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COUNTRY FOCUS:
DENMARK

Special Operations Forces

- Royal Netherlands Navy Update
- Small Arms Ammunition Developments
- Advances in Night Vision Technology
- Defence Procurement in Hungary
- Observation Technologies
- Anti-Tank Guided Weapons

C-390 MILLENNIUM SUCCESSFULLY ACCOMPLISHING MISSIONS

The C-390 Millennium multi-mission aircraft is in-service with Brazilian Air Force delivering exceptional performance and fulfilling all expectations, most notably with support during the Covid-19 pandemic. The C-390 is also the aircraft of choice for Portugal and now Hungary too. Both these air forces have selected the C-390 to meet their own unique and demanding operational requirements. By combining state-of-the-art systems and proven technologies with a worldwide network of reputable suppliers, the C-390 Millennium is a versatile addition to any air force. The C-390 is the most reliable, easy to operate and efficient aircraft in its class.

#ForADifferentWorld



Opportunity Missed – Europeans Barely Pick up on US Advances



This time, the traditional annual Munich Security Conference 2021 took place in a very abbreviated, digital format. It mainly served one purpose: US President Joe Biden intended to send a signal that he wants to work closely and openly with Europe again. The heads of government from Germany, France and the United Kingdom, as well as the EU Commission President and the EU Council President were to respond. But it was not the event for a dialogue. The heads of state made their statements.

President Biden was very clear in his commitment to cooperation between the US and the Europeans in the EU and NATO. He set a clear tone: he sees the main confrontation with China, and he would like to see the Europeans on his side. The Europeans named Russia first and judged China to be much more friendly. Here, cracks opened up between Biden and German Chancellor Merkel in particular. For Biden, China is a competitor, politically as well as economically. Merkel emphasised how important China is as a trading partner. Official German government policy still separates security and economics. Very many, especially the US, no longer follow this line: they have a broader concept of security. China also pursues strategic goals with its economic policy, and the Europeans, especially the Germans, must learn this and take it into account politically.

Biden made it clear that it was central for him to fight for democracy. He is not only concerned with economic issues, but also with values. And he is campaigning precisely for this broad concept of security policy.

Biden's Offer – Merkel's Reluctance

The responses to Biden were disappointing. Those who had hoped that the Europeans would take up his position courageously and propose some offers for areas of cooperation were bitterly disappointed. Above all, Chancellor Merkel reeled off the old familiar narrative rather listlessly. The manuscript of her last speech, when she reacted to the policies of then-President Trump, was slightly revised in content and peppered with a few kind words to Biden. British Prime Minister Johnson was almost a little gloating when he made it clear how flexible Britain could now be - without the EU. This led to a "Britain first" speech, which was also not in keeping with the spirit Biden wanted to invoke.

France's President Macron's remarks, putting his idea of a stronger European identity into the Euro-Atlantic context, were intellectually more demanding.

The reaction of the Europeans was also so disappointing because, since election day in the USA in November, Europeans have known that they would be asked what they could contribute to better cooperation: their planning staffs had time to come up with an appropriate answer. However, it may well be that the German Government no longer has the strength to do so. The coalition parties are drifting further and further apart, seven months before the federal elections in 2021. The CDU/CSU and the SPD no longer want to govern together after the elections in September 2020, which is why they no longer agree conceptually. That could be a hindrance in the election campaign, and in terms of foreign policy it is a revelation.

France and the United Kingdom performed a bit better, but not convincingly either. So, the situation has reversed: whereas last year the Europeans were the ones who wanted to step on the accelerator in the Euro-Atlantic relationship, and pushed the USA accordingly, they are now lagging far behind in the face of momentum from Washington, and it looks as if they will have to be carried to the chase. The train drivers have become the brakemen.

Road to Munich

What will happen to the Security Conference? This event is to remain a "special edition". Internally, the Head of the Security Conference, Wolfgang Ischinger, is quoted as saying that nothing can replace the "Walk in the Park", the stroll through Munich's city park which offers precisely the informal opportunities for contact among responsible politicians that make the event so valuable. So, the intent is to return to the old in-person format. If possible, such a face-to-face conference should still take place in 2021 – the coronavirus permitting. But the organisers do not really trust the situation, which is why hybrid forms are also being considered: some people will come to Munich, others will join the conference virtually. This means that those present in Munich will talk "with" those who are there and "about" those who have only joined virtually. Still, perhaps that is much better than nothing.

The Security Conference is designing a "Road to Munich." With fora on different topics, the worldwide discussion forum is to remain on the playing field of international debate. This is in preparation for what will happen in the summer of 2021 or later...

Rolf Clement

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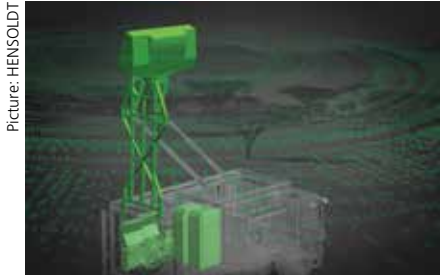


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HENSOLDT South Africa Launches Radar Business

(jr) HENSOLDT South Africa has launched its new radar business after acquiring the Air Traffic Management (ATM) and Defence & Security business units of Tellumat at the end of 2020. Together with the company's existing radar and other capabilities, these business lines are integrated to form the Radar Business Unit of HENSOLDT South Africa.



Picture: HENSOLDT

Through this acquisition, HENSOLDT South Africa's capabilities are expanded with a new portfolio area, centring around radar, IFF and datalinks. The radar offering focuses on naval and land radar, which will include leading-edge new development in this product range. Identification Friend or Foe (IFF) and data-links will also be offered, where HENSOLDT is inheriting a product range that it aims to enhance. Finally, Air Traffic Management (ATM) and radar services will become part of the overall portfolio, with the aim of expanding the ATM services and developing existing radar support services into full-blown Maintenance, Repair and Operations (MRO). The acquisition also gives rise to strong synergies between HENSOLDT South Africa's Radar, Optronics and GEW business units, with collaboration envisioned on various fronts. The ASTUS tactical surveillance Unmanned Aerial System (UAS), previously part of the Defence & Security business unit in Tellumat, is being integrated into HENSOLDT South Africa's Optronics portfolio as part of the company's airborne capability.

INVISIO Completes Racal Acoustics Purchase

(jr) INVISIO's acquisition of Racal Acoustics, announced on 22 December 2020, is now complete. The result is INVISIO broad-

ening its offer with a complementary product category consisting of advanced and robust hearing protection and communication headsets for environments with constant high noise.

Examples include the interiors of large military vehicles and around aircraft. Several attractive growth opportunities are created. These come through combining Racal Acoustics' market leading offer with INVISIO's global sales organisation and by giving INVISIO access to customers relevant to the Intercom system.

Racal Acoustics has recently completed a successful restructuring and is expected to make a considerable contribution to INVISIO's continued growth journey in 2021, while having a positive impact on profits. No material integration costs are expected. The new acquisition will constitute the group's High Noise Excellence Centre and be responsible for developing new solutions specially adapted to challenging environments with constant high noise. Products will continue to be marketed under the Racal Acoustics brand.

Aeronautics Acquiring Magal's Integrated Solutions Division

(jh) Aeronautics Group, a provider of integrated turnkey solutions based on unmanned systems platforms, payloads and communication for defence and HLS markets, is acquiring the Integrated Solutions Division of Magal Security Systems, including all the division's global operations and subsidiaries. The acquisition is a major milestone in extending Aeronautics Group's operations further into additional military, HLS and advanced paramilitary markets. The acquisition is expected to be completed in the second quarter of 2021, and is subject to customary closing conditions, including regulatory approvals.

New Rheinmetall Corporate Structure

(gwh) Rheinmetall is to strategically realign its technology group by streamlining its

structure and focusing even more strongly on defence and security technology. As a result, sales are to rise significantly over the next five years from €5.8Bn to €8.5Bn and the operating margin to over ten per cent. For the transformation into an integrated technology group, the intermediate holding company Automotive will be dissolved and the group will be divided into five divisions. The three divisions of the former Defence sector (Weapon & Ammunition, Electronic Solutions, Vehicle Systems) will be joined by the two divisions Sensors & Actuators and Materials & Trade from the Automotive sector. The former pistons unit will continue as a non-core business.

Specifically, this structure is intended to promote technology transfer between the individual divisions and support the focus on future-oriented technologies and business areas with great potential for sustainable value enhancement.

Security technology and electromobility in particular are seen as growth drivers, and their share of Group sales is expected to increase, while the share of business in the internal combustion engine sector will be adjusted to new market conditions. Security technology is expected to contribute about 70 per cent of Group sales by 2025, instead of about 63 per cent in 2020. Reliance on the internal combustion engine will be further reduced and is expected to fall from almost 30 per cent of Group sales today to less than 20 per cent. The new divisional structure not least takes these goals into account.

The consideration of Environmental, Social and Governance (ESG rating) is to become part of the compensation policy. By 2035, the Group wants to be CO²-neutral, significantly reducing energy consumption and cutting water consumption by ten per cent.



Chart: Rheinmetall



Photo: Invisio

■ PROTECTOR Weapon Station and Shot Detector for BOXER MIVs

(gwh) The British BOXER Mechanised Infantry Vehicles (MIV) will be equipped with Kongsberg's PROTECTOR RS4 remote controlled weapon station and Thales' ACUSONIC shot detection system. RBSL (Rheinmetall BAE Systems Landsystems), along with WFEL, one of the two central BOXER contractors, has awarded Thales a ten-year contract to supply and integrate the two systems with approximately 500 BOXER vehicles under contract for the equivalent of €208 million.



Photo: Kongsberg

The PROTECTOR RS4, of which some 20,000 are in global service, is designed to be equipped with light and medium calibre machine guns as well as anti-tank missiles. Dual-axis stabilisation, day/night sights and laser rangefinders enable high reconnaissance performance and precise engagement. For the BOXER MIV, Thales integrates its CATHERINE EZ thermal imaging module as well as the CELT3 laser rangefinder. The ACUSONIC shot detection system, also used with the AJAX infantry fighting vehicle, uses sonar technology to determine the direction of enemy fire and alert the crew.

■ First Look at the MTV for the Netherlands

At IDEX in Abu Dhabi, Iveco publicly unveiled for the first time the Medium Tactical Vehicle (MTV) currently under development for the Dutch Armed Forces. The vehicle will be introduced in all branches of the forces and the military police from 2023. In 2019 and 2020, the Dutch Ministry of Defence has ordered a total of 1,185 vehicles in four versions with short and long cabs.



Image: euro-sd.com

The twelve-ton 4x4 vehicle is powered by a 207-kW diesel engine with automatic transmission. The cabs of all variants are made of ballistic steel and are additionally protected against bullets and blasts by add-on protective elements. 120 MTVs will be equipped with a remote-controlled weapon station for self-defence.

The vehicle presented at IDEX largely corresponds to the prototype testing, scheduled to commence later this year. The Dutch MoD wants to qualify the vehicle in 2022. Based on the assumption that the results will meet the requirement, series production commence and the first vehicles can be available from 2023.

With the MTV, Iveco now offers a range of protected vehicles covering the seven to 19 tonne gross vehicle weight spectrum. This includes the Multirole Utility Vehicle (MUV), the Light Multirole Vehicle (LMV), the Medium Protected Vehicle (MPV) and the new Medium Tactical Vehicle (MTV).

■ Extra CV90s for Norway

(jr) BAE Systems has received an order from the Norwegian Army for 20 additional CV90 Infantry Fighting Vehicles (IFVs) to increase the combat power of its existing fleet.

The Norwegian Defence Materiel Agency awarded the contract, valued at more than US\$50M, as part of its effort to grow and modernise in the face of evolving threats.



Photo: BAE Systems

Norway is one of seven CV90 users and is the latest customer to enhance its fleet of combat-proven CV90s following significant life extension and mid-life upgrade contracts from Switzerland and the Netherlands. The new Norwegian order for 12 engineering and eight multi-carrier CV90 variants (increasing the fleet total to 164) is scheduled for delivery in 2023.

BAE Systems Hägglunds, the manufacturer of the CV90 based in Örnsköldsvik, Sweden, will deliver the new vehicles in cooperation with Ritek, an established Norwegian CV90 partner. With Ritek at the centre of the local industrial cooperation hub, up to 30 potential Norwegian suppliers will be responsible for upgrading and repairing components, as well as delivering new subsystems and technology solutions as

part of future upgrades for the Norwegian CV90 fleet.

BAE Systems has a successful history of industrial cooperation projects in Norway that have strengthened industry partnerships, transferred technical know-how, and exceeded customer expectations and requirements. During the latest CV90 procurement and upgrade contract, BAE Systems Hägglunds delivered 100 per cent offset obligation five years ahead of schedule.

Norway is one of seven European users operating the CV90. The others are Denmark, Estonia, Finland, Switzerland, Sweden and the Netherlands. With close to 1,300 vehicles in service in multiple variants, the vehicle is combat-proven and designed to accommodate future growth to meet evolving missions.

■ Nautic Africa Launches Flagship Vessel

(jr) Nautic Africa, a Paramount Maritime Holdings subsidiary, has announced the launch of its new flagship SENTINEL vessel, the second of the new enhanced class. This is a major milestone for the company and the wider African shipbuilding industry due to its successful completion despite the challenges presented by the COVID-19 lockdown enforced across the globe.

Following the successful completion of sea trials, the multi-purpose vessel is destined for the Gulf of Guinea where it will be utilised for International Oil Company (IOC) related assignments as well as escort patrols for larger vessels that have experienced an escalation of pirate attacks within 200 NM of the West African coastline.

Nautic Africa also announced that larger naval versions (40m and 47m) of the vessel have been made available due to rising interest from navies. These will be offered globally to bolster military and fishing patrol operations across EEZ waters.

The 35m SENTINEL class vessel, wholly designed with class leading features and manufactured in Africa, sets a new benchmark in innovative protection. It is fully compliant to the standards of naval and Oil and Gas (O&G) industries and IOCs operating on the waters off the African continent and beyond.



Photo: Paramount

■ USAF Receives HELWS

(gwh) The US Air Force has received a High Energy Laser Weapon System (HELWS) to fight against drones. A prototype had provided the required proof of performance in over 1,000 hours of operation since the beginning of last year. Subsequently, the HELWS had been certified and a further production order had been placed. The HELWS technology will also be deployed in key regions outside the US for operator training and experimental testing and evaluation.

Photo: Raytheon



Raytheon has mounted the weapon system in the rear of a Polaris MRZR. A 360-degree rotating head directs the laser beam onto the target and the integrated power supply enables dozens of firings, according to the company. Connected to a standard 230-volt mains supply, unlimited operation is possible. The multi-spectral targeting system – used in the large MQ-1 PREDATOR and MQ-9 REAPER drones – is used for target reconnaissance and tracking. Transport capability and survivability have been improved in the latest version of the HELWS on MRZR for additional operational

environments. A new laser beam guidance system enables more accurate target acquisition and the robust power supply system extends mission duration when no power is available.

■ IAI Introduces MegaPOP

(jr) Israel Aerospace Industries (IAI) is expanding its family of Electro-Optical/IR payloads with the introduction of MegaPOP, a system developed by TAMAM, IAI's electro-optical and navigation system house. The new payload is designed for land applications such as marine or land border control, surveillance of sensitive facilities, or any other operational mission that requires especially lengthy surveillance performance, as well as high-definition vision capabilities with a system that uses several sensors, simultaneously.

MegaPOP simultaneously tapes a video on a thermal/ HD channel with night vision, a colour daylight HD channel and an innovative HD SWIR technology channel. The continuous zoom capability provides the end-user with high quality output even under challenging visual conditions. The system features an exceptionally long range of surveillance augmented by multispectral capabilities. It offers an extraordinary range of sensors that can be used together and a range of laser capabilities. Additional system features include digital tracking, specialised image processing, and additional methods of data processing and automating surveillance capabilities.

Image: IAI



A built-in gyro stabilising system ensures stable imaging under all environmental conditions. MegaPOP has magnetic-independent, highly-accurate northing capability to assist in managing target datum points. Advanced digital interfaces allow simplified control even from remote control posts and operational work that involves additional sensors, including ELINT, COMINT, and more.

■ Successful Leonardo BriteCloud Trial

(jr) A recent trial where the German Armed Forces launched a Leonardo BriteCloud 218 decoy from an Airbus RPATS test platform, to evaluate its potential in protecting flying weapon systems from radar-guided missiles, has been heralded as a success. The trial, which was conducted with support from Airbus, Leonardo and the German analysis and testing firm IABG, saw live BriteCloud 218 rounds ejected from the RPATS during flight. This allowed the aircraft to successfully evade missiles equipped with Semi-Active Radar (SAR) seeker technology.

