-72 upgrade effort there is also interest in acquiring more surplus LEOPARD 2 tanks. These days acquiring a significant number of LEOPARD 2 is not just a matter of rapidly striking a deal for German surplus vehicles, securing a large number of tanks is not as easy as it was even a few years ago. Most likely Poland will look to acquire a brigade-set of equipment indicating a requirement for around 120 tanks.

The second part of the Polish Army armour strategy is the eventual acquisition of a new tank, with this tank initially replacing the T-72 and then the PT-91. Indigenous development of a main battle tank in Poland to meet Polish Army needs is considered to be unlikely, indicating that the chosen

now part of GDELS) and the Patria AMV, in 2002 Poland opted for the AMV. The AMV was modified to meet Polish needs, with the resulting vehicle being known as the ROSOMAK, with it being manufactured in Poland by WZM, (later renamed ROSOMAK S.A.), part of PGZ. The initial contract covered the delivery of 690 vehicles, with a second tranche of 307 vehicles ordered in 2013, with deliveries taking place through to 2019.

The ROSOMAK is a complete family of vehicles, the IFV variant mounts an OTO Melara HITFIST turret with an Orbital ATK Mk44 30 mm BUSHMASTER II cannon. The vehicle was operated by Polish forces in Afghanistan and received various upgrades leading to the M1 and M1M versions of the IFV. The ROSOMAK APC variant, is available in two versions M2 and M3, while the ROSOMAK S is an APC variant that carries two anti-tank teams equipped with Rafael SPIKE missiles. Other variants include the ROSOMAK WEM armoured ambulance,

eight mortar and four command vehicles. The RAK mortar system is also due to be installed on the future Polish IFV. The objective of the indigenous IFV programme is to replace the fleet of some 800 BWP-1 (Polish designator for the BMP-1) vehicles in Polish service. Considering the number of IFVs that Poland will need, an indigenous programme would have the "critical mass" to be successful. As other regional states, such as the Czech Republic, also have BMP-1 replacement efforts in progress, possibilities might exist for a collaborative programme. Poland now has an extremely active armoured vehicle sector and its technology base in terms of the design, development and manufacture of armoured vehicles, sub-systems and components is of a high standard and well established. Programmes related to tanks and tank upgrade, as well as the future IFV programme create the basis to sustain domestic industry in the armoured vehicle sector for the long-haul. ■

Enabling Factor

New Counter-Air Defence Capability Emerges

Stefan Nitschke

The European NATO members Germany and Italy are striving to build a more potent counter-air defence capability with the objective to enable existing and future platforms to engage hostile surface-to-air missile systems more effectively.

Air power faces completely new forms of surface threats which will certainly influence doctrine in the years or even decades to come. Increasingly, modern threats include ground-based Integrated Air Defence Systems (IADS) that are typified by a highly modular design and open system architecture, allowing the introduction of

Orbital ATK has demonstrated how its Advanced Anti-Radiation Guided Missile (AARGM) will be capable of engaging traditional and advanced land- and sea-based air defence systems, as well as non-radar time-sensitive strike targets. AARGM has been in full rate production since 2012. A US Navy and Italian Air Force acquisition

The company claims that the key drivers improving AARGM over HARM evolved from observations in Kosovo, then Iraq, and possibly Libya. During these conflicts, in particular, surface-to-air radar tactics and capabilities shifted in such a way as to diminish HARM's tactical capability to hit radars. The Air Force Assessment, Coordi-



Photos: Orbital ATK

AARGM is currently deployed on US Navy FA-18C/D HORNET (left) and is being integrated on EA-18G GROWLER (right), and FA-18 E/F SUPER HORNET aircraft. The Italian Air Force continues integration on its TORNADO ECR fleet.

advanced multifunction radar technology, battle management systems, and the latest interceptor missiles. This is why SEAD/DEAD (Suppression/Destruction of Enemy Air Defences) is a strategic necessity. Besides reconnaissance, stand-off jammers, and Electronic Warfare (EW) means, Anti-Radiation Homing (ARH) missiles will continue to form an integral part of modern air forces' strategic capability to counter this threat.

Author

Stefan Nitschke, Ph.D., is Editor Special Assignments, European Security & Defence

programme, it includes the production of operational missiles for the US Navy and the Italian Government, as well as training missiles for the Navy and related supplies and services necessary for manufacturing, sparing, and fleet deployment.

The US Navy has maintained a requirement to reduce or neutralise surface-to-air radar systems for over 50 years. This has transformed from the AGM-78 Standard Missile, the AGM-45 SHRIKE Missile, the AGM-88 High Speed Anti-Radiation Missile (HARM), and now the AGM-88E AARGM. "All were developed to meet and negate the threats during their designed period of performance," Orbital ATK told ESD early July. "As threats evolve, so do the needs for the counter systems."

nation and Engagement Branch at the Joint Air Power Competence Centre (JAPCC) contends that the robustness of modern IADS goes even further. They can operate in a standalone mode or joint targeting mode using network centric-like tactics, while gaining the Air Situational Picture (ASP) from existing, distributed sensors. "Systems of this kind can be integrated with airborne platforms for centralised C2 [command and control], making it difficult to engage them," JAPCC says.

In this instance, AARGM's improved capabilities can overcome these uncertainties. The US Navy officials believe the new technology can help fighter pilots maximise effectiveness against highly sophisticated surface-based IADS. They suggest that

with the wide variety of defensive tactics (e.g. radar shut down tactics; GPS jamming; active and passive decoys; frequency hopping), AARGM is going to get better results, if compared to HARM.

Orbital ATK says key AARGM upgrade components to the legacy AGM-88B include the Advanced ARH sensor, the active millimetre wave (mmW) terminal guidance system, and the Digital Terrain Data (DTD)-aided SAASM GPS/INS; the prefix SAASM is for Selective Availability Anti-spoofing Module. According to the company, the ARH sensor is the "initial key to the system, to detect and then pass Angle of Arrival (AOR) information to AARGM's guidance and control processing system." ESD learned that the AOR is combined with DTD information to provide a GPS coordinate. Exactly this GPS coordinate becomes the sensor focus when the hostile radar shuts down. Until then, the combined sensor system refines the threat radar location as long as it continues to transmit. "Once the threat radar shuts down, the GPS threat location becomes the primary guidance to place the endgame terminal mmW seeker in position to scan a volume to find the radar, missile launchers or support equipment," says Orbital ATK.

When used in a complex DEAD scenario, AARGM requires a radio frequency (RF) signal to provide a targeting capability, however, AARGM can be used in a point-to-point GPS type of weapon against time-sensitive targets; target coordinates will be required for this capability.

Orbital ATK was very pleased with recent AARGM testing, which included Initial Operational Test and Evaluation (IOT&E) and follow-on Blk1 software upgrade testing. "AARGM was 12 for 12 in hitting scored targets in the IOT&E and the Blk1 testing has proven AARGM capability against moving ships in radar shut down environments and IADS in mountain[ous] terrain."

All Is Possible

According to Orbital ATK, AARGM is only available in the scope of Foreign Military Sales (FMS). The manufacturer adds that potential new customers must provide the US Government a formal request for AARGM that most often takes the form of a Letter of Request (LoR) for a classified capabilities briefing and/or a request for Pricing and Availability (P&A) information. This initial request for information initiates the US Government's Exception to National Disclosure Policy (ENDP) review that culminates in an ENDP Committee review. Once the potential new customer is approved by

the Committee, information will "begin to flow for them to make a more informed decision to procure AARGM," the company adds.

As to a "steadily increasing demand in Europe", according to NATO sources, Orbital ATK suggests that the Italian Air Force be an AARGM cooperative development partner. Initial deliveries, according to a Pentagon release on 26 September 2016, were to include kits for a full-scale conversion of 19 AGM-88B HARM missiles.

With the German Air Force having stated that it has also chosen AARGM for its fu-

ment made by the Polish MoD's Armament Inspectorate, possibly in conjunction with a market analysis, emphasised the importance of air-to-ground weapon modernisation in Poland, citing Polish Air Force officials that estimate an emerging demand for SEAD/DEAD capacities at the end of this decade. In the past, Su-22M4 fighter-bombers were equipped with Soviet Kh-25MP missiles.

When switching from HARM to AARGM, existing aircraft in NATO's inventories, like the TORNADO, TYPHOON or F-16 C/D Blk52+, do not require major modification



Photo: Orbital ATK

AARGM using a mmW terminal seeker scans the threat radar ground environment and determines the best available target to engage.

ture HARM upgrade, this weapon system is set to become the core armament of NATO air forces specialised in SEAD/DEAD operations. Deliveries of conversion kits to upgrade a subset of standard AGM-88B missiles to AGM-88E AARGM are expected to begin in 2020, according to the German Ministry of Defence (MoD). Observers warned last February that ignoring the urgent need to expand and modernise the SEAD/DEAD potential of the German Air Force could only result in a degradation of this significant capability that was developed over the past decades. Germany, a framework nation participating in a NATO initiative related to "delivering fire-power from land, air, and sea," seeks a more effective SEAD/DEAD capability. This is in response to the lack of capacities in other European NATO partners, like the United Kingdom that withdrew its ALARM missiles in late 2013.

With Orbital ATK not providing detail about other potential customers, NATO sources claimed that AARGM is being offered to Poland, as the armament for its F-16 C/D Blk52+ fighter aircraft. A recent announce-

ment to retain their purposes. According to the company, "potential new AARGM customer platforms that have previously carried HARM should only require an Operational Flight Programme [OFP] upgrade to ensure the platform can talk to and process information from AARGM." Platforms that have not previously carried HARM will require the OFP update and a 'Seek Eagle'-like effort that verifies vibration, electronic impulse, and safe separation functionality between the missile and aircraft. Orbital ATK declines to identify the F-35 currently on order by Italy, Norway, and The Netherlands, as a candidate for AARGM. The F-35 can carry AARGMs externally; but, "there is currently no plan to do this," says Orbital ATK.