BriteCloud is a flare-sized electronic device that protects aircraft from modern radar-guided missiles. Launched from a standard countermeasure dispenser, it transmits powerful radio emissions that simulate the missile's expected target, drawing the threat towards BriteCloud and away from the aircraft. Leonardo claims to be the only company to have successfully miniaturised such sophisticated jamming technology into a flare-sized package.

The German trial marked the first time BriteCloud has been launched from an RPATS

Image: Leonardo



■ TCI Announces New EW Platform

(ah) TCI International, Inc. has announced the introduction of its new SWIFT platform for tactical electronic warfare operations in 2021. The system includes a man-portable version, supplementing the capabilities of the current generation Model 903S with an integrated server processor, enhanced network capabilities and increased battery life in an IP67-rated form factor, and a rack-mounted version for mobile vehicle, shipboard and transportable applications. It is backwards compatible with the manufacturer's existing COMINT systems to allow for reuse of existing assets.

Photo: TCI International



According to TCI, performance enhancements include broader instantaneous bandwidths, scaleable and higher bandwidth digital downconverters, faster scan rates, and expanded networking capabilities. The new SWIFT platform will operate the Blackbird NextGen signal detection, acquisition and processing software with new capabilities including enhanced spectral shape capabilities, integrated, multi-site networking and data collection, a common emitter database and NATO symbology, an improved common operational picture, and a higher degree of operational control over multiple COMINT assets across tactical networks, including full remote control of single or multiple COMINT systems within the theatre.

TCI promises faster reaction times through integrated signal processing, emitter identification and geolocation at the edge of the network, i.e. the site of the sensor. Processing is based on advanced radio frequency machine learning techniques. The system allows for flexible use on all levels of the chain of command, including covert and special operations.

platform. BriteCloud does not require integration and is a cost-effective way to equip such assets with jamming capabilities. The BriteCloud 218-variant rounds used during the trial pack this technology into a standard-sized rectangular countermeasure casing measuring two by one by eight inches. This means it is compatible with a range of common dispensers such as the AN/ALE-47, making it possible to economically boost the defences of older F-series jets such as the F-15 and F-16. This is in addition to smaller RPAS platforms.

BriteCloud 218 is also currently undergoing the United States Foreign Comparative Testing (FCT) programme, led by the US Air National Guard, which could lead to the decoy entering service with the US Air Force Air Combat Command and other US services. Meanwhile, Leonardo's original BriteCloud 55 decoy (which is slightly larger and compatible with round 55mm flare dispensers such as those on the Eurofighter TYPHOON and Saab GRIPEN), has already entered active service with the UK's Royal Air Force.

■ Embraer Supports Brazilian WTO Decision

(jr) Embraer has welcomed the Brazilian Government's decisions to withdraw its ongoing World Trade Organisation (WTO) dispute with Canada regarding aeronautical subsidies and to launch negotiations on more effective disciplines to regulate government support in the Commercial Aviation segment.



Photo: euro-sd.com

At the WTO, Brazil challenged more than US\$3Bn in illegal subsidies that the Governments of Canada and Quebec provided to Bombardier for the launch, development and production of the C-Series programme. These distorted the conditions of competition in the global market for commercial aircraft, causing serious prejudice to Embraer, in clear violation of WTO rules.

Although Brazil has a strong case, the WTO dispute became ineffective to address the Canadian subsidies and to remedy the distortions generated in the market. After Bombardier exited the Commercial Aviation segment and transferred the C-Series programme (now called A220) to Airbus, which

has a second assembly line in the United States, the trade dispute against Canada at the WTO is no longer the most effective means to achieve Brazil's and Embraer's goal of re-establishing a level playing field in this sector.

Embraer also supports Brazil's initiative to launch negotiations for more effective disciplines on government support in the commercial aviation segment as the best way to achieve this goal, as previously seen with the successful experience of the OECD's Aircraft Sector Understanding (ASU), signed in 2007 to regulate export credits. Ultimately, Embraer believes that commercial aircraft manufacturers should compete against each other based on the merits of their product, not on the amount of funding they receive from their governments.

■ Switzerland: Developing Capabilities, Increasing Energy Efficiency

(jh) In February, the Swiss Federal Council adopted the Army Dispatch 2021, thus defining the way forward. With guarantee credits of around CHF2.3Bn, the Federal Council is pursuing five priorities. It wants to expand command and communication systems, improve mobility, protect members of the armed forces more effectively, adapt logistics infrastructures to greater readiness and modernise training infrastructures. With these investments, the armed forces will increase their energy efficiency and produce even more renewable energy in the future. The Armed Forces Dispatch 2021 shows for the first time how much the planned investments will contribute to achieving the climate goals.

In the coming years, the intention is to gear the armed forces' capabilities more towards a hybrid conflict picture, both in defence in an armed conflict and in subsidiary support to civilian authorities. The armed forces must be prepared to be deployed in a broad range of tasks, according to an official news release.

With the Army Dispatch 2021, the Federal Council is proposing guarantee credits of CHF2.3Bn to Parliament, with all expenditure being financed through the ordinary defence budget. The Army Dispatch 2021



Photo: VBS

includes the guarantee credits for the armament programme, the procurement of army equipment and the Federal Department of Defence, Civil Protection and Sport's (VBS) real estate programme.

■ MLU for Dutch FENNEKs

(gwh) After some twenty years in service with the Dutch Koninklijke Landmacht, the service life of the Dutch FENNEK reconnaissance vehicles is being extended with a Mid Life Update (MLU) The Dutch procurement



Photo: Dutch Mod

agency the Defensie Materieel Organisatie (DMO) has signed a contract with Krauss-Maffei Wegmann (KMW) for the upgrade of 322 FENNEK vehicles. A total of €447M has been budgeted for the thorough overhaul, the integration of the new observation and reconnaissance systems (BAA II NL) and that of the Command, Control, Communications, Computers & Intelligence (C4I) system. Furthermore, functionalities in the areas of protection, firepower, mobility, training and maintenance will be improved. The revised vehicles are scheduled to rejoin the force between 2022 and 2027.

The work is being carried out in Germany by KMW and in the Netherlands by the partner companies Van Halteren Defence and Nedinsco in cooperation with the Materieellogistiek Commando Land (MatlogCo) of the Army. The FENNEK reconnaissance vehicle is a binational German-Dutch development, of which 222 vehicles in three versions have been delivered to Germany and 410 vehicles in five versions to the Netherlands since 1997.

■ EDA Launches ARTUS UGV Project

(gwh) The European Defence Agency (EDA) has launched the Autonomous Rough-terrain Transport UGV Swarm (ARTUS) project with a kick-off event. In a technological feasibility concept, the initial aim is to develop ways of supporting infantry platoons during their missions by means of a small swarm of intelligent and autonomously operating Unmanned Ground Vehicles (UGVs). The supporting swarm will significantly enhance infantry performance by tracking equipment through harsh environments, includ-

ing densely wooded or sloped areas. The swarm is to react autonomously to unexpected developments, such as the loss of its members. Overall, the aim is to increase the mobility and flexibility of the unit as well as the general level of protection of the troops. Finally, a demonstrator will be built and is to be used to prove the capabilities of the concept.

Photo: Bundeswehr/FKIE



The consortium is led by the Fraunhofer Gesellschaft zur Förderung der Angewandten Forschung e.V. from Germany and also includes ONERA of France (another established Research and Technology (R&T) organisation), Diehl Defence (also from Germany) and Austria's charismaTec, a highly innovative medium-sized company. The €1.5M EU-funded project will run for 24 months.

The ARTUS project is part of the Preparatory Action on Defence Research (PADR), launched by the European Commission in 2017 to assess and demonstrate the added value of EU-funded defence R&T. PADR paved the way for a dedicated European Defence Programme to be launched as part of the European Defence Fund (EDF) under the EU's Multiannual Financial Framework (2021-2027).

■ Dutch Army Tests SMASH in Alpine Environment

(jh) The Dutch Army has recently completed a two-day live-fire counter-drone trial using Smart Shooter's SMASH Fire Control System. The test took place in the Austrian High Mountains, as part of the Dutch MoD's ex-

Photo: Defensie Grondgebonden Luchtverdedigingscommando



amination of different ways to combat small unmanned systems.

Tested at a range of up to 200 metres in harsh weather conditions, SMASH proved to be effective as all 67 drone targets were successfully hit with up to 3 shots each. It made no difference whether the drones were stationary in the air or moving. The Dutch armed forces reported that with SMASH soldiers are able to deliver a locked shot at ground targets and drones, therefore significantly increasing hit probabilities. The RAS (Robotic Automated Systems) platoon of the 13th Light Brigade tested SMASH in Austria at the tactical level. However, the system may also be of value in protecting sensitive strategic assets such as air force bases, ships, or in military operations abroad. Testing the intercept capability fits within the roadmap of the Nucleus C-UAS of the Dutch armed forces.

■ NATO AGS Reaches IOC

(gwh) NATO's Alliance Ground Surveillance System (AGS) has achieved Initial Operating Capability (IOC). This important milestone was announced by the NATO Supreme Allied Commander, General Tod Wolters, on 15 February 2021.

Photo: NATO



In November 2020, the fifth and final Northrop Grumman RQ-4D PHOENIX UAV landed at the NATO Alliance Ground Surveillance Force (NAGSF) Main Operating Base (MOB) in Sigonella, Sicily. The base will be fully developed with all facilities by 2022 and Full Operational Capability (FOC) is to be achieved by 2025. By then, 550 personnel from the 15 NATO countries supporting the system will be working there.

The AGS capability will enable NATO to sustain surveillance over vast areas from aircraft operating at high altitudes and for long periods of time, over long distances and in all weather and light conditions. Using advanced radar sensors, these systems will continuously detect and track moving objects and provide radar images of areas of interest and stationary objects. All 30 NATO countries will have access to the information they generate.

NATO's AGS capability is being procured by the NATO Alliance Ground Surveillance Management Agency on behalf of 15 Allies. When the assets are handed over, the NATO Support and Procurement Agency will assume responsibility for the life-cycle management of the AGS fleet.

The aircraft are remotely controlled from the AGS MOB in Sigonella and fly predominantly in NATO or international airspace. Since the first training and familiarisation flight in June 2020, numerous missions have taken place, successfully collecting air surveillance data that proves the platform's performance for NATO.

■ Soucy Awarded SCRT Contract

(jr) Soucy International Defense Division has been awarded a contract to manufacture and deliver prototype Segmented Composite Rubber Track (SCRT) systems for the US Army's Ground Vehicle Systems Centre (GVSC) as part of the Platform Electrification and Mobility (PEM) project. This has been created to help develop, integrate and test essential electrification and mobility technologies necessary for soldier experimentation with manned and unmanned Next Generation Combat Vehicle (NGCV) platforms.

Within the NGCV programme, there is the Optionally Manned Fighting Vehicle (OMFV) and the Robotically Controlled Vehicle (RCV). Soucy will refine existing SCRT technology as part of the OMFV Demonstrator within the PEM programme that is aimed to achieve its goals of:

- Silent mobility
- Reduced track system weight compared with conventional steel tracks
- Decrease rolling resistance
- Ease maintenance and the logistical burden.

Photo: Soucy



Soucy CRT has made great improvements over the last 15 years, with the continuous, single loop design providing significant reductions in:

- Weight
- Vibration
- Acoustic and thermal signature

- Increased fuel efficiency
- Ease of maintenance which allows for reduced logistical support.

Segmentation of a composite rubber track could further reduce soldier physical maintenance burden, vehicle installation time and ease overall sustainment challenges in a contested operational environment. This prototype will allow the US Army and GVSC to evaluate demonstrated options of different track systems for the OMFV programme.

■ HENSOLDT to Modernise K130 Radars

(jh) HENSOLDT is modernising the TRS-3D radars of two K130-class corvettes of the German Navy, as well as an associated shore facility. An order for corresponding electronic components was placed by the Federal Office of Bundeswehr Equipment, Information Technology and In-Service Support (BAAINBw). The replacement deliveries will take place in the course of this year.



Photo: HENSOLDT

The TRS-3D is a three-dimensional multi-mode ship radar for air and sea surveillance, which can correlate the position and movement data of targets with the HENSOLDT identification system MSSR 2000 I and thus improve the automatic identification of ships and aircraft.

More than 60 TRS-3D radars are in service with navies and coastguards worldwide. In addition to K130 corvettes, vessels equipped with it include the US Coast Guard's National Security Cutters, a number of US Navy Littoral Combat Ships, as well as ships of the Finnish Navy and the Norwegian Coast Guard.

■ DARPA Initiates Design of LongShot UAV

(jh) The United States' Defense Advanced Research Projects Agency's (DARPA) LongShot programme, which is developing an air-launched unmanned air vehicle (UAV) with the ability to employ multiple air-to-air weapons, has awarded contracts to General Atomics, Lockheed Martin, and Northrop Grumman for preliminary Phase I design work. The objective is to develop a novel UAV that can significantly extend engagement ranges, increase mission effectiveness, and reduce the risk to manned aircraft.



Image: DARPA

Current air superiority concepts rely on advanced manned fighter aircraft to provide a penetrating counter air capability to effectively deliver weapons. It is envisioned that LongShot will increase the survivability of manned platforms by allowing them to be at standoff ranges far away from enemy threats, while an air-launched LongShot UAV efficiently closes the gap to take more effective missile shots. In later phases of the programme, LongShot will construct and fly a full-scale air-launched demonstration system capable of controlled flight, before, during, and after weapon ejection under operational conditions.

■ AEC Skyline Training USAFE

(jr) Operating out of Zweibrücken airport in Germany under a permit issued by German authorities, AEC Skyline's fleet of upgraded Aero L-39 jet trainers has begun supporting Joint Terminal Attack Controller (JTAC) Close Air Support (CAS) training on behalf of the United States Air Force in Europe (US-AFE). The initial sortie on 11 February mission saw one of the Dutch air contractor's L39s supporting training in the US military's Baumholder training area.

Flying under a contract that could extend to 30 September 2025, AEC Skyline's L-39s carry a L3Harris Wescam MX-15D EO/IR sen-



Photo: AEC Skyline

sor pod equipped with laser spot tracker as well as night vision devices, IR pointers and UHF, VHF radios to enable both day and night CAS tactical employment capability. The onboard L3Harris CMDL 2i digital duplex datalink, operating in the L, S, C and Ku frequency bands, provides full support for full motion video and Digitally Aided Close Air Support (DACAS) training.

Adhering to internationally agreed JTAC standards, performance includes flying up to 320 flying hours per year with a maximum of 12 hours per day. Units being supported are the Warrior Preparation

Center's 4th Combat Training Squadron as well as the 4th Air Support Operations Group and subordinate units with training being performed in primary training areas in Germany and in other European countries if required. Home based at Groningen airport Eelde in the Netherlands, AEC Skyline has indicated that it stays committed to providing full, high end training support regardless of any possible repositioning of forces allocated to United States European Command (USEUCOM). This will ensure the continuation of training aimed at integrating air combat power and surface fires.

■ Sikorsky to Build Presidential Helicopters

According to a news item published by Aerospace & Defense News, Sikorsky is under contract to manufacture a total of 23 VH-92A® Presidential Helicopters for the US Marine Corps with the company on schedule to deliver the next generation



Photo: euro-sd.com

Presidential Helicopter later this year.

The award for five aircraft was announced on 5 February 2021 and is the final lot of VH-92A presidential helicopters. Sikorsky's workforce is completing final modifications on 12 of the production aircraft at its manufacturing facility in Stratford, Connecticut and Owego, New York.

The VH-92A will transport the President and Vice President of the United States and other officials. Sikorsky brings solid experience and a proven track record to this mission having flown every US Commander-in-Chief since President Dwight D. Eisenhower. The VH-92A, also called a "White Top" due to its notable white and green livery, will continue this legacy for decades to come.

The VH-92A programme ensures long-term affordability and maintainability by utilising the FAA certified Sikorsky S-92 aircraft, modified for government defined requirements, which has industry leading reliability and availability. The S-92 fleet surpassed 1.7 million flight hours in 2020 and averages 14,400 hours of safe flight per month.

ECA CAMELEON Mk3 Launched

(jr) ECA GROUP has unveiled the latest upgrade to its CAMELEON E UGV. This MK3 version enhances its capabilities for IED and Explosive Ordnance e Devices (EOD) clearance missions.



Photo: ECA

Leveraging the technologies implemented with its latest IGUANA UGV,

ECA GROUP has also upgraded the CAMELEON E robot. The MK3 features enhanced performances and an intuitive user interface that is now compatible with ECA GROUP's entire range of UGVs.

Mission module examples include:

- 6-axis manipulator arm
- Zoom camera
- X-Ray system
- Gripper jaws
- Disrupters
- COFDM transmission
- Fibre-optic transmission
- CBRN resistance.

All are fully compatible with the IGUANA UGV range. The CAMELEON MK3 is fully compatible with the IT180UAV, which can be used in collaborating mode on the battlefield to give tactical feedback to the operator.

Rheinmetall to Modernise 27 BOXER Command Vehicles

(jr) Rheinmetall is modernising 27 more BOXER Command Vehicles for the Bundeswehr. This will bring them up to the latest A2 standard, with the contract awarded at the end of January 2021. The 27 vehicles are to undergo modernisation at the Rheinmetall Landsysteme GmbH plant in Kassel, Rheinmetall's centre of excellence for tactical wheeled vehicles. Work is set to begin in March 2021, with a return of the vehicles to the Bundeswehr slated to take place during the 2022-2024 timeframe. The order is worth a figure in the lower two-digit million-euro range.

The Command Vehicle, or FÜFz in German military parlance, is one of four variants of the BOXER armoured transport vehicle currently in service with the Bundeswehr. The FÜFz is found in mechanised formations, where it serves as a mobile tactical opera-

tions centre (or command post). The vehicles feature a full panoply of radio equipment and advanced C4I systems.

The upgrade to A2 status encompasses an extensive array of modernisation measures, including:

- Driver's visualisation system
- Exhaust emission
- Air-conditioning ducts
- Towing gear
- Driver's station
- Headlight technology
- Software and system security modifications.

In addition, the vehicle's satellite communication capability, voice and data transmission, alongside IT equipment, will all be improved.

The latest order follows the modernisation to A2 status of the first lot of 38 BOXER Command Vehicles that commenced in 2017. The current combat performance

Photo: euro-sd.com



upgrade of the second lot will ensure that the Bundeswehr's entire fleet of 65 BOXER Command Vehicles reflects the latest tactical and technical state of the art.

Oshkosh Defense Celebrates Production of the 10,000th JLTV

(jh) Oshkosh Defense, LLC announced in February that the company produced the 10,000th Joint Light Tactical Vehicle

Photo: Oshkosh



(JLTV). Since the programme was awarded to Oshkosh Defense in August 2015, the company has built a dependable supply chain and provided JLTVs at a contractual price substantially lower than the Government cost estimate.

To date, Oshkosh Defense has received orders for 18,126 JLTVs for a total contract value over US\$6Bn. Over 6,500 of those vehicles have been fielded with military forces around the globe, including over 30 US and international military installations. International interest in the Oshkosh Defense JLTV also continues to grow. Oshkosh Defense has received orders or commitments from seven NATO and non-NATO allies including United Kingdom, Belgium, Montenegro, Slovenia, Lithuania, Brazil, and North Macedonia.

Thales and Airbus to Upgrade France's Joint EW Capabilities

(jh) The French defence procurement agency (DGA) has awarded Thales and Airbus a contract for the new joint tactical Signal Intelligence (SIGINT) system to upgrade the French forces' critical signals monitoring, direction finding and spectrum analysis capabilities.

The 10-year contract will equip the three branches of the forces with a common information system and set of sensors and is designated a high-impact programme (PEM), alongside CONTACT and SCORPION, under France's defence spending plan. This joint tactical SIGINT system will provide the French armed forces command with an expanded tactical electronic support measures (ESM) capability.

The tactical SIGINT programme will upgrade the electronic warfare capabilities of front-line units, providing a set of high-performance portable or vehicle-mounted assets compatible with the latest communication technologies. The new system to monitor and localise enemy communications will support tactical manoeuvres in the theatre of operations, helping to keep own forces safe and secure. It will equip the electronic support vehicles of the French Army's 54th Signals Regiment (SCORPION programme), the French Navy's front-line warships and the ATLANTIQUE 2 maritime patrol aircraft, and could be deployed to protect air bases on military operations overseas.

The system will be the only one of its kind in service with the French forces. All three branches of the forces will rely on the same logistics infrastructure to simplify training of specialist operators and optimise through-life support delivery.

■ France Selects SURVEY Copter's ALIACA UAS to Equip Naval Vessels

(jh) The Airbus Defence and Space UAS subsidiary SURVEY Copter signed a contract with the French DGA procurement agency to provide the French Navy with 11 systems, (22 aircraft) of the electrically powered fixed-wing ALIACA maritime UAS (officially called SMDM / "Systèmes de Mini Drones aériens embarqués pour la Marine" by French authorities), including training and integrated logistic support. First deliveries are expected in 2021. The ALIACA maritime UAS is a high endurance system allowing up to 3 hours missions over a 50 km (27 Nm) range, adapted to maritime missions with gyro stabilised EO/IR payload performance and qualified to operate in severe environmental conditions. Launched by catapult, ALIACA concludes its flight by landing



Photo: Airbus

automatically using a dedicated net landing solution. With a length of 2,2m and a wingspan of 3,6m for a maximum take-off weight of 16 kg, ALIACA has a powerful yet silent electric motor. The system can be deployed in less than 15 minutes by two operators.

■ Philippines Orders GUARANI 6x6

(gwh) Elbit has been contracted to supply 6x6 GUARANI wheeled tanks to the Philippines within three years. The selection was made in December 2020, with a contract value of €39.3M. The vehicle ordered by the Philippines consists of Iveco's 6x6 amphibious platform with an unmanned turret, fire control system, TORCH-X battle management system, E-LynX software-defined radios, and gunner and commander sights from Elbit. This makes them interoperable with the SABRAH tanks, which are being delivered in the same period. The UT turret can be equipped with a remote-controlled weapon station for machine guns ranging from 7.62 mm to 25 mm calibre or a 40 mm grenade launcher.



Photo: Elbit

Weighing less than 20 tonnes, the vehicle is an armoured personnel carrier and can accommodate a two-man regular crew and nine soldiers for dismounted combat. The GUARANI is powered by an Iveco CURSOR 9 diesel engine with 280 kW and thus achieves a top speed of more than 100 km/h. The swimming speed is up to nine km/h. Strategic transport is possible in aircraft such as the C-130 HERCULES or the Embraer KC-390.

■ AERO Vodochody Delivers Upgraded Uzbek L-39s

(jr) The Uzbek Air Force has taken delivery of the final six L-39 ALBATROS aircraft, which have undergone general overhaul with Aero Vodochody. The contract for this, which also covers the partial modernisation of their onboard equipment, was signed in September 2018, with the work undertaken with the assistance of long-term strategic partner of Aero, the OMNIPOL company. In 2019, all six machines arrived at Vodochody in the Czech Republic under strict secrecy. As part of the partial modernisation, the original Russian radio station together with the on-board telephone was replaced by a Czech-made radio station on all six aircraft while the radio navigation system was replaced by a system made by Garmin company. The radio compass was also replaced by more modern technology, and the icing indicator was replaced by a new one made by Rosemount Aerospace. Aero has produced 2,900 L-39 ALBATROS aircraft, hundreds of which are still flying around the world. L-39s, which Uzbeki-



Photo: Aero Vodochody

stan gained after the collapse of the Soviet Union, are historically the most successful training jets. However, many countries also use them for other missions such as reconnaissance or border protection.

Aero provides a wide range of support services to users of its L-39, L-59 and L-159 aircraft. In 2020, it registered maintenance, repair and modernisation orders for L-39C and L-39ZA from four foreign customers in Africa and Central Asia alongside a maintenance order for 16 L-159s operated by the Czech Air Force. In December, Aero handed over three L-39ZAs to the Nigerian Air Force after repairs and life extensions. Another three Nigerian aircraft are undergoing general overhaul with Aero.

■ Russian and Indian Cooperation Continues

(yl) Russia and India are ready to revive the joint programme for the Fifth Generation Future Aircraft (FGFA) according to Vladimir Drozhzhov, Deputy Head of the Russia's Federal Service on Military Technical Cooperation with the Foreign States (FSVTS). In the context of the Aero India 2021 Expo, he also claimed the Hindustan Aeronautics Limited (HAL) is ready for licence production of the Ilyushin Il-112V prospective transport turboprop to replace an ageing fleet of the Antonov An-24/26s within Indian Air Force



Photo: Igor Laskin

(IAF). Another preliminary agreement was reached on the MiG-35 fighter joint production if the aircraft wins the IAF tender for 114 new fighter aircraft. HAL is experienced with joint production in Russia, including the Sukhoi Su-30MKI twin jet multirole air superiority fighter, which forms up the core of IAF power. Meanwhile, Drozhzhov confirmed the deal for the urgent purchase 21 MiG-29s and 12 Su-30MKIs.

He also announced that the first regiment of S-400 TRIUMPH long range air defence systems will be delivered to India by the end of 2021. Indian personnel have already arrived in Russia to be trained on the system. The contract from October 2018 is worth US\$5.43Bn and includes equipment for five regiments, to be delivered by the end of 2024.



Denmark's Defence Policy – a Delicate Balancing Act

Hans Peter Michaelsen

Denmark finds itself challenged in the security environment of the 2020s. Regional challenges in the Baltic area, renewed security focus on the Arctic and a continuing contribution to international missions is stretching the Danish Armed Forces.

Danish defence policy has undergone remarkable changes in recent history, first with the establishment of NATO and later, after the end of the Cold War. The contemporary security environment requires a carefully balanced defence policy for the Kingdom of Denmark, which includes Greenland and the Faroe Islands.

When Denmark signed the North Atlantic Treaty in 1949, it represented a dramatic change in the country's security policy. Denmark's century-long neutrality had been abruptly ended by the German occupation on 9 April 1940. After WW II, Danish defence had to be established from scratch. Denmark was a frontline state during the Cold War just a short distance from the coastlines of then Warsaw Pact members DDR and Poland, and in control of the vital outlet from the Baltic Sea to the North Sea. But the political thinking was that a small country could do little to counter a Warsaw Pact attack and thus Denmark relied heavily on NATO reinforcements to deter an invasion during the entire Cold War period.

Denmark has been regularly criticised for spending too little on defence, taking the relative welfare of Danish society into consideration. Defence spending was 3 percent of GDP in 1963 and slowly reduced to 2 percent in 1990. When the threat from the Warsaw Pact disappeared, Denmark gradually reduced its national defence forces. But wars in former Yugoslavia led to increasing international ac-

Photos: forsvarsgalleriet



Like many other countries in Europe, Denmark has increased its defence budget.

tivism, including military contributions, first to UN-led operations in Bosnia and Herzegovina (BiH), then the NATO-led operation in Kosovo (KFOR), and after 9/11, to more extensive operations in Afghanistan, Iraq, Libya, and later Mali. In 2004, the Danish Parliament completely abandoned mobilisation forces and instead converted the military primarily to expeditionary forces. Thus, Denmark was at the

forefront of NATO member countries shifting to an expeditionary posture in order to meet new security requirements.

Denmark was an early supporter of the integration of Estonia, Latvia, and Lithuania into both NATO and the EU. Furthermore, Denmark – together with Germany and Poland – contributed to the establishment of the NATO Multinational Corps Northeast (MNC-NE) in Szczecin, Poland. Otherwise, Danish defence policy has focused upon international threats, as the Baltic Sea became an area of peaceful cooperation. The 2014 Russian invasion of Crimea changed this situation and led to the establishment of NATO assurance measures in the Baltic states and Poland, with Denmark then choosing to contribute to the NATO Enhanced Forward Presence (EFP) mission in Estonia.

Author

Hans Peter Michaelsen is an independent defence analyst with 41 years of experience in the Royal Danish Air Force. He has extensive joint and international experience including Academic research on military matters at the Centre for Military Studies, University of Copenhagen. Some of the projects include the F-35 acquisition report and military R&D analysis.

Photo: Danish Parliament / Steen Brogaard



Minister of Defence Trine Bramsen has announced that the government will increase the defence budget.

Danish Defence Policy

August 1990 saw a paradigm shift in Danish defence policy. For the first time ever, Denmark contributed to an international military operation, when the corvette OLFERT FISCHER deployed to the Persian Gulf to contribute to the UN

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In the period 2021 to 2026, Denmark will acquire 27 new F-35s.



An F-16 of the Danish Flyvevåbnet. Denmark regularly provided fighter aircraft to NATO air policing missions in the Baltic states and Iceland.

naval embargo after the Iraqi invasion of Kuwait. Hitherto, Denmark had regularly contributed with relatively small contingents of soldiers to UN peacekeeping efforts such as in Cyprus and Gaza. But as Denmark gradually changed its role from a security receiver to a security provider, requirements for other types of equipment, logistics and training arose. As the previous mobilisation posture of the armed forces, especially with the Army, did not allow for international operations, this led to a change to the Danish Defence Law in 1993, which required that all military personnel participate in international military operations. The change in defence policy was quickly followed by troop contributions to UN-led operations in the former Yugoslavia where, in 1994, a well-known incident took place near Tuzla (BiH) when a Danish tank company – as part of the Nordic Battlegroup – engaged Bosnian Serb units in self-defence, showing that UN forces

were not merely observers to the fighting between the warring parties, but were also willing and able to conduct robust self-defence. To those inside the Danish military and also to the public, the incident showed that Danish soldiers could make a difference internationally. In the following years, units and individual soldiers from all service branches deployed in historically high numbers on military operations – primarily in the Middle East and Afghanistan, but also the Horn of Africa, and Libya. International operations became the primary *raison d'être* for the Danish Armed Forces – while the relative importance of national surveillance and sovereignty missions declined, given the peaceful nature of Danish waters and the Baltic. Denmark was praised by the US and Britain for its swift and effective conversion from national defence into readily deployable military units that could perform tough and challenging operations without

– or with few caveats. Danish politicians now felt obligated to participate in almost every US or NATO mission. At the political level this meant respect in Washington and London and probably also paved the way for the appointment of then Prime Minister Anders Fogh Rasmussen as NATO Secretary General in 2009.

Both in operations with the British Army around Basra in Iraq and in Helmand Province in Afghanistan, Denmark suffered casualties at a level comparable with its close allies. At the military level, it meant tough combat experience for a whole new generation of officers and soldiers, as well as a considerable number of wounded veterans that Danish society was ill-prepared to handle. At the peak of international operations in 2007-10, Denmark continuously deployed around one tenth of its entire military forces (around 20,000 personnel).

The following years saw the Danish military contribute to military operations in Libya and in the fight against the Islamic State in Iraq and Syria while still contributing to NATO missions in Afghanistan. Simultaneously, Denmark regularly provided fighter aircraft to NATO air policing missions in the Baltic states and Iceland and deployed both naval units and surveillance aircraft to anti-piracy missions off the Horn of Africa. Presently, Denmark still contributes to Operation Resolute Support in Afghanistan and to NATO Mission Iraq (NMI).

Denmark joined the EU in 1973 together with Great Britain. But when cooperation tightened within the Union, Denmark held a referendum in 1992 on joining the Maastricht Treaty, which failed to gain support domestically. The following year, a national compromise was established, which meant that Denmark opted out of monetary and justice cooperation, Union citizenship and also the Common Security and Defence Policy (CSDP). As Denmark became more activist, the constraints imposed by these choices have gradually become more apparent. Denmark has had to come up with mechanisms for acting alongside rather than within or through EU-led missions such as EU maritime missions and EU training missions in Africa. And as the EU invests more in a common security policy, such as PESCO, the downside of these restrictions has become more obvious. Recently Denmark has increased bi-lateral cooperation with France and in 2020, the Danish military participated in the French-led operation Barkhane in Mali and in the European-led Maritime Awareness mission in the Strait of Hormuz (EMASOH).



The Arctic

The Kingdom of Denmark contains three parts: the Danish mainland with a population of around 6 million; the Faroe Islands in the North Atlantic with around 52,000 inhabitants; and the huge and very sparsely populated island of Greenland with around 56,000 inhabitants. Both the Faroes and Greenland have responsibility for all domestic issues, but foreign and defence policy for the Kingdom is determined in Copenhagen. The entire Kingdom falls within NATO's area of responsibility, but neither the Faroes nor Greenland are EU members.

During WW II – when Denmark was occupied by Germany – the Faroes were protected by British forces given their strategic location in the North Atlantic. Greenland was left alone and relatively isolated after the German occupation of mainland Denmark. But gradually, the then Danish Chargé d'affaires in Washington, Henrik Kauffmann, sought US assistance to protect Greenland and in fact he signed an agreement allowing US permanent base facilities on the huge island without the consent of the government in occupied Denmark.

During the Cold War, the US established Thule and Sondrestrom (Kangerlussuaq) Air Bases. The former is still active with both the Ballistic Missile Early Warnings System (BMEWS) radar and an extensive facility for satellite communications. In recent years, Russia has upgraded its Cold

War bases in the Arctic region and the US has given the Arctic renewed attention and re-established its Second Fleet with its main operational area in the North Atlantic.

Denmark did not station regular defence forces in and around Greenland during the Cold War as it was within the US area of responsibility. On the Faroe Islands though, Denmark operated a NATO long-range early warning radar station that filled the radar gaps between Iceland, southern Norway, and the northernmost British radar installation on the Shetland Islands. The Faroe radar was dismantled in 2007 but there are plans to re-establish an air surveillance radar there.