Next Step

With AARGM-ER (Extended Range), the manufacturer is taking the next steps. "There are options for the AARGM-ER integration on the F-35." The ER variant is planned to fit in the F-35's internal bay for the A and C models, according to information found in US Navy budget documents



Photo: Orbital ATK

AARGM-ER is planned to fit in the F-35's internal bay for the A and C models.

in FY16, FY17, and FY18. ESD learned that the ER variant might double the operational range of the current AARGM (150 kilometres). An Initial Operational Capability (IOC) is anticipated for the 2023 timeframe. Orbital ATK's AARGM ER design concept reuses the AARGM seeker, removes the AARGM mid body wings, adds aft body fins/actuators with strakes along the side for lift while increasing the overall weight to over 454 kg from the AARGM's approxi-

mately 363 kg, according to Orbital ATK. This increase in weight is directly attributable to additional propulsion required to go more than twice as far in the same time of flight.

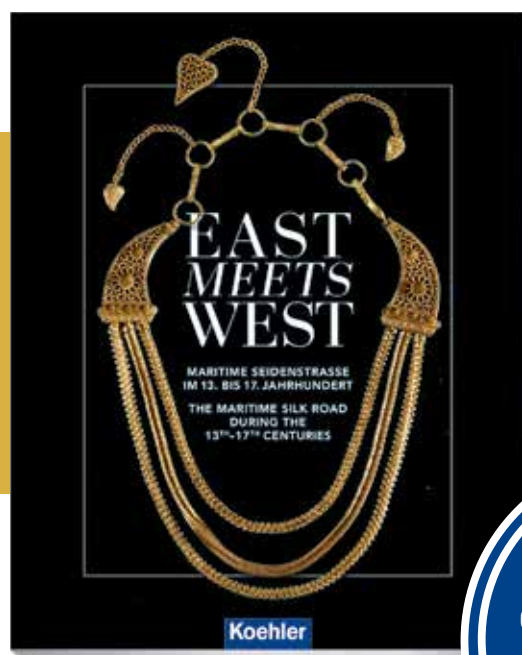
With AARGM, operators now have a significantly improved ability to DEAD versus just SEAD against the evolving threat. AARGM provides to the cockpit range information to the surface radar threat. For platforms with a range sensor, AARGM offers an

on-board, second source verification capability. This overall ability to destroy IADS enables friendly platforms the critical capability of freedom of manoeuvre. "Without this [...], the ability to bring the fight to the enemy is significantly diminished," Orbital ATK notes. "This results in attrition of total surface threat radars over time versus having the same number of surface threats in the area of regard," the manufacturer concludes. ■

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Polish Defence Industry

Remigiusz Wilk

The roots of the Polish defence industry date back to the era when the country regained its independence in 1918. In mid-1930s Poland initiated one of the biggest economic projects named Central Industrial District (Centralny Okręg Przemysłowy - COP) to relocate Polish heavy and military industry to a security area in the middle of the country. After 1945 the former COP was rebuilt and expanded. The majority of the most important Polish defence companies, including Huta Stalowa Wola and Mesko, is still located in the area.

Polish defence expenditures are at the level of 2% of GDP and it is expected to rise to 2.5 % of the GDP in 2030 i.e. to €28Bn. In 2015 the total value of military equipment exported by Poland was €420M, compared to €395M in 2014 and €336M in 2013.

The Polish defence sector can be distinguished in three categories. The first one comprises over 60 government-owned companies associated with the Polish Armaments Group (Polska Grupa Zbrojeniowa, PGZ) and also state-owned, but independent entities such as PIAP (a producer of mobile robots). The second group consists of private Polish companies. The third category are Polish subsidiaries of foreign companies, including PZL-Swidnik (part of Leonardo), PZL Mielec (subsidiary of Sikorsky, a Lockheed Martin company) and two plants owned by Airbus Defence and Space (formerly EADS PZL Warszawa-Okęcie). A fourth group is formed by the subcontractors. Although these companies are not the core of the defence industry, they are essential for its existence. One example is Huta Stali Jakoscowych, a supplier of ARMSTAL armour plates for air and land combat vehicles.

Polish Armaments Group

Polska Grupa Zbrojeniowa is officially based in Radom and consists of 64 companies with an aggregate workforce of 17,500. It is the biggest defence manufacturer in Poland, with the group's total annual revenues in 2015 of about €1.2Bn. Since late 2015 PGZ has been subordinate to the Polish Ministry of National Defence. In 2016 Poland awarded PGZ contracts for over €1.65Bn.

Author

Remigiusz Wilk is a Poland based defence journalist and Polish correspondent of Jane's JDW/IDR/JIW/JMR.

Photo: 17th Mechanized Brigade



The first 120mm RAK self-propelled mortars on ROSOMAK 8x8 chassis were officially delivered to the Polish land forces on 30 June 2017.

The state-owned industry has been consolidated under PGZ in response to the main weakness of the Polish manufacturers – the lack of new weapon system developments based on advanced technology, that could be offered for both export and the domestic market. That explains why in the scope of every major contract awarded to an international company, Poland insists on an offset obligation including technology transfer and a local production share. In the coming years, PGZ hopes to increase its innovation potential based on to offset agreements in the scope of large-scale contracts. These include the HOMAR programme with the delivery of nine multiple rocket launcher batteries worth €3.5Bn, for which Lockheed Martin's M142 High Mobility Artillery Rocket System has been recommended. Furthermore, there is the WISLA programme with eight batteries of a medium-range air and missile defence system valued €7Bn; the Raytheon's PATRIOT Configuration 3+ (PDB-8, Post-Deployment Build-8) has been pre-selected.

Finally, there is the ORKA programme calling for 3-4 new submarines with cruise missile armament valued between €1.8 Bn and €2.4Bn; bidders are the French Naval Group (formerly DCNS), German ThyssenKrupp Marine Systems and Saab from Sweden.

Huta Stalowa Wola (HSW) with 750 employees specialises in the design and construction of artillery equipment including the 120mm M120 RAK self-propelled mortar (SPM) and the 155mm KRAB self-propelled howitzer (SPH), 98 and 120mm mortars, light armoured vehicles and engineering equipment. Poland is constantly investing in HSW's manufacturing capabilities, including the production of gun barrels. HSW is currently the largest beneficiary of military materiel expenses due to the development and modernisation of the gun and missile artillery. In April 2016 the Ministry of National Defence ordered 96 RAK SPMs and command vehicles, both based on the ROSOMAK 8x8 chassis and worth €230M, while in December 2016



Photo: Rheinmetall

The first upgraded LEOPARD 2PL prototype is planned to be ready in March 2018. ZM Bumar-Labedy company (a PGZ part) is to modernise 136 of 142 LEOPARD 2A4 tanks until 2020.

they awarded a €1.1bn contract for the delivery of 96 KRAB SPHs and additional vehicles to HSW.

The company is the main contractor for the tracked BORSUK infantry fighting vehicle (IFV) to replace the BWP-1 fleet in service. It is expected that the prototype will be unveiled at the MSPO 2017 defence expo in Kielce. HSW also develops the ZSSW-30 remote controlled turret, armed with 30mm Mk44 cannon and two SPIKE LR anti-tank guided missile (ATGM) launchers, designed for BORSUK and ROSOMAK IFVs.

A subsidiary of HSW is Jelcz, the sole Polish manufacturer of armoured and unarmoured military trucks. Jelcz also delivers the chassis for rocket launchers, radar stations and other specialised vehicles. In May 2017 the Armament Inspectorate ordered a second batch of 500 Jelcz 442.32 4x4 trucks (powered by German MTU 6R106TD21 diesel) worth €100m to be delivered by 2019.

In March 2016 HSW purchased the Polish automotive manufacturer Autosan for €4m. The company produces a variety of buses, rail-car chassis and other vehicles components. Autosan has also built specialised containers and electromagnetic interference shelters for the military since 1996.

With 1,200 employees Zakłady Mechaniczne Bumar-Labedy located in Gliwice is a manufacturer of heavy tracked vehicles: the PT-91 Main Battle Tank (MBT) and derivatives, armoured recovery vehicles, and armoured vehicle-launched bridges. In December 2015 the Armament Inspectorate signed a €565m contract to modernise LEOPARD 2A4 tanks to LEOPARD 2PL

standard. The contract includes upgrades to the MBTs' turret, chassis and other equipment.

ZMBL is also located in Gliwice and has close ties with the OBRUM R&D centre. OBRUM is a co-manufacturer of the MS-20 DAGLEZJA wheeled vehicle-launched bridge, based on JELCZ truck. The last of ten MS-20 ordered in 2015 was delivered early in July 2017.



Photo: HSW

Huta Stalowa Wola plays a key role in several vehicles programmes, including RAK mortars as well as KRAB howitzers, and the development of the BORSUK infantry fighting vehicle and the KRYL howitzer.

Wojskowe Zakłady Motoryzacyjne Poznań specialises in repair and an upgrade of armoured vehicles, including LEOPARD 2 MBT.

Since 2003 Rosomak (formerly WZMS) has produced and maintained Rosomak 8x8 vehicles in versions like armoured personnel carriers, infantry fighting vehicles (equipped with the HITFIST-30P turret) and specialised variants. In total 570 Rosomak

have been delivered to the land forces. In October 2013 a second batch of 307 vehicles was ordered to be delivered to 2019.

PIT-RADWAR is a manufacturer of radar, air defence, command and control (C2), and IFF systems. The company has been selected as a subcontractor for the Polish PATRIOT air and missile defence system to supply indigenous equipment such as the P-18PL passive air surveillance radar, the 3D ASEA VHF-band early warning radar, and the PCL-PET multi-static passive location system. In December 2015 Poland placed a €260m order for 77 POPRAD very short-range air defence (VSHORAD) systems to be delivered from 2018 to 2021. The POPRAD is armed with four GROM/PIORUN MANPADs, and it is based on the AMZ-KUTNO ZUBR vehicle.