The Danish Navy performs maritime patrols, search and rescue, fishery inspection and support to civil society around Greenland and the Faroes. They are supported by transport and maritime patrol aircraft from the Air Force. Denmark gradually increased its focus on Greenland and the Faroes in 2016 with an extensive MoD study and the establishment of a new Arctic Command in Greenland's capital, Nuuk. Recent developments – and especially the public offer by former US President Trump to buy Greenland in the fall of 2019, put the situation in the Kingdom of Denmark's Arctic and North Atlantic parts high on the agenda, both in the political and public sphere.

In early 2021, the Danish Government is expected to release a new Arctic Strategy and also reveal the contents of a €200M

Arctic capability package outlined in the latest defence agreement. It is expected that the capability package will contain enhanced air and maritime surveillance around Greenland and the Faroes with satellites, ships, and planes.

Defence Agreements

Danish defence is politically regulated by multi-year defence agreements backed by the majority of the political parties in the Danish Parliament. These defence agreements generally start with the release of a government defence proposal whereafter the political negotiation process starts. This process is primarily conducted behind closed doors in the Ministry of Defence. When consensus between the participating political parties has been established, the defence agreement is presented to the public. Because the government always ensures a broad majority behind agreements, there is no subsequent defence debate in the Parliament.

Defence agreements normally last for four to five years, although the current agreement has a duration of six years, from 2018 to 2023. This tradition of agreements provides stability for Danish defence, but it also means a relatively late reaction to sudden and unforeseen changes in Denmark's security environment. This was the case with the Russian annexation of Crimea in 2014, which did not influence Danish defence planning before 2018.

The previous defence agreement 2013-2017 decreased defence spending in the aftermath of the worldwide economic crisis in 2008-09. Danish defence spending hit an all-time low in 2015 with around €3Bn (1.12 percent of GDP) – the lowest since Denmark joined NATO in 1949. The latest Defence Agreement 2018-23 contains a modest increase in spending with the political aim to reach 1.35 percent of GDP in 2023. Despite satisfaction among the political parties that they had reversed decades of decline, both the US and other allies, expressed disappointment. Within a year, the government re-opened the defence agreement and through both an increase in resources and a revised calculation of what was to be included, Denmark's defence spending is now set to reach 1.5 percent of GDP by 2023.

Before summer 2021, the Danish Government plans to launch a new and revised Foreign and Security Policy Strategy for the coming years. This strategy is expected to be the stepping stone for the initial planning for the next defence agreement from 2024 onwards.



Since the 1990s, units and individual soldiers from all service branches deployed in historically high numbers on international military operations.



Denmark was praised by the US and Britain for its swift and effective conversion from national defence into readily deployable military units.

Defence Outlook

Danish defence is well on its way to implementing the 2018 defence agreement. However, domestic problems stemming from the COVID-19 pandemic and a changing international situation pose challenges that must be balanced if Denmark is to achieve its national security ambitions.

Minister of Defence Trine Bramsen has officially announced that the government will likely advocate an increase to the defence budget in the next defence agreement. The majority of the political parties have decades of tradition of discussing and agreeing security and defence issues in a manner that largely avoids public debate. Although politically convenient, this tradition also hinders a more public discussion of security and defence policy issues. This is causing some concern about public support for increased defence spending at a time when health issues in the aftermath of the COVID-19 pandemic are draining public funds.

Furthermore, the government in Copenhagen is facing increasing challenges as the home rule governments in Greenland and the Faroe Islands demand increased consultation and inclusion in national security decision-making. Trust needs to be built in order to overcome the legacies of the Danish Government's decisions and even those of the US that determine military issues with little or no consultation with the local governments. Increased

trust and coordination are also required as great power competition has opened new areas of concern: China has sought both economic influence in infrastructure and investments in mineral extraction in Greenland and the adoption of telecommunications technology on the Faroe Islands. These actions have threatened to create divisions between the local governments of Greenland and the Faroe Islands with mainland Denmark. When domestic areas such as infrastructure and trade contain elements of security policy, the cohesion of the Kingdom is challenged.

Danish security ambitions pose another internally generated set of challenges, as politicians have set truly diverse requirements for the Danish Armed Forces. The Arctic and North Atlantic regions with their vast areas require surveillance platforms, coastguard-like platforms, but also ultimate warfighting capabilities tightly integrated with the country's allies to deter aggression. The Danish homeland still requires efforts – not to prevent or defend against an invasion as during the Cold War – but to contribute to homeland defence, anti-terror operations, border control or as recently demonstrated – support to the health services during a pandemic.

The Baltic region, and especially the three Baltic states and Poland, are the focus of NATO assurance and deterrence measures. As this area is in Denmark's backyard, a military contribution to NATO EFP is a natural and highly prioritised task for

the Danish Army. Furthermore, if a crisis should occur around the Baltic states, Denmark is an almost ideal staging area for NATO reinforcements that can enhance NATO assurance and deterrence in the region. And should such a crisis develop, both the Danish Navy and Air Force will be natural contributors.

Both Africa and the wider Middle East are troubled areas with weak states, the threat of terror, and migration. Extensive experience with capacity building operations mean that Denmark is a natural troop contributing nation. Moreover, as a result of its huge global merchant fleet, maritime security is also in the focus of shipping companies and Parliament. Thus, Denmark will most likely strive to contribute to maritime security operations from the Mediterranean to the Gulf of Guinea (West Africa), the Horn of Africa to the Persian Gulf and the Strait of Hormuz.

Finally, increasing great power competition in the international system, between the United States and its liberal democratic allies on the one hand, and the authoritarian great powers of Russia and China on the other, will impose further requirements on Danish national security. These will include initiatives to decrease opportunities for authoritarian great powers to challenge Danish interests, whether in the Arctic, in the Baltic, or in the Kingdom itself. Denmark, however, will continue to be pressured by its allies to increase its defence expenditure, to reach 2.0 percent of GDP by 2024 as its government had agreed in 2014. The further development of the defence and security policy mechanisms of the EU will further challenge Denmark to reconsider its caveats and opt-outs.

With the above-mentioned challenges, Denmark risks a situation where its armed forces are too small to cover the political ambition to effectively contribute to areas where the security interest of both Denmark and its allies are threatened. This will especially be the case in the maritime domain where the three different security axes, North, East, and South, have vastly different requirements for maritime forces. Soon, the military and political preparations for the next defence agreement will start. With continued US pressure on European allies to contribute more to common defence, Danish politicians will have to consider options to strengthen Denmark's capabilities to contribute to both national, regional, and global security challenges. Denmark's future defence policy will most certainly be a delicate balancing act. ■



Danish Armed Forces – Building Capabilities for New Challenges

Hans Peter Michaelsen

Denmark's Armed Forces have reversed many years of cuts and are now slowly increasing both numbers of soldiers, equipment, and capabilities. Around 25 years of international activism in a broad spectrum of military operations – from peaceful training to hard combat – has boosted the levels of professionalism and experience in the Danish military. However, strained budgets and a strong civilian job market has made troop retention difficult and recruitment challenging. The current Defence Agreement 2018-2023 includes restructuring and savings, as well as the acquisition and implementation of new weapon systems. Simultaneously, Denmark is providing forces to several international missions and is currently leading two of these. This article will briefly touch upon defence organisation and the status in each of the three services and provide an outlook of overall challenges and some perspectives for the future of the Danish Armed Forces.

Photos: Forsvaretsallieret



From 2012, three 6000 tonne AAW frigates of the IVER HUITFELD class were introduced.

The Danish Defence Organization

Denmark's new Chief of Defence, General Flemming Lentfer took office on 1 December 2020. He oversees the core functions of the Danish military: the Army, Navy and Air Force, the Arctic Command, the Special Forces Command, the Defence Command, various joint functions, and finally the Royal Danish Defence College, which is responsible for all joint and single service education. The Joint Arctic Command in Nuuk, Greenland's capital, was established in

2012 and is responsible for all defence tasks and units operating in the northern part of the Danish Kingdom. The Joint Arctic Command also functions as a point of contact and coordination centre for all activities involving the armed forces and local authorities in the Arctic and North Atlantic region. The Special Operations Command (SOCOM) in Aalborg was established in 2014 and it trains and commands the two special operations forces (SOF) – the Jaeger Corps (Army SOF) and the Frogman Corps (Navy SOF), plus the Sirius dog sleigh patrol that guards the large national park in northeastern Greenland. In 2021, SOCOM will establish a Composite Special Operations Component Command, in close cooperation with Belgium and the Netherlands. All other parts of the defence organisation such as the Acquisition and Logistics Organisation, the Personnel Service, the Home Guard, the Intelligence Service, and the Civil Emergency Management Service, all report directly to the Ministry of Defence (MoD).

The total number of employees in the MoD is (excluding the Defence Intelligence Service) around 20,500 persons, of which 15,000 are officers and soldiers in uniform. An additional 2,000 conscripts are trained annually, with the majority used for different guard duties and support to homeland defence. The Danish Home Guard has 500 permanently employed soldiers and 14,500 volunteers and some additional 30,000 in the reserve structure.

The Danish Army

The Danish Army has undergone remarkable changes since the end of the Cold War, changing from a mobilisation-based Army with a huge number of conscripts to an almost entirely professional Army. The Army has gained extensive international experience, first in Bosnia, Kosovo and later in Iraq and Afghanistan. The tough counterinsurgency missions in Basra, Iraq and Helmand, Afghanistan were costly in terms of both dead and wounded soldiers and also damaged equipment.

Author

Hans Peter Michaelsen is an independent defence analyst with 41 years of experience in the Royal Danish Air Force. He has extensive joint and international experience including Academic research on military matters at the Centre for Military Studies, University of Copenhagen. Some of the projects include the F-35 acquisition report and military R&D analysis.



In April 2021, Denmark will take delivery of its first F-35 Joint Strike Fighter.

The Danish Army has three main tasks: Defence of the Kingdom of Denmark, international security, and support to Danish society. The Army contains two brigades of which First Brigade has primary responsibility for providing units to various international and national missions. The Second Brigade is primarily responsible for training soldiers of all levels, including mission training for all units preparing for international missions. The Army's primary weapon systems consist of 44 LEOPARD 2 main battle tanks, which are presently being upgraded from 2A5 to 2A7 status. The Army has previous international experience with the LEOP-

ARD tank, first in 1994 with the LEOPARD 1 near Tuzla in Bosnia and later from 2007-2014 with LEOPARD 2A5 tanks in Helmand province. The 44 CV9035 infantry fighting vehicles have a crew of three and space for seven soldiers. A number of these were also deployed with the Danish Army in Afghanistan from 2010-14. Denmark has recently acquired 309 units of the PIRANHA 5 infantry vehicle which has a crew of three and can transport up to eight fully equipped soldiers. Based on the Army's current operational capabilities, work is underway to build a deployable brigade which can contribute to deterring a comparable opponent and

take part in collective defence under a NATO framework. The ambition is to establish a brigade of approximately 4,000 troops which meets NATO's force goals for a medium sized brigade by 2024, though such a brigade requires additional weapon systems and capabilities. Among these are the NEXTER CEASER artillery system which is currently being implemented, with the last four of 19 systems due to be delivered later in 2023. A Ground Based Air Defence (GBAD) system is currently in the planning phase as the Danish Armed Forces have been without GBAD since 2005. Furthermore, anti-armour weapon systems for the combat battalions, equipment for electronic warfare and new sensors, a drone capacity and logistics, command support, engineering equipment, etc. are all under acquisition.

When not fully deployed, the brigade's composite units can also be deployed individually thereby enhancing the overall ability to participate more often in international missions. However, if parts of the brigade are deployed internationally – or nationally to enhance homeland defence – it will take additional time to prepare and train the complete brigade. Presently, the Danish Army provides around 145 soldiers on a continuous basis to NATO's Operation Resolute Support. Furthermore, the Army provided an Armoured Infantry Company with around 200 soldiers during 2020 to the British Battlegroup in the Enhanced Forward Presence (EFP) in Estonia. In November 2020, Denmark took over the leadership of NATO Mission Iraq (NMI) and plans to continue until mid-2022. In addition to taking over the leadership of NMI, Denmark is providing a staff, as well as a safety- and escort contribution with up to 285 soldiers of which 85 will be a helicopter detachment from the Danish Air Force from May 2021.



The Danish Special Forces operate eight AS-550 FENNEC. They have been deployed internationally in Iraq, Afghanistan and in EU FRONTEX operations.

The Danish Navy

The Royal Danish Navy cut most of its small units during the first 15 years of the post-Cold War period. Submarines were abandoned and fast patrol boats, minesweepers and minelayers were substituted by small 300-500 tonne flexible ships that could quickly transfer roles from patrol to combat, to minesweeper by changing the "LEGO-like" modules on the ship. But as Denmark's more global defence aspirations matured, the need for larger ships was obvious and in the beginning of this century, five new and larger ships were ordered. The first two



6,500 tonne Flexible Support Ships (recently renamed as ASW Frigates) of the ABSALON class have been in service since 2007. Furthermore, from 2012 three 6,000 tonne AAW frigates of the IVER HUITFELD class entered service. The five frigates have been deployed extensively on various anti-piracy missions, and later, the AAW frigates have been deployed in multinational Carrier Battle Groups both with the US and French Navies.

Around Greenland and the Faroe Islands, the Danish Navy has at least two of the four Ocean Patrol Vessels of the THETIS class permanently deployed. All the frigates and the patrol vessels have an organic MH-60R SEAHAWK helicopter on board, detached from the Royal Danish Air Force 723 SQN. Furthermore, three smaller Arctic Patrol Ships are used in the littoral waters around Greenland. The littoral Danish waters, including the two vital straits to the Baltic, Storebaelt and Oeresund, are patrolled by five small DIANA class patrol vessels augmented by several patrol vessels operated by the Navy Home Guard from various harbours around the roughly 7,000 km of Danish coastline. In the domestic waters around Denmark, maritime surveillance is performed by a large number of radars and

integrated in a national maritime surveillance centre. Around the Faroe Islands and especially Greenland, surveillance is much more scarce with very few sensors. The three AAW frigates will be prepared and equipped with SM-2 missiles so they can defend and protect a naval force and coastal areas against enemy aircraft and certain types of missiles. Hitherto, the only air defence system is the Evolved SEASPARROW Missile (ESSM) system. Initial preparatory work will also commence with a view to acquiring SM-6 missiles. This will provide Denmark with a more complete frigate capacity that meets NATO's force goals on maritime area air defence.

The Navy will also implement an anti-submarine capacity that can both track and combat submarines. The two ABSALON class frigates will be equipped with sonar equipment that can detect submarines. An anti-torpedo system will also be acquired. A number of dipping sonars and torpedoes will be purchased for the SEAHAWK helicopters so they can participate in anti-submarine warfare operations. The Danish Navy will also prioritise enhanced cooperation with other countries regarding training in anti-submarine warfare.

From August to December 2020, the Danish Navy took part in the European-led Maritime Awareness mission in the Strait of Hormuz (EMASOH) with the frigate IVER HUITFELD. In January 2021, the Danish Navy took over the leadership of the EMASOH mission for half a year.

The Danish Air Force

The Royal Danish Air Force (RDAF) operates two squadrons with a total of 30 F-16 A/B MLU aircraft. The F-16 has been the cornerstone of Danish air power since the Cold War and the continuous upgrade has meant that Denmark has participated in several international missions including Kosovo, Afghanistan, Libya and most recently on two occasions in the fight against the Islamic State in Syria and Iraq. Furthermore, the F-16s have contributed to a high number of NATO air policing missions in Iceland and in the three Baltic states. The F-16s are nearing the end of their service life and from 2023-25 they will be phased out as Denmark's 27 new F-35A aircraft gradually come into service.

Denmark joined the F-35 Joint Strike Fighter project early as a partner nation, but the political decision to purchase the

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The primary weapon systems of the army are 44 LEOPARD 2 main battle tanks which are presently being upgraded from 2A5 to 2A7 status.

F-35 was not taken until 2016. The first aircraft is due for delivery in April 2021. Denmark will – as with Norway and the Netherlands – conduct all conversion and pilot training in the multinational environment at Luke Air Force Base in the US. Therefore, Denmark plans to have six F-35A aircraft permanently based in the US for training. This means that when the final aircraft are delivered in 2027, the RDAF F-35 inventory in Denmark will consist of 21 aircraft, all based at Skrydstrup Air Base in the south of Jutland. The RDAF has three helicopter squadrons at Karup Air Base. 722 SQN has 14 EH101

MERLINS for domestic Search and Rescue (SAR), as well as Tactical Troop Transport (TTT). The Merlin TTT version has been deployed to both Afghanistan in 2014 and Mali in 2020 and are planned to deploy to Iraq in May 2021. 723 SQN has nine MH-60R SEAHAWK maritime helicopters for use with the Danish Navy where they operate from the five frigates and four arctic patrol vessels. Although the primary tasks are surveillance and SAR, some of the SEAHAWKs will be equipped with dipping sonars to perform an additional ASW role – primarily to be performed from the ASW frigates of the ABSALON class. The

third helicopter squadron is 724 which operates eight AS-550 FENNECs primarily for use by Special Forces, police, and other authorities. They have also been deployed internationally in Iraq, Afghanistan and in EU FRONTEX operations.

Air Station Aalborg is the home of 721 SQN with four C-130 J transport aircraft and four CL-604 CHALLENGER transport/surveillance aircraft. Both aircraft types are extensively used both in and around Greenland and in international operations. Recently, a C-130 J was deployed to the UN MINUSMA mission in Mali in 2020 and in January, a CL-604 deployed to Crete to participate in the EU FRONTEX mission for a month, a mission the aircraft have regularly contributed to twice a year since 2015.

Denmark’s Air Surveillance and Control is performed from the Control and Reporting Centre (CRC) in Karup, which is tightly integrated in the NATO structure covering the entire Danish airspace. Recently, CRC Karup has been assigned a new task to build an air picture over the vast areas around Greenland, integrating a variety of civil and military surveillance sources. It is expected that if/when a surveillance radar is placed on the Faroe Islands, its radar data will also be integrated at Karup, thus the CRC will eventually be able to produce a recognised air picture (RAP) over the entire Danish Kingdom depending on available sensor inputs.

In the beginning of the millennium, the RDAF gradually established a deployable CRC unit using one of the two Lockheed Martin TPS-77 deployable long-range surveillance radars. The unit deployed to Mazar-i-Sharif in northern Afghanistan in 2012-13 to control and monitor coalition air operations. Later, from 2016-19, the radar deployed to Al Asad Air base in Iraq to establish air surveillance in Operation Inherent Resolve while the operator crew integrated in the US CRC established at Al Dhafra Air Base in the United Arab Emirates. While the radar was redeployed in late 2019, the RDAF Ops crew is still a part of the coalition with the Danish crew integrated in the US-led coalition crew.



Denmark operates a fleet of 44 CV9035 infantry fighting vehicles.

Future Challenges and Perspectives

The Danish defence sector is well on its way to implementing the 2018-2023 defence agreement, which has reversed years of defence savings to a gradual increase with the aim to reach 1.50% of GDP in 2023. Although initiatives to strengthen the Danish Armed Forces are underway, the process to acquire new



weapon systems, recruit and train soldiers and train units takes years. An increased mission capability is therefore not expected before the end of the current defence agreement and some will have to wait for additional funding in the coming defence agreement from 2024 onwards.

Denmark received relatively harsh criticism during the NATO Defence Planning Capability Review 2019/2020 in October 2020. NATO pointed out that the brigade had critical deficiencies and was likely to be unusable in a high-end conflict until 2024. Furthermore, there are no current plans to develop JISR and long-range signal intelligence (SIGINT) capability. But the main limitation is the fact that several elements of the brigade are continuously used in other national or international functions, thus the brigade is similar to having a large LEGO model where a number of the LEGO bricks will not be available unless given a relatively lengthy notice period.

The primary criticism of the Navy was the long time period for implementing an ASW capability that is not expected to be completed before 2028. Furthermore, the challenges in the next defence agreement will be a necessary mid-life update of the frigates – especially if Denmark decides to contribute to maritime Ballistic Missile Defence (BMD) and acquire SM-6 missiles. And the four Ocean Patrol Vessels of the THETIS class will be 40 years old in 2030 and a replacement will have to be planned soon. An additional challenge is that the Navy does not have any ships tailored for use in the Baltic Sea, as the five frigates are expected primarily to conduct operations either internationally or in and around the North Atlantic. Neighbouring Sweden is presently building new corvettes and this could be an area of cooperation between the two countries.

The RDAF is relatively small and the challenge it faces is the balancing of resources to perform domestic tasks over the entire country and simultaneously provide relevant contributions to international missions whether in UN, NATO or a coalition. The conversion from F-16 to F-35 will mean a halt in international deployments with fighter aircraft from 2023 to 2025 and thus Danish politicians will have to look for other capabilities in the military toolbox should the need arise for Danish contributions. Here the RDAF has well trained and experienced crews and equipment in other areas, but its relatively small size limits the number of options available.

The latest defence agreement added two additional flight crews to the four

C130J transport aircraft and enhanced the maintenance structure. This will increase the generation of flight hours for the aircraft by approximately 20%. From 2021, one CL-604 will be continuously deployed to Greenland to enhance surveillance and SAR in this vast area.

While the EH-101 MERLIN is a relatively new and modern medium sized helicopter, the small AS-550 FENNEC is nearing its end of service life and a successor will have to be identified before long and financed in the coming defence agreement. The nine new MH-60R units will be equipped with dipping sonars to enhance ASW operations, but with nine patrol/frigate vessels the number of helicopters is currently at the bare minimum.

All but the first seven F-35A aircraft will be delivered with drag chutes just like the Norwegian aircraft to allow operations from icy/snowy conditions and thus allow deployment to Greenland if necessary. However, the relatively small number of aircraft (21 in country) will probably prohibit the extended use of F-35s in and around Greenland. However, both Norway and Italy have been conducting Iceland air policing missions from Keflavik and this base is – together with Kangerlussuaq on Greenland's west coast – well suited for operations in the North Atlantic and southern Greenland.

Although many in and around the RDAF would wish for a more robust F-35 structure, the highest priority will probably be the acquisition of new and more modern weapon types for the F-35 – this could be a naval/land attack missile like the Norwegian developed Joint Strike Missile. On the air surveillance side, the RDAF is looking for new long-range radars to supplement the two TPS-77, which are set for mid-life updates in the coming years. Furthermore, the inventory of short-range gap filling Thales RAC3D radars from the dismantled DEHAWK SAM system are nearing their end of life and it would probably be

wise to acquire a number of modern deployable AESA radars that are also able to detect drones and loitering munitions. Such radars can be used both in national surveillance and in conjunction with a new SHORAD system for the Danish Army.

The initial steps for the coming defence agreement are expected to be taken this year. For a number of years, Danish politicians have had their primary focus on contributing to international NATO and/or coalition operations. However, the security situation now requires greater balance between national operations whether in the Arctic and North Atlantic or the Danish homeland, NATO operations in and around the Baltic Sea and international operations such as Mali, Iraq and the Strait of Hormuz. Presently, the armed forces – and especially the Army – are striving to reorient towards more classic defence tasks i.e., establishing a medium brigade for NATO operations. A new course has been set for a stronger Danish defence sector, but the end-state will probably not be revealed before the next defence agreement from 2024 onwards is negotiated. ■

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The Danish Defence Industrial Base

Morten Andersen

The story of Denmark’s defence industry relates to the aftermath of World War II when the United States strongly supported its Western allies with all kinds of military equipment. Never before has Denmark possessed Armed Forces of such scale.

Unfortunately, for the domestic defence industry those were not fruitful decades. After all, competing with something ‘free’ is never easy. However, in 1967, the US Government shipped the last free military equipment to Denmark; soon after, the first major Danish defence acquisition followed with the DRAKEN fighter jet from Sweden. Subsequently, the defence industrial base in Denmark took off.

Photos: Morten Andersen



The Royal Danish Navy is based on the indigenous “Stanflex” concept including the IVAR HUITFELDT frigate class; here on an export promotion tour to Stettin, Poland.

A Decisive Moment

In order for SAAB to deliver the 46 fighters, the Danish Government required that the Swedish company engaged Danish companies as partners or sub suppliers, and that heralded a decisive moment for Denmark’s defence industry. In 1969, the first contract based on this requirement was secured by Per Udsen Co. Aircraft Industry in Grenaa, for the production of both drop tanks and vertical stabilisers for the DRAKEN fighter. Soon after, Per Udsen secured additional orders for the VIGGEN fighter and the T-17 trainer, also manufactured by SAAB.

Only seven years after acquiring the DRAKEN jets, the Danish Parliament was engaged in what was called “The Weapons Deal of The Century” when Denmark decided to become a part of the international F-16 programme, buying initially 52 fighter jets. Once again, Per Udsen Co. Aircraft Industry paved the way for Danish companies’ involvement by securing orders for the F-16 pylons and stabilisers. This was not only for the Danish fighters but also for other user nations in what was later to become the most successful combat aircraft in aviation history, still in production with Danish parts and systems.

Per Udsen Co. Aircraft Industry was not the only Danish company involved in the F-16 programme though. Many more followed, and there is no doubt that for the next four decades this fighter acquisition was the single most important driver of international partnerships, innovation and growth in the Danish defence industry.

The Naval Industry

Notwithstanding the importance of Danish defence companies working with and supplying foreign Original Equipment Manufacturers (OEMs), there is one exception that must be stressed: the naval industry. Since King Hans founded the Royal Danish Navy in 1510, the vast majority of vessels for the Navy have been designed and built by Danish shipyards supplying not only the Navy, but also what has become one of the worlds’ largest merchant fleets.

In the 1980s, the Danish naval industry, in close cooperation with the armed forces, developed the “Stanflex” concept, based on the idea that equipment

needed for special tasks is placed in exchangeable on-board containers making it possible for the same vessel to be used for different tasks. This concept is especially useful for smaller navies like Denmark’s. Since 1989, the Stanflex concept has been incorporated in six different ship classes of the Royal Danish Navy. The flexible ship design is now seeing the first export success with the British Frigate 31 programme headed by a British company, but based on the Danish IVER HUITFELDT class.

Organising the Industry

As the Danish defence industry has progressed and the stakes have increased, the need for cooperation between the very small (internationally speaking) Danish companies grew. The first part of the industry to become organised was the naval/maritime companies which in 1992, and with government support, formed Naval Team Denmark. The organisation works closely with the Armed Forces to globally promote not only the Stanflex concept, but also the many other prod-

Author

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ucts and technologies of the almost 30 companies in its member base.

A few years later, FAD – Danish Defence and Security Industries Association – was founded as an integral part of the Confederation of Danish Industries. Eleven defence companies established the association in 1996, and during the past quarter of a century they have been joined by many others, now constituting a national body of around 90 companies. FAD is the voice of the Danish defence, security and aerospace industry and the focal point concerning all matters related to defence and aerospace industry, both nationally and internationally. FAD is the Danish member of ASD – Aerospace and Defence Industries Association of Europe – and is cooperating with national defence industrial associations from several countries.

Finally, CenSec was founded in 2004, originally as a business network for Danish SMEs in the western region of Denmark specialising in high tech industries like defence, homeland security and aerospace. CenSec has since undergone a significant development and three years ago, the organisation was approved by the Danish Government to become the National Innovation Network for Security. Starting on 1 January 2021, CenSec is the official and government supported national defence industrial cluster of Denmark, consisting of almost 150 member companies, though not all of them are defence companies. CenSec works with OEMs, system integrators, Ministry of Defence procurement, logistic and repair agencies etc., to identify, develop and recommend appropriate supplier and sub-contractor capability.



The F-16 acquisition has – more than any other military capability – impacted the Danish defence industry since the mid-seventies.

The Danish Defence Industry by Numbers

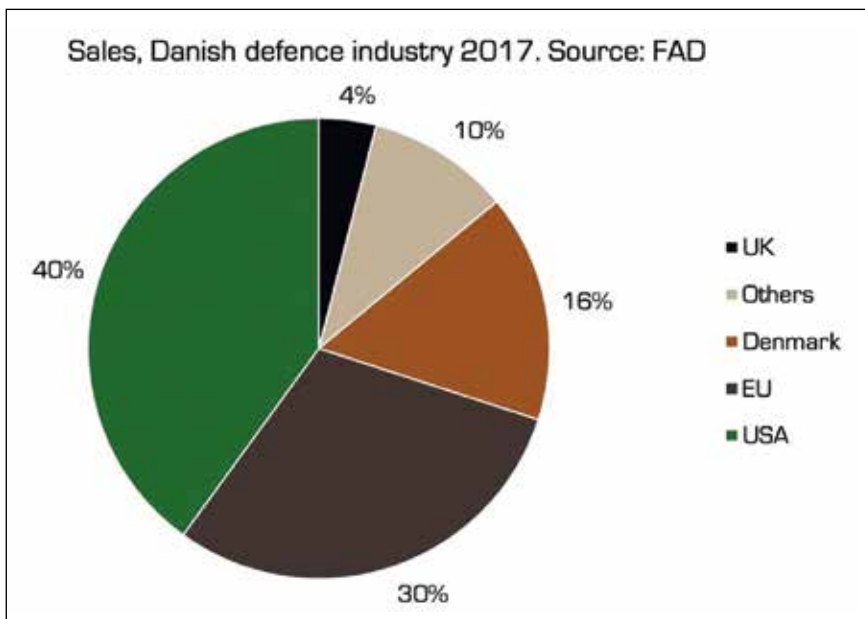
The Danish defence industry in 2021 paints a picture of a relatively diversified business, dominated by a handful of companies. The total number of firms is around 150, including Tier 3 suppliers and most of them have a civilian business larger than the military. Yearly sales are approximately €535M and no less than 84 percent of all goods and services are exported, with the US being by far the most important market. Sales are dominated by the air segment, which covers 42 percent of all sales.

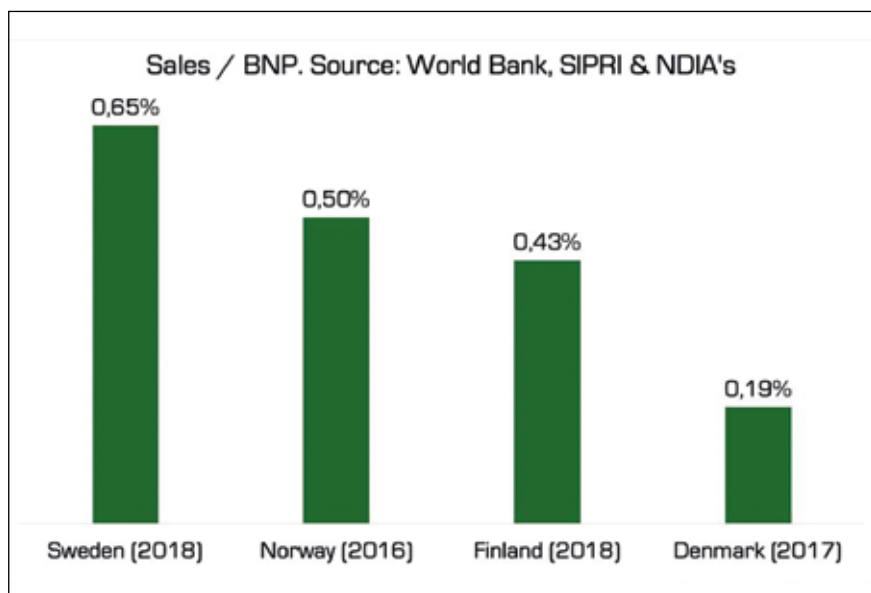
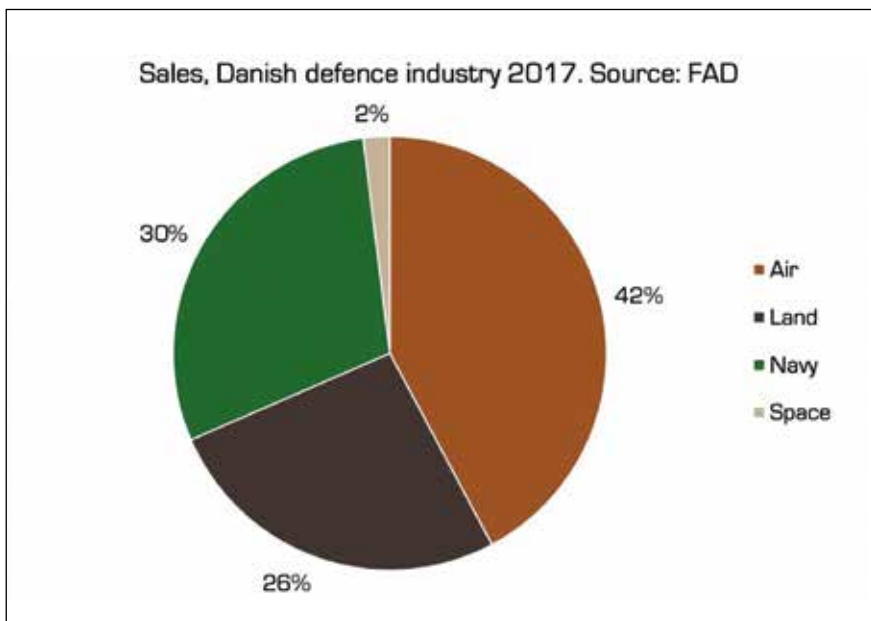
The vast majority of sales from Danish defence companies are based on sales as sub suppliers to other defence companies, although national Armed Forces, largely in the NATO hemisphere, are also

important customers. To illustrate this, the latest sales data from Danish defence companies on the dominating US market show that from a total sale of US\$789M in 2014 – 2017, only 16 percent originate from direct sales to the Armed Forces. Denmark’s defence industry is, and has been for decades, privately owned and operated, which is quite unusual in the global context. Business support from the government has, except for offset requirements, been very limited and infrequent. In addition to the effects of the Marshall Plan, these are the primary reasons why the defence industrial base in Denmark is relatively small within the global setting.