Wojskowe Zakłady Elektroniczne specialises in the production of electronic reconnaissance and electronic warfare systems, command and communications, and air defence. Other manufacturers of communication systems include Wojskowe Zakłady Łączności Nr 1 and Nr 2 (authorised maintenance centre for Harris radios).

With 600 employees Warsaw-based PCO is the producer of optoelectronic devices implementing image intensifying, thermal imaging and laser technology. The portfolio comprises a variety of individual equipment such as night-vision and thermal goggles, monoculars, sights and binocu-

lars as standard equipment of Polish Armed Forces. In December 2016, the Armament Inspectorate awarded a €82m contract for the delivery of 5,344 devices for the new Territorial Defence Forces to PCO. The company also manufactures optoelectronic systems for combat vehicles (GOC-1, GOD-1 and GOS-1), thermal cameras (KLW-1, KMW-3) and night and thermal periscopes and sights. Cameras from PCO are to be

Photo: Fabryka Broni



A Fabryka Broni MSBS-5,56K assault rifle with PCO red dot under test for the Special Forces and Territorial Defence Forces. A procurement programme is expected to commence by year's end.

used in the LEOPARD 2PL tank upgrade programme.

Headquartered in Skarzysko-Kamienna, the Mesko ammunition plant is the largest PGZ company with 2,800 employees, including its four subsidiaries (WSK Warszawa II, ZM Krasnik, FPS Bolechowo and ZPS Pionki). It is the single Polish producer of pistols, rifles, medium calibre tank and artillery ammunition, GROM and PIORUN man-portable air defence systems (MAN-PADs) and unguided rockets. Mesko also manufactures the Rafael SPIKE LR ATGM. In December 2016 Mesko signed a €220M 6-year contract for the delivery of 1,300 PIORUN launchers and missiles, and 420 fire control units. In February 2017 the Polish Armed Forces ordered 108,000 20mm training rounds for the F-16C/D fleet worth €3.77M. In June 2017 Mesko signed three separate contracts for 5.56mm, 7.62mm and 30mm ammunition worth €46M.

ZM Dezamet is located in Nowa Deba and specialises in 40mm low and high velocity grenades, mortar rounds, hand- and rifle grenades, artillery ammunition and fuses. The company also produces 40mm single-shot grenade launchers. Dezamet has been selected by PGZ as a future manufacturer of light, disposable anti-tank weapons for the Polish Armed Forces to replace the KOMAR RPG-76. The main competitors are Dynamit Nobel Defence, Nammo and Saab. In July 2017 Dezamet was awarded a contract for the delivery of 35,000 PG-15W training rounds worth €31M.

Other ammunition manufacturers are BZE Belma (mines, mine cassettes, fuses, and mine layers), and Nitrochem (explosives). Zakłady Mechaniczne Tarnów (ZMT) specialises in the production of sniper rifles,

machine guns (UKM-2000, WKM-B and WLKM), multi-shot grenade launchers, light mortars, ZSMU-series remote controlled weapon stations, mobile containerised shooting ranges, 23mm land and naval anti-aircraft artillery and combined artillery-missile systems as well as training

Photo: WB Group



WB Electronics is the main supplier of the FLYEYE unmanned aircraft system, FONET intercom system and TOPAZ artillery fire control system. The company also develops the WARMATE small loitering munition.

equipment. the CBR research and development centre is part of ZMT. An order for 6 batteries of the PSR-A Pilica VSHO-RAD missile-and-gun system worth €176 M was placed in December 2016. In April 2016 Poland signed a €40M contract for the delivery of 2,494 UKM-2000 machine guns. The land forces are also expecting the delivery of 200 revolver-type RPG-40 grenade launchers ordered in February 2016

for €2M and capable to fire 40mm low and medium velocity ammunition.

Fabryka Broni Lucznik-Radom (FBLR) is the second small arms manufacturer of PGZ. In July 2014 the company relocated to a new plant which was built for €24.3M. The annual production capability covers 25,000 assault rifles, submachine guns and pistols. Under licence to Carl Walther FBLR has co-produced a P99AS semi-automatic pistol chambered in 9x19mm calibre since 2000. Over 106,000 pistols have been delivered to the Polish Police, Border Guards and other law enforcement agencies. FBLR also manufactures a 9mm PM-98/06 submachine guns and the 5.56mm BERYL and MINI BERYL rifles and carbines as standard weapons of the Polish Armed Forces. The company also produces the calibre 7.62x39 mm BERYL M762 variant, of which 2,000 rifles were delivered to Nigeria. Since 2007 FBLR has developed the modular MSBS 5.56 small arms system, a weapon family in calibres 5.56x45 mm (also 7.62x39 mm and UTM training ammunition) both in a classic and a bullpup configuration. In 2012 FBLR designed a 9mm PR-15 RAGUN pistol to replace older models in service. The MSBS 5.56 and PR-15 are being tested by special forces and the Territorial Defence Forces.

It is expected that both weapons will be qualified according to military standards will be adopted by the end of 2017.

PGZ also controls shipyards: MSR Gryfia in Szczecin and Nauta in Gdynia. Moreover, in May 2017 the Group purchased the Naval Shipyard Gdynia for €53M.

Also part of PGZ are the three Wojskowe Zakłady Lotnicze Nr 1, Nr 2 and Nr 4 plants for overhaul and maintenance of military

aircraft and helicopters, including the upgrade of MiG-29 and Su-22 aircraft.

PSO Maskpol is a manufacturer of individual ballistic protection systems including combat helmets and vests, protective NBC garment and gas masks.

Wojskowe Zakłady Uzbrojenia is responsible for the maintenance and upgrades of the SA-4, SA-5, SA-6 and SA-8 air defence systems. OBR CTM manufactures underwater weapon systems, C2 systems, and radio communication systems.

WB Group

With over 750 employees the WB Group is the largest privately-owned defence manufacturer in Poland. The company's turnover in 2016 was €83M, compared to €59M in 2015. The WB Group is headed by WB Electronics and currently comprises five companies: WB Electronics (established in 1997), Flytronic (since 2009), and Arex, MindMade, and Radmor (all three acquired in 2011). The WB Group is the main producer and supplier of specialised electronics, command and control systems and unmanned aircraft systems for the Polish Armed Forces.

In 2001 WB Electronics delivered the first TOPAZ artillery fire control systems for the 2S1T GOZDZIK, DANA, and KRAB howitzers, 120mm RAK mortars and LANGUSTA multiple rocket launchers.

Also in 2001 the company developed the FONET tactical networking intercom system, which integrates vehicular communication systems including computers and transceivers, with an integrated internal telephone function. FONET is used by Polish, Slovak and Hungarian Armed Forces along with several other armies including the United States, Malaysia and Sweden. In 2009 Fonet received a licence from Harris to offer it with the designation RF-7800I. Over 6,000 Fonet systems have been manufactured in Poland and in the US.

The WB Group has also developed a family of unmanned aircraft systems (UAS) including FLYEYE (designed by Flytronic), ŁOŚ (with COMINT and ELINT payloads), and MANTA (featuring a vertical take-off and landing capability). Twelve FLYEYE systems (around 45 unmanned air vehicles in total) have been delivered to Polish SOF, Land Forces and Border Guard, and to other nations since 2010. In 2017 FLYEYE UAV completed military trials in Ukraine and is to be manufactured by CheZaRa under the licence. The FLYEYE system has been used during the Polish mission in Afghanistan and in the Ukrainian conflict since 2015.

Since 2012 the WB Groups has been developing a micro loitering munition systems



Photo: Polish Navy

The ORP KORMORAN mine countermeasure vessel, expected to be commissioned in 2017, will be the first new Polish Navy ship commissioned since 1994. It is built by Remontowa Shipbuilding, Gdansk.

including WARMATE and STING. WARMATE is a modular, fully autonomous system which can be equipped either with EO/IR reconnaissance payload, high-explosive anti-tank, high-explosive or thermobaric warhead, depending on the mission profile. WARMATE was sold to three international customers including special forces of an unnamed NATO country.

Radmor is the biggest Polish manufacturer of mobile VHF/UHF communication equipment including the R35010 and R3501 personal radios (the latter also delivered to Bangladesh Army), vehicle and manpack radios. Since 1995 Radmor has produced PR4G radios – TRC9200-3 and TRC9500-3 – under licence to Thales (formerly Thomson CSF), and since 2006 the F@stnet RRC9210 and RRC9310. In 2016 the 10,000th PR4G radio was delivered to Polish Armed Forces. Since 2009 Radmor has participated in the European Secure Software Defined Radio (ESSOR) programme and develops the ESSOR HDR waveform and COMP@N series software defined radios.

Arex has been in existence since 1989 and specialises in electric drive control, weapon control and training systems. Recently WB Electronics and Arex have also designed the automatic ammunition magazine for the RAK mortar.

Others

It is expected that in November 2017 a new ORP KORMORAN mine warfare vessel, first of its class, will be commissioned. The ship is built by a consortium led by the privately owned Remontowa Shipbuilding shipyard with 850 employees. In September 2013 the Polish Navy signed the contract for the delivery of three Project 258 KORMORAN II ships worth €285M.

The Polish domestic market's smaller private companies also include specialist vehicle manufacturers like Auto-Hit, AMZ-Kutno (produces DZIK and ZUBR vehicles

and the Special Operations Vehicle co-developed with Krauss-Maffei Wegmann), Germaz, Szczesniak PS, WISS Wawrzaczek, and Zeszuta (in June Military Police received 14 Plasan Sasa SANDCAT vehicles ordered in 2015 for €5.9M). The Lubawa Group (net sales €15M) is a manufacturer of ballistic shields, bulletproof vests, tents and specialised coated fabrics, including BERBERYS multispectral camouflage. Air-Pol manufactures personal, braking and stabilising parachutes. Polish electronics and communication equipment companies and suppliers to the Armed Forces are also DGT, Etronika (manufacturer of NV/IR devices), Hertz Systems, KenBIT, Kolt, Optimum, Teldat, and Tranbit. It is worth mentioning, that also a private-owned Pioneer Arms small arms factory, a producer of AK-type assault rifles, operates in Radom.