Major Companies

The biggest defence company in Denmark is Terma, which is developing and manufacturing a variety of products, among them surveillance radars, self-protection systems for aircraft and helicopters, 3D audio systems and not least, advanced aerostructures. The aero-structure business is based on the acquisition of Per Udsen Co. Aircraft Industry in the late 1990s, which paved the way for Terma to become a principal supplier of composite parts, radar electronics and the gun pod for the F-35 fifth generation fighter. Among other major Danish defence companies are Systematic, Weibel Scientific, Brüel & Kjær and Dantherm. Systematic is developing the SitaWare® command and control software suite for both the land and sea domain sold to a growing number of user nations globally, including the United States. Weibel delivers advanced Doppler radars for ground-based weapon systems, allowing to measure





and track ammunition fired with a high degree of reliability and accuracy. Brüel & Kjær has developed into the world's leading supplier of advanced technology for measuring and managing the quality of sound and vibration used in the majority of the world's aircraft and helicopter engines, gearboxes, submarines, etc. Finally, Dantherm is a leading supplier globally of energy efficient and mobile heating and cooling systems to military bases from the Arctic to Africa. These five companies constitute approximately half of the entire Danish defence industry based on sales. Their products and technologies therefore show which products and technologies are the most dominant in the industrial base. For a complete list of Danish defence companies please go to the websites of Naval Team Denmark, FAD & CenSec.

The Importance of Offsets

There is no doubt that offset requirements have been a crucial part of the growth and innovation in the Danish defence industry, since it was implemented by the Danish Government more than fifty years ago. Originally, the requirements were based on a wish to create local jobs, but over the years, the focus has shifted. Offsets are now called "Industrial Cooperation" and the aim is to support the national security of Denmark by strengthening Danish defence companies through cooperation with foreign suppliers. The suppliers (obligors) are expected to transfer technology, knowledge, and training to the Danish partners and a multiplier system rewards the foreign supplier. The greater the transfer, the higher the multiplier. On average, the foreign obligor has 10 years to fulfil the requirements.

Due to pressure from the European Commission wanting to eliminate offset requirements, the legal framework for industrial cooperation in Denmark was changed in 2014. From an obligation routinely added to all large defence acquisitions, the requirements are now added after an individual assessment of each acquisition. The extent of industrial cooperation obviously reflects the acquisitions of the Armed Forces. Every year around €135M worth of new requirements are imposed, but spikes are seen following larger acquisitions like helicopters and armoured personnel carriers. All industrial cooperation must be within eight technology areas pre-approved by the government; the leading area is "advanced materials technology and processing", i.e., metal work. Several government bodies are involved in the rather complicated legal process of industrial cooperation which is described in detail, also in English, on the website of the Danish Business Authority.

Lockheed Martin and MOWAG

In the decades to come, three major Danish defence acquisitions and the related obligors, will surely impact the industry as a whole. These are the F-35 fighter jet manufactured by Lockheed Martin, the PIRANHA V APC and the EAGLE V patrol vehicle manufactured by MOWAG General Dynamics European Land Systems. Although legal offset requirements are omitted from the F-35 programme by default, the world's largest arms programme indeed does come with political offset requirements from the partner nations. Lockheed Martin also sold the MH-60R SEAHAWK Maritime helicopter to Denmark in 2012 and the American defence contractor will be deeply involved with Danish defence companies for many years to come. Among those, without any doubt, Terma will be the leading Danish partner and sub supplier. But Terma has also been joined by others, including Multicut (fittings), Weibel (ballistic radars), BridgeIT (mobile solutions for servicing Sikorsky helicopters) and Gomspace (microwave sensing nanosatellites). The Swiss company MOWAG is also engaged with Danish defence companies for the long haul, not least due to the PIRANHA V, which is expected to be a part of the Danish Army for 40+ years. Other leading Danish companies for industrial cooperation include Hydrema (final assembly), Nissens (cooling systems) and Mikkelsen Electronics (cables and dashboards). Also, the Dutch company,

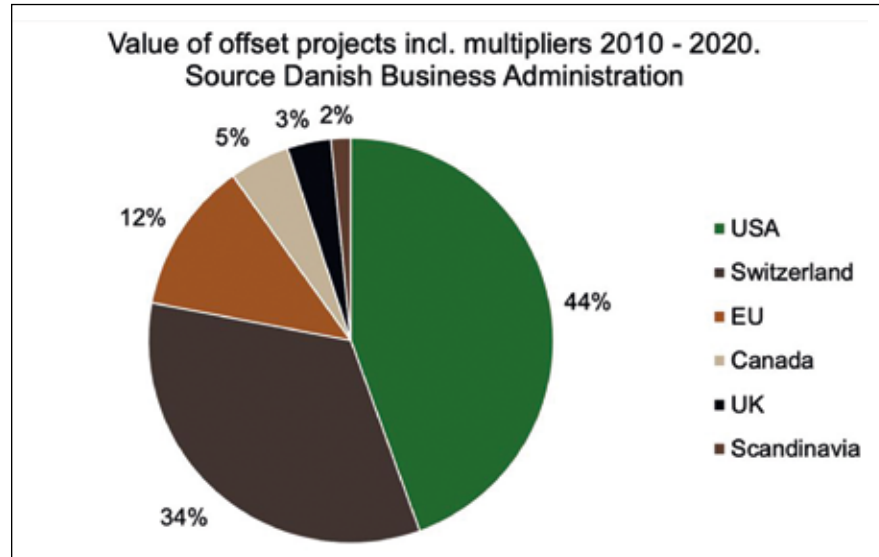


TenCate, is engaged in industrial cooperation with MOWAG supplying ballistic protection systems developed and manufactured by its Danish subsidiary.

European Defence Projects

Although a Danish element in European ballistic missile defence is still on the drawing board, and no political decision has been taken, this crucial military capability could very well become the third acquisition for the Danish defence industry's future innovation and growth. Denmark's contribution will perhaps be based on cooperation with the Netherlands and Germany, adding sensors and interceptor missiles to frigates in the North Sea. Which nations (if not all) will acquire sensors and/or missiles is unclear, but no matter what, it will be a major defence acquisition for Denmark, adding substantial offset requirements to the suppliers expected to be found among Raytheon Technologies, Lockheed Martin or Thales.

A dark horse in developing the Danish defence industry in the future is the European Defence Fund (EDF). The Danish Government has developed a national action plan to promote Danish inter-



ests in the fund and ensure increased dialogue between the armed forces, defence companies and research institutions, and to explore co-financing opportunities. However, Denmark has opted out of defence cooperation in the EU and as a consequence is not a member of the European Defence Agency, which manages the EDF. That is a huge disadvantage for Danish companies aiming to become

a part of the EDF project and so far, the Danish industrial involvement has been very scarce.

The Danish defence industry has been shaped historically by international cooperation and for the foreseeable future industrial cooperation on a legal or purely commercial foundation will continue to play a vital part in the innovation and growth of the industrial base. ■



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The Royal Netherlands Navy Procurement and Modernisation Projects

Guy Toremans

The Royal Netherlands Navy (RNLN) is undergoing a major modernisation and fleet replacement programme to improve its operational efficiency and combat effectiveness.

Over the next two decades, 23 ships of its current 33-ship fleet are scheduled to receive a mid-life upgrade and/or be replaced by new platforms. For this, the Navy has been allocated a total of €6.3Bn.

New Programmes

Key replacement programmes include four new submarines, two new frigates, six new mine counter-measures vessels (MCMV), a

second combat support ship and four new multi-purpose auxiliaries, as well as new landing craft. In the longer term, four new platforms to succeed the DE ZEVEN PROVINCIEËN class frigates and two new Landing Platform Dock units to replace the ROTTERDAM and JOHAN DE WITT will be inducted into the fleet.

The WALRUS Replacement Project

Since 2014, the RNLN has been looking into the replacement of its four WALRUS class submarines. No longer possessing the industrial capacities needed for building submarines, the MoD has had to look for an industrial partner. The Navy's requirements include enhanced stealth characteristics; reduced signatures; an Air Independent Propulsion (AIP) capability; considerable automation in ship control, remote monitoring, and combat systems in order to operate the boats with a crew of 40, a greater range and growth potential. In 2019, the MoD invited Naval Group, teamed with Royal IHC, the Swedish Saab Kockums partnered with Damen, and the German tkMS, to submit their bids for the 4-boat strong WALRUS class replacement programme. Saab and Damen joined forces to develop an enlarged 'expeditionary' derivative of the A26 submarine for the Swedish Navy, also known as the BLEKINGE class. This so-called 'Oceanic Extended Range' design features a hull diameter of about 8 m, a length of 82 m, a displacement of 3,500 tonnes and endurance foreseen to be over 10,000 NM at 10 kt. Naval Group, teamed with the Royal IHC, offers a variant of Naval Group's SHORTFIN BARRACUDA. The third candidate is the German shipyard tkMS, proposing an upgraded version of its Type 212CD design. tkMS is offering to share intellectual property rights and to develop a naval maintenance site in Den Helder. The Type 212CD design embraces the latest technology with regard to fuel cell AIP technology. The fact that Germany and Norway are already mov-

ing forward with an improved 212CD design, is claimed to be saving two-to-three years in building the boats and over €1Bn in costs. The final Request for Proposals (RfP) is expected by end-2021 in order to have a construction contract in place by 2022. This timeframe could allow for the first hull to commission in 2027 and all four new boats in service by 2030.

Anti-Submarine Warfare Frigates (ASWF) Programme

On 8 June 2018, the Belgian and the Netherlands Defence Ministries ratified the joint procurement of four Anti-Submarine Warfare Frigates (ASWF) to replace their two KAREL DOORMAN class (M-type) frigates. The Netherlands is taking responsibility for the procurement of these platforms. The ASWF programme is in the procurement preparation phase, with DMO working on the design. The aim is to commence construction in 2023 for delivery of the lead ship in 2028 and the second frigate to follow in 2029. The two Belgian frigates are to join the fleet no later than 2030. All four hulls will be built at Damen Schelde Naval Shipbuilding (DSNS) in Vlissingen.

Design characteristics for the new frigates are under consideration but preliminary indications point to a displacement of around 6,000 tonnes, and 146 m long. Reflecting an anti-submarine warfare (ASW) bias, the ships will be fitted with a 'state-of-the-art' ASW suite. The frigates will also feature a robust above-water warfare capability, including the Thales Above Water Warfare System (AWWS) system. Weapon systems include Leonardo's SOVRAPONTE 76/62 gun, two 16-cell Lockheed Martin Mk 41 VLS, suited to accommodate RIM-162 ESSM Block 2, SM-2 and SM-3 missiles, a new SSM with Saab's RBS15 Mk3; MBDA's EXOCET MM40 Block 3 missiles, Kongsberg's Naval Strike Missile (NSM), Boeing's HARPOON Block 2 or Israel Aerospace Industries (IAI) LORA systems being possible options. They will also mount a Raytheon Mk-31 21-cell



Photos: Guy Toremans

The WALRUS class diesel-electric submarine ZEELEEUW concluded her SLEP in 2019.

Author

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The Royal Netherlands Navy continues with the incremental upgrades of its four DE ZEVEN PROVINCIE class air-defence and command frigates (LCFs) DE ZEVEN PROVINCIE (photo), TROMP, DE RUYTER and EVERTSEN.

Rolling Airframe Missile (RAM) system used in conjunction with the DART sub-calibre guided projectile fired from the Leonardo OTO Melara 30 mm gun. To maximise their versatility, the platforms will incorporate a mission bay that allows the installation of containerised mission modules. As the frigates are planned to be in service to 2060, they will have growth margins for upgrades. There are also indications that space may be reserved for a laser weapon. These new frigates could well have some export opportunities, with the Portuguese Navy being a possible candidate.

The rMCM Capability Replacement Programme

On 23 May 2019, Belgium's Naval & Robotics (BNR) consortium was awarded a €1.953Bn contract, of which the Netherlands will pay €966M. Each country will receive six MCMVs, with Belgium leading this 12-ship strong programme. The 'mother-ships', based on Naval Group's BAMO design, will have a length of 82.6 m, a width of 17 m, a draft of 3.8 m and a displacement of 2,830 tonnes. The platforms will

have growth potential and flexibility for incremental improvements throughout their in-service life. BNR started with the Critical Design Review (CDR) which is anticipated to be validated no later than May 2021 in order to be ready for the steel cut in June 2021 as the delivery is set for 23 September 2024. The second ship is scheduled to join the Royal Netherlands Navy in May 2025. The follow-on units will be delivered at six-month intervals, alternating between both Navies and with all MCMVs expected to be operational by 2030. The lead ship and the third unit are to be built at the Piriou Shipyard in Concarneau, the second unit – the first for the Royal Netherlands Navy – is to be constructed at the Kership Shipyard in Lanester, Lorient. The follow-on units will be constructed at a European shipyard yet to be selected, while their outfitting will be carried out at the Kership Shipyards in Lanester and at the Piriou Shipyard. ECA Robotics Belgium will provide the MCM toolbox systems (approx. 100 drones), based on ECA Group's UMIS (Unmanned MCM Integrated System) offboard MCM-suite. The delivery of the first batch of drones is expected by end-September 2023.



The refit of the SNELLIUS and LUYMES (photo) is anticipated to be completed by 2021.

Future Destroyer (LCF Replacement) Programme

In the longer term, the naval service is also set to replace its four DE ZEVEN PROVINCIE class frigates (LCF). With the first DE ZEVEN PROVINCIE class ending its service life around 2032, it is estimated that a construction contract could be in place by 2029 in order to have the first hull commissioned by 2033 and all four operational by 2036. As the German Navy has a similar timeline and similar requirements for the replacement of its SACHSEN class frigates, both countries signed an agreement to work jointly on this Next Generation Frigate programme, with the Netherlands due to acquire four units and the Germans six. While purely speculative at this point in time, the new units may be around 150 m in length and have a displacement of more than 7,000 tonnes.

Combat Support Ship (CSS)

In order to enhance its maritime support capacity, the RNLN decided to acquire a second Combat Support Ship (CSS) named DEN HELDER. The CSS will supplement the Joint Logistic Support Ship (JLSS) KAREL DOORMAN. The design is based on the Damen Logistic Support Vessel Replenisher 20000. At 179 m, a beam of 26.4 m and a draft of 7 m, the ship will have a displacement of 22,600 tonnes and feature a helicopter deck suited to operate two CHINOOKs simultaneously, with a hangar for up to six helicopters. Her cargo capacity is estimated to be at 7,600 m³ of diesel fuel (F76); 1,000m³ of aviation fuel (F44); 226 m³ of water; 1,000 tons of solid cargo; 500 m³ of ammunition and up to 24 TEU containers. It will be armed with one RAM/DART close-in-weapon system (CIWS) that consists of a Raytheon Mk-31 21-cell RAM system used in conjunction with the DART sub-calibre guided projectile fired from the Leonardo/OTO Melara 30 mm gun, and will also mount four Leonardo/OTO Melara HITROLE NT 12.7 mm Remote Weapon Stations (RWS). The first steel was cut at Damen Shipyards in Galati, Romania on 2 December 2020, while the fitting out will be carried out at Damen Schelde Naval Shipbuilding (DSNS). The delivery of the HMNLS DEN HELDER is scheduled for 2024.

Future Landing Platform Dock (LPD)

The 2018 Defence White Paper confirmed the plans to replace the Landing Platform Dock HMNLS ROTTERDAM and the HMNLS JOHAN DE WITT. A Request for Proposals (RfP) for the first hull is expected in 2025.

The first unit could commence construction in 2026 in order to replace the HMNLS ROTTERDAM by 2030. The building of the second unit could start in 2028 to supersede the HMNLS JOHAN DE WITT by 2032. Preliminary indications seem to point to a vessel with a length between 180 / 200 m and a displacement of some 18,000 tonnes. The vessels will have a flight deck and hangar to support up to five helicopters or two CH-47 CHINOOKs, and a well-deck that can take four LCU Mk IX or six LCVP. They will also be capable of embarking a 400-strong Combined Joint Task Force staff and feature extensive hospital facilities. Their cargo capacity is estimated at 1,030 tonnes of fuel, a 900 m² garage, 400 m² for dry provisions, and 300 m² of ammunition.