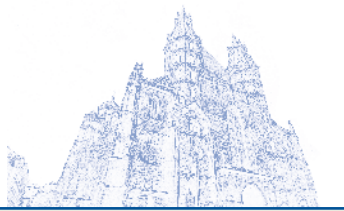
The Big Three

In 2007 PZL Mielec was sold to Sikorsky Aircraft (in 2015 Sikorsky was acquired by Lockheed Martin). The company has 1,700 employees and manufactures the M28 SKYTRUCK utility aircraft. Since 2011 it has served as an additional final assembly line for the S-70i helicopter. PZL Mielec also builds cabins, pylons, empennages, and tail cones for UH-60 helicopters.

AgustaWestland (now Leonardo Helicopters) acquired PZL-Swidnik in 2010. The 3,500 employee-company produces and upgrades W-3 SOKOL and SW-4/AW009 helicopters and aircraft components.

Airbus has two plants in Poland, in Warsaw and Mielec with 900 employees. The company produces the PZL-130 ORLIK primary training aircraft and parts.

All three companies have submitted bids for two separate Polish tenders for 16 new military helicopters for anti-submarine warfare and combat search-and-rescue, offering S-70i BLACKHAWK, H225M CARACAL and AW101.



Viewpoint from Vienna



Georg Mader

Game of TYPHOON

Most people would consider the use of their own combat aircraft over their own territory to be so far out-of-the-box as to be unthinkable. Egyptian F-16s, maybe, or Iraqi L-159s against Islamists; but in Europe? Pure fiction! Well, in a saga like the following, everything is possible.

Near to south Germany, high up, there lies an old and neutral alpine republic, in which it is absolutely normal for the leaders to deploy their own combat aircraft over their third or fourth consecutive election-campaign – accompanied by the acceptable collateral damage of destruction of some personal preferences, or the dumping and laundering of billions of euros previously extracted from the working masses.

Let us therefore handle the most recent episode of this Austrian “saga” as “Season IV”, like one of those multi-season HBO series coming in expensive sleeve-cases with episode guides in golden fonts. While such a guide to content would in this case dwarf our given space, let’s just recap on the seasons’ highlights; it might be enlightening.

“Austrian EUROFIGHTERs are history!”

“It was necessary to halt the overflowing costs of a Eurofighter – which does not have the full capabilities needed for our sovereign air-surveillance,” Defence Minister Hans Peter Doskozil said on 7 July and subsequently announced that “The Eurofighter in Austrian service is history!” What he precisely meant was that this is now scheduled to be the case after 2020, when he himself and his clan might very well no longer be functioning ministers. Nevertheless, he added to today’s facts the prophecy that “Buying and operating

a new fleet comprised of 15 single-seater and three twin-seater supersonic jets of an alternative type over the same period, could be up to €2Bn cheaper up to 2049 (!) than continuing with the 15 Tranche-1 TYPHOONs (left over from the end-of-Season III massacre in 2007) not fully useable for what we want in the future...”

The honourable minister knew all the facts and numbers from a study on future Austrian active air-surveillance (also alleged to be called “peacetime air-policing”) that he has tasked to be worked upon by a 26-person special commission under Austrian air force commander Brigadier Karl Gruber. The study was commissioned back in mid-February, at the time when he also forwarded a lawsuit against the makers of the jets, Airbus and Eurofighter, to the federal attorneys. Formulated by an in-house “task force”, the lawsuit alleged “Fraud and deception together with willingly and continuously cheating on ability to deliver what was contracted for ~€1.9Bn back in 2003 [Season II] and even up to what was ‘modified’ for ~€1.7Bn in 2007 [Season III].”

Capabilities Long Missing

The author always has seen Brig. Gruber as one of the “shining” figures in the saga, keeping at bay the dark forces of evil. A rotary-wing and radar-man, while he is no jet pilot, he has impressed the author when shopping for models while highlighting Ezer Weizmann’s black SPITFIRE or the shipping-strike Douglas BOSTON with muzzle-flashing MG-nose. Therefore, he absolutely can be trusted and supported when in his study he points out and pushes for capabilities that are state-of-the-art and absolutely normal today, although they were lost when the J-35OE from Season I was retired

in 2005. Even that J-35OE DRAGEN had a simple radar-warning receiver, while its successors were denied such – and a built-in IR-sensor for night identification was removed in Season III's massacre in 2007 – and a radar-guided BVR missile was already taken away in Season II, by the way. The bitter – and, for the average taxpayer, EXPENSIVE! – irony is that all these subsystems back then were



Photo: Mader

The Austrian Defence Minister Hans Peter Doskozil (right) and the Austrian Air Force Commander, Brigadier Karl Gruber, during their press conference on 7 July

brutally evicted by Doskozil's party colleagues and replaced with ballast by pre-predecessor Norbert Darabos. And now, in Season IV, we have the criticism that the platform offers only "limited capabilities", obliging our politicians to drop the whole unloved mess. Normally it should be a matter of concern for an aircraft manufacturer when his first export customer and one of the wealthiest countries in the world declares its fighter is too expensive to operate. But we have learned that Austria is something of a special case and critics are partly right to say that the landlocked, neutral nation probably never really needed those 15 TYPHOONS it ordered in 2003 (Season II). The advanced multirole fighter – originally designed in the late 1980s to tackle the latest Russian threats – has in Austria been relegated to a peacetime interceptor QRA-type role with one or two tiny missiles and a belly fuel tank. But today you can ask any single-fleet air-arm why they are acquiring F-35s when they expect they will only do just that in peacetime: air-policing, maybe with some 9/11-prevention.

Time-Travel – in Both Directions

No, there is no reason why Austrian pilots should not have these latest assets. "I want to be assured that my pilots are not sentenced to death, when in the future maybe meeting a defecting, renegade Su-27 and its pursuers..." Gruber – fully justifi-

fied – said on 7 July. He also presented two alternatives to the politicians: A single-type fleet solution and a mixed-type fleet solution. What is very interesting is that he confirmed that the two-seater option that had been rejected and denied since Season 1 would – of course – be within the scope of the currently flown Eurofighters. But also: 18 of an alternative type would come with half the running costs. When the study, however, concedes a wide margin in its calculations, and is based only on informal numbers given by foreign governments and operators, this is where fate is determined by political courage – although this has been missing ever since Season I, evident in the inability and unwillingness to positively carry through such expensive defence acquisitions over a period of several years. And in the saga, the phenomenon of time-travel begins.

The observer is left baffled, wondering: How they can predict exactly what the costs will be for the alternatives from the – ever preferred – Far North or from the expectantly misused "price cutters" across the Western ocean? And that up to 2049, or Season XXI!? And they can tell that even including (another) ~€1.5Bn of acquisition costs, it will be cheaper than to operate a system flown in other sagas with no errors and which was finally paid in full in 2014. It may be possible, but no figures reveal how one of the ~1,100 hours is calculated in Austria, or what would change if the current system were flown with 1,800 hours, or why it is reported that the Italians fly only for half the Austrian numbers of € 60,000/hour. In the meantime, the very same characters from the minister's clan were successful in travelling back in time to early Season II to publicly poison the unloved, fat and ugly baby. With the result that it today – by the same powers – was declared as ripe to be thrown away because it only consumes, and it delivers far too little.

Preview to Season V

We were left stunned by the dramatic finale of the final chapter of Season IV. We only know that after 15 October there will be a Season V. But it is secret who the actual players will be. There is a good possibility that many roles enshrined for decades could change: Those who dare to travel in time might not continue to be in charge of Austrian defence, for example. Of course, given the successful public poisoning mentioned, there is no favourable image a new man or woman in the MoD could use or gain in declaring a reverse to the announcements of 7 July. It might be – and is to be earnestly hoped – that the men and women of Brigadier Gruber's Austrian air-arm get those long-missing capabilities and their two-seaters. But if that will happen on the TYPHOON, or if the funds for another type become available when a commitment is demanded for a fresh contract – especially with the current system only one third of the way into its lifespan – only a time-traveller to a future Season V treasury master could tell. So far, modern Austria has always been a place of "bread and circuses", not of swords and shields.

To be continued...

“Funding is the cornerstone of any defence technology development.”



Although the decision which nations will participate in the “Next Generation Weapon System” (NGWS) armament effort is still pending the related requirement is expected to generate a key project for the defence industrial base involved. To implement the billion Euro programme several countries will have to assume management responsibility. In this interview, Michael Schreyögg, Member of the Executive Board and Chief Programme Officer at MTU Aero Engines, elaborates on perspectives and expectations from the point of view of a (likely) industrial contractor.

ESD: The potential development of a new airborne weapon system – dubbed the Next Generation Weapon System – will bring along the prospect of funding being made available for engine technologies. In which areas do you think there is a special demand, or are there special opportunities?

us – industry – with an outline of the conceivable future scenarios for the time when the TORNADO will have been phased out after 2035. But if we indeed want a Next Generation Weapon System (NGWS) for Germany by 2035 that has been developed from scratch, and if we simultane-

activity to work on regarding technology development and technology funding. Military technology development and funding are essential if you want to remain competitive in global aviation throughout the next decade. Against the background of the highly demanding applications we



Photos: MTU Aero Engines/Sikorsky



The T408 engine for the CH-53K KING STALLION heavy transport helicopter is a shaft propulsion system laid out for different helicopter and turboprop applications. MTU Aero Engines supplies the turbine.

Schreyögg: This is, in fact, a decisive point you are making here. Adequate technology funding is the cornerstone of any defence technology development. The national German military aviation strategy provides

ously plan to minimise the risks regarding its full operational capability by the time it is needed, we need to act as quickly as possible. Timely decisions are of the essence to ensure we can address the major fields of

always push the limits of what is physically possible in military development programmes, with the technology thus taking the next leap forward. A point in case is the compressor technology implemented with

the engine for the Eurofighter TYPHOON, which we improved for the propulsion system powering the A400M and which we are now introducing into the high-volume commercial market, incorporated on the GTF. What is currently lacking in Germany and in Europe is the next major development programme for us to keep enhancing the systems integrity of the engines. To satisfy the stringent requirements an NGWS will have to meet in terms of performance and efficiency, you need to conduct extensive background research that takes seven to ten years to complete, and you need another ten to 15 years to build the demonstrators and develop the project. Experience gathered in past international development programmes for military turbofans has shown that it takes 20 years or so for the desired maturity of the overall system to be achieved. For the military engine of the future, we think that the technology priorities will be new materials and coatings, for example, and perhaps also new manufacturing processes.

MTU is a dependable partner in development programmes and, with its decades of experience with funding programmes, has demonstrated that it is making good use of funds to come up with mature products. Take the EJ200 engine for the Eurofighter TYPHOON as an example. It shows that MTU develops innovative engines that meet each and every aspect of the customer's wants and needs.

ESD: Has the industry already worked on any plans, or even engaged in any activities, in this respect?

Schreyögg: We have been busy dealing with the topic for quite some time now. MTU believes in the strength of a European partnership. We are already in talks with the German Defence Ministry and proven industrial partners, the aim being to come up with the best solution for a TORNADO replacement. It goes without saying that we do have an interest in playing a role in the development, production and in-service phases of an NGWS, to keep the competences and jobs in Germany or bring new ones to the country. In view of the current global developments, it once again shows just how valuable it is to invest in a European solution, which promotes and sustains the national structures. This way, we ensure Europe's political independence on the global market and the European countries' capability to take action. Should the German or European industry be left out in the cold and have no say when it comes to finding the solution, we – that is, industry – will lose our systems capability in the long run.



Photo: MTU Aero Engines

For in-service support of aircraft and helicopter engines MTU Aero Engines is involved in several public-private partnership ventures with the German Bundeswehr. Shown here is the maintenance facility for the EJ200 Eurofighter TYPHOON engine.

Today, MTU has already taken the most important characteristics of a Next Generation Weapon System and the associated priorities for action into account in its technology roadmap. For us, it is clear that the performance of the new system will largely depend on the propulsion systems. What I am talking about here, specifically, is improved efficiency for more range, lower operational costs thanks to reduced fuel burn and less maintenance, plus an extremely high power density. With improved engines available for the new system, we expect mission flexibility to be appreciably higher for the operators. And that is an objective for all of us.

ESD: What do you expect from the public procurement authorities?

Schreyögg: We would expect that in the decision-making process, good care is taken to ensure that the time needed for technology development is fully taken into account and a decision is made in a timely fashion. Industry needs to know for certain which of the scenarios is the one primarily pursued by the German Defence Ministry. Only then will it be possible to transition seamlessly from the TORNADO to the new combat aircraft and to provide the Air Force with the best possible weapon system. This is why we recommend that we – policy-makers and industry – get together to discuss the issue, based on the preparatory studies focussing on the clarification of the requirements and the preparation of the specification, so that we can begin with the planning for implementation promptly. To mitigate the development risks for the

optional scenarios, the amount of technological preparation that will be required will appreciably exceed current levels. This is why the expenditures for enabling defence technologies will have to be increased massively as quickly as possible. Today, we operate on a military technology budget of a few million euro annually. This will have to rise to €20 to €30 million per year. Accordingly, an increase of the technology budget for engines will have to reflect in the budget planning from 2018 on.

ESD: So how much time in advance is required?

Schreyögg: Quite honestly, we have to start now if we want to meet the 2035 objective. The planning for implementation does no longer permit any further delay. If the aircraft is to be in service by 2035, we need to develop the aircraft, the aircraft armament and the avionics suite. As I mentioned earlier, this will take roughly twenty years. After all, what we do not want to do is launch any new developments without having the enabling technologies available. We can protect against risks in a development programme only if we make sure that the technology it is based on is mature in good time.

ESD: In your opinion, what are the perspectives in a European context? What do you expect from your industrial partners?

Schreyögg: With a focus on the development of a new propulsion system for a potential new combat aircraft, we think that there will be close collaboration with our proven partners in the military arena. The

primary objective is to have a European co-operation pattern in place for the development of the aircraft, with a major involvement of the German defence industry.

ESD: Which role do you expect MTU Aero Engines to play in the heavy transport helicopter project in Germany?

Schreyögg: Should the CH-53K helicopter be procured for Germany, our stake of slightly more than 18% in GE's T408 engine will automatically secure a work share for us. We are responsible for the development and production of the power turbine and hold licences for the maintenance, final assembly and testing of the engine. This is why we are in a position to offer our customers in Germany and in Europe the perfect service, and they have the right to expect that. We have been a reliable cooperation partner of the German Armed Forces for many years. The integration of the T408 propulsion system into the existing support structures for all military aero engines operated by the German Armed Forces would be a natural consequence for us.

ESD: What are the potential perspectives for a possible export sale of the CH-53K to third countries like Israel?

Schreyögg: The CH-53K is the only advanced system in the heavy-lift helicopters category and is ideally positioned, be it as a replacement for operators of the predecessor engine or as a candidate for new customers. Incidentally, this was one of the reasons for us to take a stake in its development in 2008 in the first place.

ESD: From your perspective, where does the TP400-D6 stand right now? Are there spin-off effects for future commercial and military projects?

Schreyögg: We have stabilised the programme, and engine deliveries proceed on schedule in line with the operational demands at the assembly line for the airframe. It took quite a lot of effort to get to this point.

With every programme we make technological advances and build expertise within the company, which can obviously serve as a basis for new programmes. In the TP400-D6 programme, too, we have been able to grow our technological expertise in the fields of compressors, turbines and engine controls. This paved the way for the development of the most powerful propeller engine in the Western world, one that meets the challenging mission requirements of a military transport aircraft. During development the focus was on less fuel burn, on lower operating costs as well as on tactical manoeuvrability and an extended operational spectrum.

Spin-off effects that cause a leap forward in technology development can only be achieved through dedicated, funded enabling technology programmes. With the A400M having moved into its in-service phase, the issue of further technology development is becoming increasingly important for the engine industry. We need follow-on projects, especially so engine demonstrators, to be able to retain our know-how for the future and continue to further build on our skills, some of which are unparalleled worldwide. In all aviation nations, there is a close correlation between military development programmes and the engine companies' technological positioning.

ESD: Do plans to further enhance the performance of the TIGER combat helicopter include changes to the engines?

Schreyögg: Yes, of course. Through our engine consortium for the TIGER helicopter, we are currently in talks with Airbus Helicopters and the customer's procurement agency to exchange views on the further development of the programme. With the engine enhancements being discussed, the focus essentially is on optimisation of the operational costs along the entire engine lifecycle.

ESD: One of MTU's main businesses is engine maintenance services. Do you expect any changes taking place in the cooperation with the German Armed Forces in this area?

Schreyögg: Our cooperation with the German Armed Forces is a textbook example of a requirements-based service concept. The prime objective is the fulfilment of the contract with the customer's best interests in mind, meaning that the first priority is to return the engine on schedule after repair. MTU and the German Air Force are already exploring options to take their partnership to the next level and intensify their cooperation in the field of engine repair and overhaul (WEK-T). The aim is to guarantee maximum availability of the German Armed Forces' engines based on concepts similar to the ones that are already widespread in our cooperation with many of our commercial customers. This results in further efficiency gains from a clear assignment of responsibilities and a focus on core competences, as is common practice in commercial aviation. Incidentally, we are also constantly improving these capabilities in the commercial after-sales business. Examples include, but are not limited to, on-wing services provided by our teams stationed worldwide, engine trend monitoring or the expansion of our engine lease and asset management business.

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Common Options

Europe Getting Momentum in Submarine Cooperation

Stefan Nitschke

The three European submarine builders, DCNS (now Naval Group) in France, thyssenkrupp Marine Systems in Germany, and Saab Kockums in Sweden, have something in common: developing new strategic alliances in Europe. This is a mission that needs to be assessed against the backdrop of increasing defence collaboration in Europe.

When the former Viking Submarine Corporation (jointly established by Kockums, Kongsberg Defence & Aerospace and Odense Staalskibsværft) released its design of the VIKING submarine in the early 2000s, observers reacted enthusiastically: “The exciting thing about VIKING getting involved in international sales is that it brings the ‘big picture’ for creating feasibility for the Nordic countries’ next-generation submarine commonly procured by Sweden, Norway, and Denmark,” official sources claimed at that time. It was initially planned that the Nordic ‘core axis’ would procure a total of 10 submarines of this type, starting in 2005. But this did not happen. Denmark decided not to procure any submarines, and Norway was reluctant over defence industrial co-development or co-production of a new submarine with other Nordic countries. Sweden’s strong position in submarine design at that time was a reason. Following unsuccessful attempts made by the joint venture company to identify other partners, the Swedes laid the foundation for a future submarine design – the A26. Saab Kockums’ A26 is now being exclusively built for the Royal Swedish Navy.