Multi-Purpose Auxiliary Ships

Another project is covering the successor of the Navy's 1987-vintage submarine support ship HMNLS MERCUUR, the two hydrographic survey ships SNELLIUS and LUYMES, and the Caribbean Logistic Support Vessel HMNLS PELIKAAN. These new auxiliaries are likely to be based on Damen's Multi-Role Auxiliary Vessel 1600 with a length of 61.5

m with a displacement of 1,600 tonnes. The design phase could start as early as 2022 with a contract in place by 2024 for the HMNLS MERCUUR replacement. The contract for the successors of the two survey ships could be under contract in 2025 and 2026, with deliveries anticipated in 2027 and 2028. The fourth hull, to replace HMNLS PELIKAAN, could be delivered in 2030.

New Landing Craft

The Navy is also considering the replacement of its twelve 15.7 m LCVP Mk5 landing craft by 2026.

Modernisation Programmes

Until these new platforms join the fleet, the Navy is carrying out a series of modernisation and incremental upgrades to several of its current vessels.

WALRUS Class Service-life Extension Programme (SLEP)

The Navy's four WALRUS class submarines, WALRUS, ZEELEEUW, DOLFIJN and BRUINVIS, commissioned between 1990 and

1994, are undergoing an extensive Service-life Extension Programme (SLEP), allowing them to remain in service for another 20 years. The SLEP package entails the installation of a new internal communications system, a new Tactics CAMS-Force Vision combat management system, a Kongsberg Passive Sonar Processing System and a Wartsila ELAC Nautik Scout Mine and Obstacle Avoidance Sonar, a Vigile 200 ESM system, a Safran Sigma 40 Inertial Navigation System, a non-hull-penetrating L3 KEO Model 86 optronic mast, upgrade of navigation consoles, and Mk 48 Mod 7 CBASS torpedoes. The first unit, ZEELEEUW, concluded her SLEP in 2019, followed by DOLFIJN in 2020. The BRUINVIS should be completed in 2021 and the WALRUS will commence its upgrade programme in 2022.

LCF Upgrade Programme

The Royal Netherlands Navy continues with the incremental upgrades of its four DE ZEVEN PROVINCIEËN class air-defence and command frigates (LCFs) DE ZEVEN PROVINCIEËN, TROMP, DE RUYTER and EVERTSEN. By 2024, all four units are to be fitted with a Thales SMART-LMM radar, a Tactics



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The PELIKAAN was recommissioned into the fleet on 17 September 2020 after an 8-month refit.

CAMS-Force Vision combat management system, a new Leonardo 127/64 LW VULCANO 127 mm gun, a Raytheon Mk-31 21-cell RAM; the Mk 54 torpedoes and the RIM-162 ESSM Block 2 missiles. The development of the DE ZEVEN PROVINCIEËN class into a fully configured BMD “shooter” is yet to be determined. The possible addition of the Raytheon SM-3 Blk 1B missile for exo-atmospheric intercept of ballistic missiles is also under consideration.

KAREL DOORMAN (M-type) Frigates Upgrade

The remaining two KAREL DOORMAN class frigates, VAN AMSTEL and VAN SPEIJK, have benefited from a major Mid-Life Improvement Programme (IP-MF) between 2010 and 2014, extending their service lives beyond 2025. However, in order to be in line with NATO’s renewed focus on underwater warfare, the frigates’ anti-submarine warfare (ASW) capabilities will be enhanced with

the installation of LIDAR sensors and Mk 46 Mod lightweight torpedoes, upgrades to LW08 air search radar and a Thales SCOUT Mk 3 radar, in addition to upgrades to the Link 11/16/22 and the HARPOON Block IC ASM to the Block 2 standard, replacement of the RIM-7P SEA SPARROW SAM, and replacement of the SLQ-25 NIXIE towed torpedo decoy system. Both frigates are to remain in service until 2030 when the new ASWFs are due to enter the fleet.

HOLLAND Class Offshore Patrol Vessels (OPV) MLU

In order to provide them a further 20 years of service, the four HOLLAND class OPVs, HOLLAND, ZEELAND, FRIESLAND and ZEELAND will be subject to a Mid-Life Upgrade (MLU). The radar and communication systems will be replaced, as well as the information technology (IT) hardware and software. The MLU will be implemented between 2022 and 2028, ensuring that at least one vessel is

always available. The first OPV to undertake this modernisation will be the ZEELAND, scheduled to enter the dock in 2022. This OPV will be the first major ship to be fitted with a Hull Vane solution, an underwater spoiler below the stern of the ship. The main benefit is a reduction in fuel consumption (expected to be at least 10%) and dampening motions in higher sea states.

Landing Platform Dock Units

In 2019, the ROTTERDAM already underwent a 12-month MLU comprising the installation of a ballast water treatment system, new masts, installation of the Thales NS 100 radar, a Thales Gatekeeper EO system and saw the ship’s operations room and the amphibious command centre being combined and fitted with new equipment. This MLU ensures that the ship can remain in service until the 2030 timeframe. In January 2020, the RNLN signed a contract with Damen Schelde Naval Shipbuilding and RH Marine for the preparatory phase of a MLU for the JOHAN DE WITT. This modernisation will encompass the upgrade of the combat management system, a NS 100 air/surface search radar, Scout Mk3 radars, updates to the Integrated Platform Management System and the Integrated Bridge System; the installation of a Raytheon Mk-31 21-cell Rolling Airframe Missile (RAM), as well as the modernisation of the ship’s medical facilities. The JOHAN DE WITT is expected to complete this MLU by 2023.

Auxiliaries

In August 2019, Alewijnse Marine was awarded the contract to carry out the mid-life refit of the PELIKAAN. This 8-month refit included: installation of new communications equipment, a Closed-Circuit Television (CCTV) system and an alarm and monitoring system (AMS); a new navigation radar, and the upgrade to the ship’s galley and berthing accommodations and a heavier crane facilitating the use of new fast raiding interceptor craft. The PELIKAAN was recommissioned into the fleet on 17 September 2020. The refit of the SNELLIUS and LUYMES will entail upgrades to the navigation radars and to the communications suite, and also the installation of a new sonar suite and underwater sensors. Work on both vessels is anticipated to be completed by 2021.

Landing Craft

The Navy’s five 35.8 m LCU Mk IX type landing craft are scheduled to receive a MLU in 2023. ■



The navy is considering the replacement of its twelve 15.7m LCVP Mk5 landing craft by 2026.

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Airborne Special Mission Resources

André Forkert

Paratroopers and Special Forces (SF) use aircraft to approach their mission target, often over long distances. From helicopters or airplanes, they then jump silently to their target on land or on water.

Parachuting, in particular, is an incomparable way to reach an area quickly and unnoticed, thereby offering the decisive element of surprise. However, the paratroopers' extensive operational equipment makes the jump considerably more difficult. In recent years, the increasing amount of equipment has added to the weight these troops must now carry. In many countries, this requires a replacement of the systems currently in use. This applies to freefall systems as well as to automatic parachute systems. Whenever possible, insertion by helicopter is preferred. However, their range is limited, and there is also the danger that the approach will be detected by rotor noise. This is where the parachute systems come in.

Photo: US Army



US Army paratroopers using the new T-11 parachute jumping system out of a C-130J. The aircraft can carry up to 64 paratroopers.

Photo: US Army

The backbone of air transport in Europe is the Airbus A400M. It can carry up to 116 paratroopers and their equipment over tactical and strategic distances. To improve the tactical options, and especially the dropping of paratroopers, France and Germany have jointly ordered ten Lockheed Martin C-130J SUPER HERCULES aircraft. These can also operate where the A400M is too large. The C-130J has a range of about 3,300 km and can carry 92 passengers, or 64 paratroopers, or six pallets of materiel. For tactical missions, smaller aircraft can be considered, such as the Embraer KC-390 (e.g. Hungary and Portugal), CASA C-235/C-295 (e.g. Czech Republic, France, Spain) or the Alenia C-27 SPARTAN.

a 28% larger surface area with a 14% larger diameter compared with the T-10. This gives the parachute a maximum payload of 181 kg. However, the system has also become significantly heavier at 24 kg. The new glider has come under heavy criticism because it is highly susceptible to wind, which has led to several jumping accidents.

The German Armed Forces intend to certify the A400M for automatic parachute jumps from mid-2021, and to conclude a contract for the procurement of a new automatic parachute system in the near future though this procurement has been repeatedly postponed for years. In Germany, the A400M has only been certified so far for use with a so-called container delivery system and for dropping parachutists via side doors and via the loading ramp in freefall. For full-scale use of the A400M, only the possibility of dropping jumpers by means of an automatic parachute system from both side doors at the same time is missing; this capability is set to be achieved by the middle of this year. The T-10 will use an extended deployment line for this purpose. France is already one step ahead. On 18 May 2020, the French Ministry of Defence announced that the A400M ATLAS transport aircraft was now capable of dropping paratroopers through



In the scope of the Advanced Troop Parachute System (ATPS) programme, the US Armed Forces have replaced the T-10 parachute with the T-11 automatic troop parachute. The T-11 has a 28% larger surface area with a 14% larger diameter compared with the T-10. The maximum load is 181 kg.

Author

André Forkert a former infantry officer, is Co-Editor of the German website www.soldat-und-technik.de.

T-10 Successor

The T-10 troop parachute is still in use with the airborne troops of many nations, including the Bundeswehr. It has now been in service for almost 70 years and no longer meets today's requirements, for example in terms of payload. The US Armed Forces have replaced the T-10 with the Advanced Troop Parachute System (ATPS) programme and the Airborne Systems T-11 automatic troop parachute. The main canopy of the T-11 has

the aircraft's side doors. Depending on the user nation, it should be possible to drop 106 to 116 paratroopers per aircraft, simultaneously from both side doors.

The T-10 successor system is to be procured promptly and in cooperation with Belgium and the Netherlands. The Bundeswehr's requirement is stated as 4,336 parachutes and 3,090 reserve parachutes.

The new chute will also introduce a new safety system for automatic jumps. The AAD (Automatic Activation Device) CYPRES systems from Airtec GmbH & Co KG are used in militarily freefall systems in more than 100 countries. The automatic opening device measures the fall speed and automatically initiates the opening of the reserve parachute if the jumper exceeds a certain fall speed (approx. 35 m/s) below a certain altitude (approx. 1,000 ft). With the CYPRES 2 Static Line System (SLS), a version for automatic jumps is also available. The SLS consists of the components SLS Aircraft Module (1x per aircraft, 3 kg), the SLS Self Test Module (for riggers) and one SLS unit (165 grams) per jumper. This is installed in the reserve. The SLS Aircraft Module in the aircraft communicates constantly with the jumper unit. Activation occurs at a fall speed of >13 m/s and a height of 500 to 600 ft below the drop height (aircraft) when the actual parachute has not deployed or has not deployed properly by then. For the German, Dutch and Belgian cooperation, NATO has issued a call for tenders for 450 SLS devices for the year 2021.

After Landing

While the parachute jump is only the movement procedure, the real work begins after landing. To recover and transport the heavy



Photo: Palfinger

The CRAYLER vehicle from Austrian company Palfinger can be used to pick up airdropped cargo with a weight of up to 1,600 kg. As an external load, the vehicle is suitable for airlift with NH90, PUMA, Mi-17 or the UH-60 BLACK HAWK.



Photo: Airborne Systems

Operators of the Maritime Craft Aerial Delivery System (MCADS) include the armed forces of Australia, France, Norway, the UK and the US.

loads, vehicles that can also be airlifted can be used. These can be quads, light 4x4 all-terrain vehicles with a winch or crane, or vehicles like the Palfinger CRAYLER. This all-wheel drive forklift has a tiltable lift mast that reduces the transport height to less than 1 m and can therefore be loaded without any problems. In the version with belt drives, materiel weighing up to 1,600 kg can be handled quickly and precisely. In addition, this forklift can be transported as an external load with the widely used NH90, PUMA, Mi-17 or UH-60 BLACKHAWK helicopter models. Two European SF units are already using the CRAYLER.

But the target is not always on land. One example was the 2009 rescue of Captain Richard Phillips on the MV MAERSK ALABAMA, who had been kidnapped by Somali pirates. Here, members of the United States Naval Special Warfare Development Group (DEVGRU) jumped over water and then approached the target in inflatable boats – which had also been deployed by a parachute cargo system. Now the German Armed Forces also want to acquire 16 such launching systems for their Special Forces as the "Absetzsystem Schlauchboot KSK". This will be based on a military-off-the-shelf (MOTS) system. The British Special Boat Service (SBS), as well as the US Navy SEALs have been using such systems for some

time. In English, these missions are called "boat drop" or "boat airdrop" operations. According to the British Armed Forces, the UK is the world leader in this field. Systems developed by British companies are in use by maritime Special Forces around the world. One such system is the Maritime Craft Aerial Delivery System (MCADS) developed by Airborne Systems (IrvinGQ) of Bridgend, Wales. MCADS operators include the armed forces from the UK, USA, Australia, France and Norway.

MCADS uses the PRIBAD 21 (Platform, Rigid Inflatable Boat Aerial Delivery 21 ft) platform, which can accommodate boats from 9 to 12 m in length, and the PURIBAD (Platform Universal, Rigid Inflatable Boat Aerial Delivery), for boats from 6.5 to 8.5 m in length. According to the company's promotional material, it is the only system in operation that can also drop "large" RHIBs. In 2011, the first versions of the MCADS were delivered to the UK Ministry of Defence, which are configured to drop boats of 6.5 m to 8.5 m in length from UK C-130J aircraft. Another boat drop system in UK service is the Small Boat Aerial Delivery System (SBADS), developed by Babcock International's Marine & Technology Division. SBADS is used for boats over 3.6 m in length. The UK Ministry of Defence reportedly ordered 186 SBADS units in 2011. ■



Photo: author

Shown here is a dummy with Airtec's AAD (Automatic Activation Device) CYPRES SLS systems, which is used for static line jumps.

European Small Arms Acquisition Programmes – Stagnation or Change?

David Saw

The ability to design, develop and produce small arms and associated ammunition used to be considered as one of the basic building blocks of a successful national defence industry. Although Europe still retains world-class small arms design and manufacturing capabilities they are no longer as widespread as previously.

This diminution of Europe's small arms industrial capabilities is one of the many casualties of Europe's changing defence priorities in recent years. In order to gain an understanding of where Europe is in terms of future small arms procurements, we need to gain an understanding

of Europe that did not have small arms design, development and production capabilities and an accompanying capability to produce the required ammunition. Although it must be said that weapon design and development was often based on other people's designs and patents.

FN Herstal) with a new production site at Herstal outside of Liège. The manufacture of the Model 1889 rifle was only a starting point. John Moses Browning, the famous US small arms designer, would later work with FN and broaden their product line and capabilities.

Post-1945 FN would become a critical centre of small arms innovation, thanks to Dieudonné Saive. He had been Browning's assistant in the 1920s and had gone on to further develop many Browning designs, leading to weapons such as the Hi-Power pistol in 9x19 mm. In the late 1940s, he started developing the Fusil Automatique Léger (FAL), arguably the definitive post-1945 battle rifle. Then came the development of the MAG light machine gun by Ernest Verrier at FN during the 1950s, who would later go on to design the MINIMI Squad Automatic Weapon (SAW). Today, FN remains one of the most important European small arms manufacturers and since 1997, the Walloon Regional Government has owned the company.

Photo: Bundeswehr/Marco Dorow



Recruits from Gebirgsjägerbataillon 232 train in shooting techniques with their G36 assault rifles on the Reiteralpe high plateau in September 2020. The German new assault rifle programme remains mired in controversy, with a definitive purchase decision still awaited.

of the industrial picture and of what the key trends have been in small arms in Europe in recent years.

When the military scene in Europe was characterised by large conscript armies it was eminently sensible to have a national small arms industry. If you have a requirement for hundreds of thousands of weapons you are hardly likely to want the supply of such a core capability to be subject to the good will of a foreign supplier. Equally as important, especially when purchasing small arms in large quantities is to have weapons that exactly meet your needs. As a result, there were very few countries in

A good example of these trends comes from Belgium. Firearms had been manufactured around the city of Liège since 1350, thus the Belgian small arms industry predates the establishment of the country of Belgium! In the 1880s, the Belgian Army sought a new bolt-action battle rifle that would utilise the new smokeless powder cartridges that had been developed. They decided to acquire a Mauser design, later designated the Model 1889, in a new 7.65x53 mm calibre. To manufacture the rifles, lots of Belgian small arms manufacturers joined forces to establish a new company Fabrique Nationale (today

Lost Capability

While Belgium has preserved its small arms capabilities, others in Europe have not been so fortunate. Two examples of that are countries with highly rated military capabilities in the shape of Britain and France. In Britain, the majority of small arms design and manufacture used to be carried out by the state-owned Royal Ordnance Factories (ROF). There were privately owned small arms manufacturers such as Birmingham Small Arms (BSA), formed in 1861, which was formed by independent small arms manufacturers to mass produce small arms for export and then there were more modern entries into the small arms sector such as Sterling Armaments.

BSA evolved into a diversified company manufacturing cars and motorcycles, but its small arms capabilities remained strong.