Several European navies call for a rejuvenation of their existing conventional submarine fleets, including Sweden. This party includes Poland, The Netherlands, Spain and Norway, too. Protagonists at the three leading European submarine builders said that the current submarine market in Europe is heavily influenced by their respective designs, and this could be further “cemented” through new strategic alliances. Their own assessments were found to be true. Naval Group, following its successful bidding for Australia’s SEA 1000 Future Submarine project, puts its SCORPENE high-technology platform on the ‘wish list’ of several European countries, including Poland. It also found strong interest among parliamentarians in Oslo. SCORPENE is the result of years of incre-

Photo: Italian Navy



The Class 212A AIP submarine – a record of the success of German-Italian defence industrial and naval cooperation

mental evolution that has added serious expertise to a complex underwater platform already selected by the navies of Chile, India, and Malaysia.

thyssenkrupp Marine Systems was not slow to respond. The submarine builder is now kicking off a new round of submarine cooperation in Europe. A world leader for conventional submarines, it is creating new strong ties with Norway following its decision, on 3 February 2017, to go for the 212CD (Common Design) submarine, an enlarged derivative of the German and Italian Navy’s 212A air-independent propulsion (AIP) boat. On that day, Norwegian Defence Minister Eriksen Søreide announced that her government had chosen Germany as the strategic partner for the Royal Norwegian Navy’s (RNoN) new

submarine programme, calling for four boats and containing subsystems of both German and Norwegian origin, rejecting a bid from France’s Naval Group. The four boats will replace the service’s six ULA class diesel-electric submarines.

Naval Group protagonists, however, have not been shy about criticising thyssenkrupp Marine Systems for its lack of experience in the design and construction of submarines with a surfaced displacement of more than 4,000 tonnes. In the New SCORPENE design Naval Group offered to Oslo, it replaced the ethanol-type MESMA AIP modules with Naval Group-Indret’s “ground-breaking” AIP FC-2G anaerobic propulsion system, unleashed at Euronaval in October 2016. Vice versa, the RNoN designated the installation of lead-acid batter-

ies in the New SCORPÈNE, as proposed by Naval Group, as a "retrograde step". Spain's Navantia should not be ignored. Its S-80 (ISAAC PERAL class) submarine project, consisting of four boats, does not leave much room for European cooperation. The building programme is in a difficult situation, since there are technological problems associated with the submarine's propulsion system. However, the shipbuilder is beginning to relax, hoping that the

countries. According to circles at Fincantieri, the partnership between Germany and Italy resulted in a "boom" affecting "large parts" of the Italian defence industry, forming the "ultimate basis for continued co-development of submarines in the future." The new situation in Norway could have been fostered by the Government's immediate action in response to a rapidly aging submarine fleet and the overall deterioration in the relationship between Russia

In recent weeks, parliamentarians in Oslo have been raising questions about the role of the country's defence industrial base and its share in the Type 212CD submarine acquisition programme. What was read in an announcement released by the Norwegian government in March 2013 is that the government calls for "industrial partnerships and technology transfer", which is explicitly favoured by the MoD in an attempt to further reduce project risks and costs. In broad terms, Norway's next-generation submarine offers much potential for industrial cooperation with partners in Germany and other European countries. One of the latest projects with Germany – the MSI-90U Mk2 software-based command and weapon control system designed and produced for German Type U212A submarines – clearly demonstrates that Norway's defence industry has a number of areas where it has unique, world-class technologies on offer. Now, it is suggested that Kongsberg will again be the lead combat system supplier for the Norwegian 212CDs and their German sisters.



Graphic: Saab Kockums

Sweden's A26 next-generation submarine design

design will attract interest from a foreign customer in the near future. "We really do like to see this positive [development], so that if we are delivering the first submarine to the Spanish Navy soon, we can tell [potential new] clients in Europe what they will get out of our product," a Navantia official told at Euronaval 2016. To make up for lost ground, Navantia will seek additional support and funding by the Spanish Government for research on submarine design and construction as well as related technologies like anaerobic propulsion systems.

Need for Cooperation with Italy and Norway

The Italian Navy, which received the fourth boat of the HDW 212A class, ITS ROMEO ROMEI (S 529), on 11 May 2017, is about to procure two additional boats. To further increase naval collaboration, the defence ministries of Germany and Italy signed a Memorandum of Understanding (MoU) on 10 March 2017 that further extends existing submarine cooperation in the fields of Research & Development (R&D), design, construction, and operation. The MoU also calls for the participation of other European

and Western countries in the wake of the Ukraine crisis. "We have just agreed on the principles to modernise Norway's submarine force," a government source said in 2016. "This will allow us to contribute a viable [undersea] warfare capability to NATO, including special forces [delivery options] and improved ISR [Intelligence, Surveillance and Reconnaissance]."

For more than three decades, Germany and Norway have successfully collaborated in the field of submarine technology. Now it seems as if thyssenkrupp Marine Systems' wish to supply new submarines to Norway may come true.

At UDT 2016 in Oslo, Øystein Bø, State Secretary for the Norwegian Ministry of Defence (MoD), noted in his keynote address that there are ambitious underwater defence programmes in Europe. Countries like Norway, The Netherlands, Sweden, and Poland are committing substantial resources for platform modernisation and new systems and components." He added that there was strong need to revitalise the notion of collective defence in the maritime domain. "My point of departure is that the strategic environment is changing. We are entering a new normal."

Ready to Respond? Poland and The Netherlands

Poland, in the midst of a nationalist fervour removing any military equipment stemming from the Cold War era, is looking to acquire three new submarines to replace its ageing KOBLEN (SOKÓŁ) class boats, due to be decommissioned in 2021. Defence circles in Poland noted that the scheme offered by the German-Italian MoU on submarine cooperation could attract interest from the Government in Warsaw. However, it was reported that the Polish Government did little to respond. It needs to do more to take immediate action to find the best solution for the Polish Navy's submarine replacement programme. In early July 2016 it emerged that Naval Group SCORPÈNE design could be the "best solution"; but, this was not confirmed by the company's Chairman and CEO Hervé Guillou at Euronaval 2016 in October. He only suggested that Naval Group is now addressing the upcoming submarine building projects in Poland and The Netherlands. It was not confirmed that there could be a second-generation AIP system currently under development and named FC2G AIP on offer for the two countries' submarine projects. As Poland is currently pursuing a high-technology platform as found in the SCORPÈNE design, questions have been raised regarding what Naval Group would offer for long-term defence industrial co-development or the co-production of a new submarine.



Photo: DCNS

The new SCORPÈNE attack submarine offered to meet Norway's requirement for a next-generation submarine

As to the Dutch demand, the search for a new submarine comes from the top. The Royal Netherlands Navy, according to an announcement made by Minister of Defence Jeanine Hennis-Plasschaert in November 2014, needs to replace its inventory of four WALRUS class diesel-electric submarines from 2025. United Press International (UPI), in a report released on 22 January 2015, confirmed that Damen Shipyards Group and Saab have partnered in pursuit of a WALRUS class replacement programme contract from the MoD in The Hague. A source at Damen Shipyards Group claimed in September 2016, "We want to develop a conventional submarine design based on the current A26 and accelerate associated underwater technologies to counter existing designs as offered by [potential] competitors."

It is interesting to note that in May 2013 the Norwegian Government was examining a partnership with the Royal Netherlands Navy, in the scope of which all four of the Dutch WALRUS class diesel-electric submarines were to be replaced, but due to budgetary constraints, The Netherlands, lacking industrial capacities for designing and building conventional submarines, were not able to do so. As a result of the

current budget constraints, the Dutch MoD [was] looking for an international partner to increase economy of scale and reduce costs of ownership in a new submarine programme, said Captain Hugo Ammerlaan, Commander Submarine Services. Until this happens, the naval service is going to further upgrade the existing submarines. According to Commander (retired) E.P.M. van der Klip, former Programme Manager, Heavyweight Torpedoes and Submarine Sonar Systems, at the Defence Materiel Organisation, new sub-systems and components will be used to extend the service life of the four WALRUS class submarines to at least 25 years.

Conclusion

The German-Norwegian submarine cooperation is the blueprint for a wider European collaboration in this field. It could affect the two remaining new-construction programmes in Poland and in The Netherlands. Details emerged last April that the Polish Navy is closely watching the developments in Norway, eventually initiating a serious assessment of thyssenkrupp Marine Systems' 212CD design. But what about Sweden? Industry sources claimed that the

A26 design, which is now being developed for Sweden's Navy, could be offered as a "next-gen submarine with unequalled capabilities" to The Netherlands and Poland, raising questions about the type and extent of industrial cooperation and government-guaranteed partnerships, however.

And what about Europe's suppliers of submarine subsystems and components? Manufacturers like Gabler Maschinenbau are signalling ambitions to take a "big slice" of upcoming programmes in the scope of submarine cooperation in Europe. The company told ESD that it plans to further address the developments in Germany, Norway, Poland, and The Netherlands. The French manufacturer SAGEM said at Euro-naval 2016 that it expects a "favourable" situation, since there is a growing interest in French-built submarines, sub-systems, and components. SAGEM found that Australia's decision to go for Naval Group Shortfin BARRACUDA Block 1A is a striking example for political calculations; but it is also viewed as a "blow" to other international bidders, like Sweden. However, this situation leaves much room for speculation over submarine procurements in the near future, namely in Poland and The Netherlands. ■

DCNS Renamed Naval Group

(df) French company DCNS (Direction des Constructions Navales) changes its name to Naval Group. "This new identity is a natural step in the group's history, aimed at supporting our ambitions to guarantee our exposure and credibility in international markets," the company announced.



Naval Group CEO Hervé Guillou added: "The creation of a strong, unifying brand, that embodies both our heritage and our expertise will enable us to meet two major objectives: continue to attract and retain the best and brightest talent for our workforce to ensure we have the critical skills required to maintain our clients' sovereignty, and increase our international reach and win new markets in an extremely competitive landscape."

FLIR Teams with AIM Norway

(bk) FLIR Systems teams with AIM Norway (Aerospace Industrial Maintenance) in order to build a FLIR Service Center close to the headquarters of the Norwegian aircraft maintenance provider.

Photo: FLIR



The companies want to supply technical continuance and support for regional search and rescue (SAR), airborne law enforcement (ALE) and military customers which use electro-optical/infrared (EO/IR) systems in service in Norway, including the Star SAFIRE 380-HDc. Norway's All-Weather Search And Rescue Helicopter (NAWSARH) programme of the Norwegian Ministry of Justice is planned to start this summer.

"Together with AIM Norway, we look forward to helping keep our customers operational and to building a great foundation for future business," said Kevin Tucker, Vice President and General Manager of FLIR Surveillance. Ove Haukåsveen, CEO

of AIM Norway, emphasises: "Norway has one of the most challenging operating environments in the world. We are proud to be part of a team providing solutions that help make it a safer place."

IAI Invests in Cyber Security Companies

(df) Israel Aerospace Industries (IAI) announced that it is investing millions of dollars in two cyber companies in The Netherlands and Hungary in order to expand its cyber R&D just as its global footprint. In The Netherlands, IAI will invest in Inpedio BV, a provider of cyber security solutions for governments and enterprises. One of their products is MERCURY, which protects cellular iOS and Android devices from sophisticated attacks by implementing a multilayer approach that integrates the protection layers of the devices with those of network and communications layers.

In Hungary, IAI is investing in Cytox, which provides governments with an operational cyber solution for design, management and implementation of cyber intelligence as well as innovative engines for gathering intelligence from end devices and cloud services. These investments join IAI's already existing cyber operations in Israel, Switzerland and Singapore. Recently, the Secura Group from Singapore also invested \$4.5M in Custodio Technologies, IAI's R&D center in Singapore in exchange for 20% of its shares.

Kelvin Hughes Acquired by HENSOLDT

(bk) The German sensor house HENSOLDT and the UK private equity firm ECI signed a Share Purchase Agreement for the British security and maritime radar solutions provider Kelvin Hughes. "Kelvin Hughes' portfolio will allow us to enter more price-sensitive markets and their security solutions will

Photo: Kelvin Hughes



add value to the HENSOLDT products and bring us one step closer towards our strategic objective to develop our sensor house into a sensor solutions provider," emphasises Thomas Müller, CEO of HENSOLDT. Designing, producing and marketing of ra-

dar sensors mainly for maritime and security applications are the task areas of Kelvin Hughes. Among their products are solid state high performance X-band pulse doppler radars as well as command and control software.

Leonardo DRS Buys Daylight Solutions

(df) Leonardo announced that its US subsidiary, Leonardo DRS, completed the acquisition of Daylight Solutions, Inc., a developer and supplier of quantum cascade laser based products and technology. The acquisition received the approval of the stockholders of Daylight Solutions and all the required regulatory approvals, including review by US antitrust authorities and the Committee on Foreign Investment.

"Innovation is at the core of Leonardo DRS and Daylight Solutions brings an exceptional record of technology advancements in the growing field of infrared laser systems," said William J. Lynn, CEO of Leonardo DRS.

Rebecca Williams Is LORD's New President

(bk) The LORD Corporation Aerospace & Defense Global Industry Group has named a new president. Rebecca Williams will lead the company's worldwide business serving aerospace and defence customers with



Photo: LORD

an improved solutions offer through legacy capabilities and recent acquisitions. Her aim is to have closer relationships with Original Equipment Manufacturers (OEM) as well as tier partners in order to achieve exceptional value through closer partnerships.

Williams started to work for LORD in 1979 and was, most recently, the president of the company's Asia Pacific (APAC) region. During that time the APAC region achieved major new customer wins in commercial aerospace, automotive and industrial customers. Bill Cerami is Williams' predecessor and will retire at the end of 2017 after a 40-year career at LORD.

Cooperation on Maritime Aircraft

(df) In order to replace their (often ageing) fleets of maritime anti-submarine and patrol aircraft in a cost-effective manner, six NATO members have signed a Letter of Intent (LoI) named "Cooperation on Multinational Maritime Multi Mission Aircraft

Capabilities." This cooperation could lead to the joint acquisition or development of new aircraft. "The decision to work together demonstrates both foresight and the willingness to invest in the critical capabilities that the Alliance needs," said NATO Deputy Secretary General Rose Gottemoeller, during the meeting. The Lol was signed at a ceremony in Brussels by the Defence Ministers from France, Germany, Greece, Italy, Spain and Turkey and is open for additional nations to join.

NG and UTC Join Forces

(df) Northrop Grumman and UTC Aerospace Systems join forces "to launch a new era of coordinated technology development", as UTC officials call it. Both companies will align their technology investments on key products and systems in order to develop and deliver advanced, affordable technologies to their joint customers. "Over the last five years, UTC Aerospace Systems has amassed a portfolio of over 4,000 aircraft components and terabytes of related performance data," said Geoff Hunt, Vice President Technology and Engineering, UTC Aerospace Systems. "Along the way, we have built a deep understanding of system of systems – SoS – level design. We see how systems interact throughout the aircraft, and we can leverage technologies across our portfolio to help customers achieve their goals." Greg Manuel, Vice President Global Supply Chain, Northrop Grumman, added: "We look forward to gaining a deeper understanding of what UTC Aerospace Systems has to offer in terms of emerging technology and fundamental capability. Our goal is to discover where we can leverage each other's strengths, and together fine-tune our focus and investments."

Peli Extends British Facility

(df) Peli Products has doubled the size of its office and facilities at its UK Engineering branch, Peli-Hardigg, in Ashford, Kent to 40,000 square feet. "The increase in space has also allowed us to create a more efficient manufacturing process – increasing the foam fabrication and foam assembly areas as well as doubling the size of our custom design area, a true differentiator for us in the market," said Piero Marigo, Peli Products EMEA Managing Director. "Engineers can customise every point of the designs of the protective system from shock and vibration attenuation to impact protection and operational logistics according to individual product specifications, usage and environmental analysis. As part



Photo: Peli

of our ambitious, multi-year development plan and our focus on innovative solutions, Peli-Hardigg will also increase further the size of its engineering department over the coming months."

Rheinmetall Defence Electronics Becomes Rheinmetall Electronics

(bk) In order to focus on their growing success in markets outside the defence sector, Rheinmetall Defence Electronics GmbH has been renamed Rheinmetall Electronics GmbH.

"The name change in no way indicates a turning away from defence technology; far more, it expresses the expansion of our business operations," states the company. "Our international growth strategy aims at positioning the company more strongly in civil sector markets, and to tap into new fields of business in addition to our traditional defence activities." An important order from PEMEX, Mexico's state-owned oil and gas group that was booked at the start of 2016 demonstrates the company's current success in civilian markets. Rheinmetall will build and operate a modern training centre for initial and continuing training of PEMEX's offshore oil platform personnel worth €250M.

Advanced Aerostats for India

(bk) The Indian company Garware Wall Ropes Ltd. (GWRL) announced the signing of a Memorandum of Understanding (MOU) with Israel's Aero-T (a subsidiary of Israel based RT LTA Systems Ltd.) with the intention of supplying new advanced aerostats especially for the Indian market. Aerostats are tethered balloons and have capabilities of operating at altitudes of up to almost 5 km. Equipped with radars, aerostats are useful for low-level ground



Photo: RT

surveillance. They are mobile and can be deployed in varied terrain. "With Aero-T we will be able to cater to the needs of the Indian Defence by providing completely indigenised aerostats backed by our reliable delivery and maintenance support," said Vayu Garware, CMD of GWRL. The collaboration will involve GWRL establishing an aerostat envelope production facility and Aero-T providing the technology, know-how, integration, acceptance and continuous support for the aerostats' development & production.

New Swiss Fighter Timetable

(df) Switzerland has approved first funding of the replacement of its Boeing F/A-18C/D HORNET. In this context an initial amount



Photo: Peter Gronemann

of CHF10M (about €9M) has been authorised for market sighting, preparation study, testing and other possible pre-order costs. According to this (new) timetable Switzerland will select its new fighter aircraft for the air force by 2020 with deliveries starting in 2025. These new fighters will replace the 30 HORNETs of the Swiss Air Force, whose life cycle has been extended to 2030 in order to avoid any shortages. This life cycle extension also needs financing, since the fighters will reach the end of their 5,000 hours per airframe life around the year 2025.

Lisa Atherton New President & CEO of Textron Systems

(df) Textron Inc. has named Lisa Atherton as new President & CEO of Textron Systems. She succeeds Ellen Lord, who will be nominated by US President Donald J. Trump as Under Secretary of Defense for Acquisition, Technology and Logistics within the Department of Defense. Atherton most recently served as executive vice president of Military Business at Bell Helicopter where she provided strategic direction, overall management and performance for all government programmes. Atherton began her career with Textron in 2007 as the Vice President of Area Attack at Textron Defense Systems.



Photo: Textron

IMDS 2018

Showcase of Russian Naval Technology

Sergei Kirshin and Yury Laskin

The 8th IMDS International Maritime Defence Show and conference edition was held in St. Petersburg from 28 June to 2 July 2017 with 443 companies from 31 countries participating.

The event brought together Russia's major naval manufacturers and 50 foreign enterprises. 21 ships were docked near the exhibition site. The show was visited by 56 delegations from China, India, Vietnam, Thailand, Philippines, Pakistan, Algeria, U.A.E., Greece, Chile, Angola, and others. The delegations expressed specific interest

multimode missiles integrated with a radar and optical fire control system in a single turret mount. PANTSIR-ME provides protection against modern air threats including low-flying and small-sized unmanned aerial vehicles. The intercept zone is from 10 to 20 kilometres in length and from 3 to 15 kilometres in height. The system has a

Procurement Plans

- The Russian Navy plans to order a new nuclear-powered aircraft carrier and to be commissioned by the end of 2030.
- The Russian Ministry of Defence approved the preliminary design of new-generation missile destroyer. The LEADER Class destroyer will be powered by a nuclear propulsion plant and will be equipped with the KALIBR anti-ship missile, the ONIKS land-attack missile system, and a naval variant of the S-500 SAM system.

Photos: Alexander Belyaev



The Project 1135.6 frigate ADMIRAL MAKAROV has been commissioned to the Black Sea Fleet



The display of PANTSIR-ME was a long-awaited novelty at IMDS 2017

in naval ships and weapons operated by the Russian Navy and proven in combat. Ships equipped with the KALIBR cruise missile system attracted particular attention (Project 636 diesel-electric submarines, Project 21631 small missile ship).

According to Alexander Mikheev, the Director General of Rosoboronexport, naval export averaged 12 percent of the company's portfolio over the past several years. Since 2000 Russia has exported 50+ warships and submarines constituting a total financial volume of \$24Bn.

Heard and Seen at IMDS 2017

Russia and India have chosen the shipyards to build the Project 1135.6 frigates for the Indian Navy. Two frigates will be built by Russia's Yantar Shipyard, two more by the Goa Shipyard in India. The contract will be signed this year.

The Tula-based Shipunov-named KBP unveiled the naval version of the PANTSIR-ME ADS. PANTSIR-ME combines artillery with

modular design with one command module and up to 4 combat modules depending on the type of ship. The combat module can work autonomously and as part of a cell of 4 modules. It can be installed on ships displacing 300 tons and more.

The United Engine Corporation displayed new marine gas turbine engines which will be subject to series production from 2018 at NPO Saturn. In the scope of a substitution programme for imported components and foreign designs the Project 20380/20385 corvettes will be powered by two 1DDA-12000 diesel-diesel engines by Kolomna Plant and the Project 20386 corvettes will be powered by two M90FR CODAG engines of NPO Saturn.

The Rubin Design Bureau demonstrated the AMULET ultra-light unmanned underwater vehicle. AMULET can operate at a maximum depth of 50 metres, has a submerged cruising speed of 1 m/s and a range of 15 kilometres. Amulet has length of 1.6 meters and weight of 25 kilograms.

- Design work for the PRIBOY amphibious assault ship has commenced. The Navy hopes to receive at least two ships by 2025. Each unit will carry 500-900 marines, 50 infantry fighting vehicles and 10 tanks.
- The Navy plans to build a series of more than 10 improved Project 22350M frigates displacing 8,000 tonnes.
- The Project 677 lead submarine ST. PETERSBURG will be upgraded to the configuration of the first serial-produced submarine of the type. The First two series submarines KRONSHADT and VELIKIYE LUKI will be commissioned in 2020 and 2021 respectively. The Navy will place an order for two more submarines.
- The Navy plans for more than ten guided missile corvettes of Project 20386. The lead ship DERZKY was laid down in late 2016. Her delivery is scheduled for 2021. The second corvette will be keel-laid in 2018. ■

“Best competence to build the next generation of conventional submarines.”

Photo: Kongsberg Defence Systems



Recent months have finally brought confirmation of what has been on the horizon for some time: Norway and Germany are going to work together in a number of key strategic defence programmes. This will offer significant potential to bring the superior expertise of Norway's premier supplier of defence and aerospace systems, Kongsberg Defence Systems, into everyday life. In an interview with ESD, Eirik Lie, President of Kongsberg Defence Systems, details the company's capabilities and future opportunities, as well as long-term cooperation with German industry partners. Lie has held his position at Kongsberg Defence Systems since August 2016.

ESD: What is Kongsberg's business record with the German Armed Forces in general and the German Navy in particular?

Lie: Kongsberg has a long history with Germany, both as far as the defence and civilian side of the company are concerned, supplying to the Air Force, Army, Navy, and the merchant and fishing fleet. Today, we have four offices at three locations in Hamburg, Kiel, and Berlin.

The first contract for joint development of submarine command and weapon control systems [CWCS] for the Norwegian ULA Class and the German U212A was signed in 1982. Kongsberg delivered MSI-90U for U212A Batch 1 and Link 11/16 for U212A Batch 2 submarines. Currently, Kongsberg is under contract for maintenance support of the MSI-90U system.

Other activities include AUVs (Autonomous Underwater Vehicles) and navigation/bridge systems delivered to both military and civilian users.

ESD: At the beginning of February, the Norwegian Government announced that Germany had been chosen as strategic partner in the scope of the new Norwegian submarine requirement. To what extent and with which elements and capabilities do you envision Kongsberg to participate in the programme?

Lie: Norway announced in February its intention to start a dialogue and negotiations with thyssenkrupp Marine Systems, with

the goal to enter into a delivery contract in 2019. Norwegian defence industry ambition in the submarine programme is to win new business similar to the acquisition value over the lifespan of the programme. The Norwegian MoD estimates the financial volume for the acquisition of four submarines at approximately NOK40Bn (~€4.23Bn).

Indirectly connected to the programme, the Norwegian and German MoDs also announced in February to extend naval co-operation from submarines to anti-surface missiles. The two governments have decided to launch a comprehensive strategic partnership for the cooperation of their naval forces. The intention is to jointly develop, procure, and operate not only submarines but also anti-surface missiles in both their respective navies. The volume of the NSM (Naval Strike Missile) sale to Germany is estimated to reach NOK10Bn (~€1.057Bn).

ESD: About a month later, Kongsberg, thyssenkrupp Marine Systems and ATLAS Elektronik announced the foundation of a joint venture company. Where will the new company be based and what will be its business objective and capability portfolio?

Lie: As part of the industrial participation plan, Kongsberg, in March, entered into a teaming agreement with thyssenkrupp Marine Systems and ATLAS Elektronik. Together, we will create a new company

based in Norway that will be the exclusive combat system provider for all submarines built by thyssenkrupp Marine Systems. We join the best competence of our companies to build the next generation of conventional submarines where we are all equally committed to a long-term cooperation. The partnership will last for decades and can be worth more than NOK15Bn (€1.58Bn) for Kongsberg and the Norwegian defence industry in the next decades.

ESD: Do you expect additional funding to be provided for the continued development of IDAS as part of the submarine procurement?

Lie: IDAS (Interactive Defence and Attack System for Submarines) is an ongoing discussion between the German and Norwegian authorities and we do not know the outcome of this. However, this is a very interesting capability where Kongsberg would like to participate.

ESD: Kongsberg's NSM has been selected to equip the German Type F125 frigates and future MKS 180 Multi-Role Combat Ships. What are the particular advantages and operational requirements for the missile and how many systems will be subject to procurement?

Lie: I am not able to disclose technical details or quantities. However, the NSM is a long-range precision strike missile, guided with an inertial navigation system aided



Photos: Kongsberg Defence Systems

by a military SAASM (Selective Availability Anti-spoofing Module) GPS receiver and laser altimeter. NSM has unique capabilities compared to legacy anti-ship cruise missiles. The missile is designed to ensure a high hit probability in the anticipated challenging naval scenarios for the 2020-2030 timeframe and beyond. NSM attributes include, among others: multi-mission sea and land attack; long stand-off range of more than 200 kilometres; very low observable, passive imaging infrared seeker with ATR (Automatic Target Recog-



Surface warships of any size and type can carry NSM (top); ship-board helicopters can deploy the air-launched version (JSM); and submarines may be fitted with NSM-SL (second from top), offering new punch to underwater warfare platforms.

nitition); a sea skimming capability adaptable to sea state; low-level overland flight; target selection in a group of ships; and a rapid automated mission planning system.

ESD: Will German industry be given the opportunity to participate in the German NSM procurement?

Lie: Yes, but I am not able to disclose concepts or details at this stage.

ESD: What is the status of the development programme for a sub-launched version of NSM, and what are the prospects for the air-launched version?

Lie: For the sub-launched NSM, we have conducted a feasibility study in cooperation with selected industry partners to illustrate the potential for a low-risk, affordable adaptation programme. The air-launched version, named JSM (Join Strike Missile), is a fully funded development programme and is currently subject to testing. The

US Air Force is conducting flight-testing at Edwards AFB in California aboard the Lockheed F-16, with weapon releases taking place

at the Utah Test and Training Range. Development testing will be complete in 2018, in parallel with the integration into the internal weapons bay of the F-35, in time for delivery for the Royal Norwegian Air Force F-35s.

The questions were asked by Jürgen Hensel and Stefan Nitschke.

Preview

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		CALIBER	MAGAZINE CAPACITY	FRAME	BARREL LENGTH (MM)	LENGTH OF WEAPON WITH STOCK FOLDED/UNFOLDED, RETRACTED -EXTENDED (MM)	HEIGHT WITHOUT MAGAZINE (MM)	WIDTH OF WEAPON WITH STOCK FOLDED/ UNFOLDED (MM)	WEIGHT WITHOUT MAGAZINE (G)
CZ BREN 2	8"	5.56x45 mm NATO	30	ALUMINIUM	207	505/684-733 ± 10	202 ± 5	80/104 ± 5	2891 ± 50
CZ BREN 2	11"	5.56x45 mm NATO	30	ALUMINIUM	280	577/762-807 ± 10	202 ± 5	80/104 ± 5	2986 ± 50
CZ BREN 2	14"	5.56x45 mm NATO	30	ALUMINIUM	357	657/840-884 ± 10	202 ± 5	80/104 ± 5	3103 ± 50
CZ BREN 2	9"	7.62x39 mm	30	ALUMINIUM	227	525/706-753 ± 10	202 ± 5	80/104 ± 5	2847 ± 50
CZ BREN 2	11"	7.62x39 mm	30	ALUMINIUM	280	573/755-802 ± 10	202 ± 5	80/104 ± 5	2896 ± 50
CZ BREN 2	14"	7.62x39 mm	30	ALUMINIUM	357	650/833-880 ± 10	202 ± 5	80/104 ± 5	3009 ± 50

Stated dimensions may be different in particular design and configuration.

CZ P-10 C

9x19 15 (17)

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	FRAME	GRIPS	TRIGGER	SIGHTS	OVERALL LENGTH (MM)	BARREL LENGTH (MM)	HEIGHT (MM)	WIDTH (MM)	WEIGHT (G)	SAFETY FEATURES
CZ P-10 C	POLYMER	-	STRIKER FIRED DOUBLE ACTION	LUMINESCENT OR TRITIUM	187	102	132	32,2	760	TRIGGER SAFETY; DROP SAFETY # 1 STRIKER BLOCK; DROP SAFETY # 2 TRIGGER BAR SAFETY



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