Between 1939 and 1945, BSA produced some 1.2 million Lee Enfield rifles. In the end, though, inefficient management and bad commercial decisions marked the end of BSA in 1973. Then you have Sterling, best known for the Sterling submachine gun that was in British service from the 1950s onwards. They also developed some assault rifle designs and manufactured the Armalite AR-18 under license, but the company went bankrupt in 1988.

Had the British adopted the EM2 assault rifle in the intermediate 7x43 mm calibre and the TADEN machine gun in the same calibre, and ignored the US pressure to adopt 7.62x51 mm round then the fate of the British small arms industry could have been totally different. Instead, they adopted 7.62x51 mm and the FN FAL and later the FN MAG. The Royal Small Arms Factory (RSAF) at Enfield made some minor modifications to the two FN weapons, but in terms of small arms, it took until the late 1960s for serious design and development work to resume. Here the objective was the replacement of the SLR (the British version of the FAL) and the programme became known as the SA80, with the calibre for the SA80 being fixed when the FN SS109 5.56x45 mm became the NATO standard.

Type classified as the L85A1 assault rifle and the L86A1 Light Support Weapon (LSW), production of the new weapons started in 1985 at RSAF Enfield. However, in the background other things were happening. The British Government had made ROF into a government-owned company known as Royal Ordnance (RO) in January 1985, with the aim of privatisation on the stock market. This strategy failed to work out and it was decided to sell RO as a single entity, with British Aerospace (now BAE Systems) purchasing RO in April 1987. Amidst all of that, RO management decided to close RSAF Enfield and sell the site, moving production to RO Nottingham and the new Nottingham Small Arms Factory (NSAF).

On reflection, the SA80 family of weapons should not have been put into production; the design was simply not ready and needed to be extensively debugged. Matters were not helped by the change of production site to the NSAF and arguably by the management culture of the NSAF that was modelled on that of the Japanese car industry! By the time production ended at the NSAF in 1994, over 350,000 of the SA80 family had been produced, with the NSAF being closed in 2001.

The deployment of British troops to the Middle East in 1990/91 for the first Gulf War revealed a host of problems with the SA80 system and various solutions were adopted to resolve the issue. In the end, a major up-



Photo: J.Bardene/SIRPA Terre

A member of the 13e Régiment de Dragons Parachutistes, part of the French Special Forces reconnaissance capability, with his HK416 rifle. French Special Forces were using the HK416 long before the weapon was selected as the standard French assault rifle in 2016.

grade programme was awarded to Heckler & Koch (HK), at that time owned by BAE, to upgrade some 200,000 L85 and L86 weapons to the L85A2 and L86A2 standard. The first L85A2 and L86A2 were supplied at the end of 2001 and the programme was completed in 2007. A further upgrade programme for the L85 to the L85A3 configuration was announced in 2018 and this is supposed to keep the weapon in service through 2025.

France was responsible for some of the most important small arms innovations of the late 19th and early 20th centuries, with much of its production centred on the state-owned Manufacture d'Armes de Saint-Étienne (MAS). Rather than sign on to the NATO 7.62x51 mm bandwagon, France stuck with its own 7.5x54 mm round and the MAS 49/56 semi-automatic rifle. Then at the end of the 1960s, work started on a successor

assault rifle that evolved into the FAMAS, which was adopted by the French Army in 1978 with some 400,000 acquired and all built by MAS. The French Navy purchased some 15,000 of the improved FAMAS G2 model in the mid-1990s, but the Army refrained from joining in. In 2001, small arms work ceased at MAS for the first time since 1764 and France was officially out of the small arms manufacturing business.

Making Choices

It is important to note that specialist firearms manufacture is still happening in both Britain and France in such areas as sniper rifles and hunting and sports shooting. In terms of small arms, however, that ship has sailed and there is no major small arms capability in either country. Which leads to the question of what next for Britain and France in terms



Photo: Ministry of Defence

The L85A3 is the latest upgraded version of the British Army assault rifle, more than 30 years after it entered service its faults have finally been corrected. The L85A3 is supposed to remain in service until 2025, at which point a new assault rifle will be required.

of small arms? For Britain, matters are still a work in progress, while France has virtually settled its small arms future.

During their involvement in Iraq and Afghanistan, the British acquired small arms to meet various needs as Urgent Operational Requirements (UOR), although many of these were later withdrawn from service. In 2010, Lewis Machine & Tool (LMT) won a UOR to supply the British Army with a Designated Marksman Rifle (DMR) designated as the L129A1, a version of the LMT LM-308MWS in 7.62x51 mm. The first contract covered 440 weapons, but many more were ordered subsequently. The L129A1 was also selected for the Sniper Support Weapon (SSW) requirement and equips the second man in the two-man sniper team.

France has modernised its small arms capabilities in recent years, starting with the Arme individuelle futur (AIF) programme to replace the FAMAS, which commenced in May 2014 and was contested by the FN SCAR, HK416, HS Product VHS-2, the SIG Sauer MCX and the Beretta ARX160. In September 2016, the HK416 was selected, with over 100,000 5.56x45 mm HK416F-C and HK416F-S rifles, plus 10,767 HK269G (AG36) 40 mm grenade launchers being ordered.

Then in early 2020, France announced that its pistolet semi-automatique (PSA) requirement had been met by 74,596 Glock 17 Generation 5 pistols in 9x19 mm, with all weapons delivered by 2022. Also awarded was the fusil de précision semi-automatique

The objective was to replace the HK G36 assault rifle in 5.56x45 mm with a new system. The plan was that deliveries of the winning system would start in 2020 with deliveries to be complete by 2026. The Bundeswehr had adopted the G36 in 1995 and the decision to replace it was taken in controversial circumstances. Contenders for the new rifle requirement would include HK, obviously, offering their HK433 design (later they would also offer the HK416), Rheinmetall working with Steyr Arms of Austria offering the RS-556, based on the Steyr STM-556 weapon, C.G. Haenel with the MK556 (based on their CR223 system) and even Schmeisser who had a number of different systems based on the AR platform.

The German programme started moving forwards in 2017 and by 2018 there were only two contenders left, HK and Haenel. For many Haenel were the unknown quantity in this competition. Based in Suhl in Eastern Germany, the company is part of the Missiles and Weapons cluster of the EDGE Group, the defence industry holding company of the United Arab Emirates (UAE). As an aside, Haenel was the place where the famous German small arms designer, Hugo Schmeisser would start work on an automatic carbine in 1938, that would eventually lead to the first true assault rifle, the Sturmgewehr StG-44.

In May 2020, by which point all technical evaluations had been completed, both HK and Haenel were invited to submit their Best and Final Offer (BAFO) for the rifle programme, with bids to be submitted by 22 June 2020. Then on 15 September, the German Ministry of Defence announced that they had selected Haenel to supply some 120,000 MK556 assault rifles to the Bundeswehr. More controversy would erupt though when on 9 October, the Ministry of Defence announced that the tender win by Haenel had been cancelled, in the wake of allegations of infringement of HK patents by Haenel. These allegations were to be investigated by patent lawyers at the behest of the Ministry of Defence, with results expected in January at which point the programme will be revisited and decisions can be taken on the future direction of the programme. Clearly selecting a new assault rifle for Germany has proven far harder than anticipated. This requirement remains the major outstanding assault rifle requirement in Europe, yet the longer it is delayed the more likely the possibility that the 5.56x45 mm round will no longer be the assault rifle calibre of choice. Of course, that assumes that the US makes up its mind about NGSW and its 6.8 mm cartridge. As such, the future of assault rifles in European NATO rests on decisions in Bonn and Washington DC. ■

Photo: Armée de Terre



Unorthodox firing positions being demonstrated. The French Army selected the FN SCAR-or semi-automatic sniper rifle. A total of 2,610 rifles with Schmidt & Bender telescopic sights and OIP Sensor Systems night vision equipment are being supplied.

In 2013, Britain announced that it had selected a replacement for its L9A1 9x19 mm pistol (Browning Hi-Power) in the form of the Glock 17/Glock 17T Gen4 (L131A1/L132A1) and Glock 19 (L137A1) in 9x19 mm. The pistol programme started in 2011 and was awarded in January 2013, with over 25,000 pistols acquired. The Glock will also replace SIG Sauer P226/P229 pistols in British service once these weapons exceed their time of life.

The primary outstanding issue for the British is what happens after the L85A3. As previously noted the weapon is expected to serve until at least 2025, but what then? There is no shortage of very credible 5.56x45 mm assault rifles that could be considered. However, by 2025 the US Next Generation Squad Weapons (NGSW) programme should be in service and, if that is the case, then Britain has the opportunity to adopt what could be the future of small arms.

(FPSA) for a DMR. Here the FN SCAR-H PR in 7.62x51 mm has been selected with 2,610 being delivered through 2022. With the machine gun sector being taken care of by the FN MINIMI and the MAG, France has its small arms situation under control for the foreseeable future.

Problems in Germany

Unlike Britain and France, Germany retained a small arms design, development and manufacturing capability and its industry has been both innovative and globally successful in this sector. Most external observers had assumed that the System Sturmgewehr Bundeswehr programme would be a coronation and that HK, as the national champion, would inevitably be the winner. That is why it is an enduring mystery that the provision of a new assault rifle for the Bundeswehr has proven to be so complicated and controversial.

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Small Arms Ammunition Developments in Europe

David Saw

In terms of small arms ammunition developments in Europe it is not difficult to conclude that they are, in the majority of cases, still prisoners of decisions taken many years ago in terms of calibre standardisation.

At the time, there was obvious logic behind these standardisation decisions. Today, these decisions might finally be reaching the end of their shelf life as work progresses on next generation small arms and new calibres.

Within NATO, calibre standardisation goes back almost to the start of this defensive alliance in 1949. Some of the decisions taken in this regard were pretty non-controversial. For example, the emergence of 9x19 mm as the standard pistol and submachine gun cartridge and the 12.7x99 mm (.50 BMG) as the standard heavy machine gun cartridge (HMG) are very understandable. The 9x19 mm is a good pistol cartridge. Indeed, in 2017 the US military selected the SIG Sauer P320 in 9x19 mm as the basis for its new Modular Handgun System, acquiring two variants in the form of the M17 and M18.

The thing is that Georg Luger designed the 9x19 mm round in 1902 and until this very day, this round is still the most common pistol round. At the start of the 1990s, however, NATO had come to the conclusion that the round had reached the end of its life, citing lack of stopping power and noting that the increasing prevalence of body armour would reduce its utility even further. They then embarked on a search for a new round to be used with what was described as a Personal Defence Weapon (PDW) that could replace the pistol and the submachine gun, and even the assault rifle in certain circumstances.

Attempted Solutions

In the end, two rounds emerged to contest this PDW requirement, along with weapons to utilise them. FN was first into the fray for the new requirement, developing a 5.7x28 mm round, followed by the P90 PDW and the Five-seven pistol. Competition came from Heckler & Koch (HK) with a new 4.6x30 mm round, followed by the MP7 PDW and eventually by a pistol.

Photo: Armée de Terre



A French soldier with an HK416F-S rifle on a public security mission during the holiday season in France. The HK416 in 5.56x45 mm standard NATO was selected by the French Army in 2016. By the end of 2022, the US Army could have a new assault rifle in 6.8 mm calibre, calling into question the future of the 5.56 mm round.

The aim had been to test the new rounds and weapons and then select the best competitor as a standard NATO round. Testing took place in 2002/2003 and the 5.7x28 mm round performed effectively. However, political factors prevented the unanimity needed for the new round to be standardised and the PDW requirement came to an end. Both FN and HK continue to produce weapons in their new calibres, but the 9x19 mm round remains the NATO standard.

Returning to the subject of the 12.7x99 mm (.50 BMG) calibre, in 1918 the US Army called for the development of an HMG and John Browning responded with a new round and a new machine gun that was eventually taken into service in 1921. The original weapon was water-cooled, but in the 1930s, an air-cooled heavy barrel version was developed, which was the M2HB machine that is so widely used today. The M2HB and the 12.7x99 mm have been the

dominant Western HMG combination since the 1940s and remain so to this day. There are still development possibilities within this system, such as the arrival of polymer-cased ammunition that offers equivalent performance but reduced round weight compared with traditional rounds.

That is not to suggest that there have been no efforts to dethrone the M2HB and 12.7x99 mm round as 'the' Western HMG. One of the most significant efforts came from FN, who in 1983 announced a new HMG in the form of the BRG-15. This was a dual-feed weapon utilising a 15.5x115 mm round. Incredibly powerful, it offered performance far in excess of the M2HB/12.7x99 mm combination. In an ideal world FN would have found a major customer to support the development and fielding of the BRG-15. Unfortunately, that never happened and FN was unable to finish the development of the BRG-15 as a private venture.

Rifle Calibres

In the 1950s, the US had pressured NATO to adopt the 7.62x51 mm round as its standard rifle calibre. By contrast, the British and many others wanted an intermediate cartridge in 7x43 mm to allow them to field a true assault rifle. US opinion prevailed and NATO went with the full power 7.62 mm round. While that was happening the US sponsored all sorts of small arms research in an effort to find a perfect high technology small arms solution. Eventually, US thinking turned to a new lighter rifle and round in the early 1960s, adopting the M16 and the 5.56x45 mm M193 round. Remember this was happening as European NATO nations were still transitioning to 7.62x51 mm. By 1970, there was an agreement that NATO would standardise on a small calibre round and this led to the selection of the 5.56x45 mm SS109 round from FN as the NATO standard in 1980.

The 7.62x51 mm and 5.56x45 mm calibres remain, at least for the moment, as the only game in town in terms of NATO small arms calibres. Significant improvements to round performance are available though. The US has fielded enhanced performance round in both calibres, as have the British. Another factor leading to performance enhance-

ments is the arrival of Designated Marksman Rifles (DMR) on the scene, primarily using the 7.62x51 mm calibre. This has created a demand from some users for even higher quality/higher performance rounds to maximise DMR performance; essentially this is sniper quality ammunition.

On the surface one would assume that the dominance of the 5.56x45 mm calibre for assault rifles is set to continue in Europe. For example, in 2014 France started the Arme individuelle futur (AIF) assault rifle programme to replace the FAMAS. In September 2016, HK was announced as the winner of AIF and was contracted to supply over 100,000 HK416F-C and HK416F-S rifles in 5.56x45 mm. In July 2019, the Estonian Defence Force announced that it had selected the Lewis Machine & Tool (LMT) MARS-L (designated as the R20 RAHE in Estonia) as its next assault rifle in 5.56x45 mm and as a DMR in 7.62x51 mm. The R20 RAHE will gradually replace the IWI GALIL as the primary Estonian assault rifle and the first 1,500 R20 were delivered in July 2020.

Arguably the most anticipated European assault rifle selection expected in 2020 was that of Germany, with the System Sturmgewehr Bundeswehr programme for a new 5.56x45 mm assault rifle with an initial quantity of 18,700 weapons to be acquired,



Photo: Crown Copyright

A British Army sniper with the L115A3 rifle, a version of the Accuracy International AWM, on overwatch in Southern Afghanistan. The L115A3 is chambered for the .338 Lapua Magnum round, which has become a de facto standard for sniping applications.

with a maximum of 20,000 weapons per year thereafter. The German programme was thrown into chaos after a preferred tenderer was announced in September and then that announcement was withdrawn in October. Let us assume that Germany finally selects a new assault rifle in 2021 and takes first deliveries in 2022, the problem is that by that time the dominance of the 5.56x45 mm assault rifle could be under serious threat. At present, the US Army is moving ahead

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Photo: SIG Sauer

The SIG Sauer SL MAG utilises the .338 Norma Magnum round from Norma in Sweden. This machine gun weighs less than an M240B and can engage targets out to 2,000 metres. A weapon like this could replace the M2HB in many applications.

with its Next Generation Squad Weapons (NGSW) to replace the M4 rifle and the M249 Squad Automatic Weapon (SAW), both 5.56x45 mm calibre systems. NGSW will use a government-supplied 6.8 mm projectile, with the three different weapon vendors offering three different round types; hybrid (steel base + brass), composite-cased and case-telescoped. The US Army plan is that the NGSW weapons will enter service in the fourth quarter of FY2022. If we assume that NGSW survives the arrival of the new US administration and moves into production and service, then that would appear to place those looking for a new assault rifle in a difficult situation, either embrace the future with 6.8 mm or remain in the past with 5.56 mm.

In the context of ammunition it would appear that Europe remains a follower rather than a leader, primarily due to NATO standardisation and the lack of an enormous commercial ammunition sector that US companies enjoy. It is not all bad news for Europe though. In the specialist ammunition sector you have .338 Lapua Magnum from Finland (the company is part of NAMMO), which is one of the most significant sniper rifle rounds.

Then in Sweden, there is Norma, a subsidiary of RUAG. According to the company, they manufacture 30 million cartridges in more than 100 different calibres annually. They have their .338 Norma Magnum round for long-range engagements, SIG Sauer selected this round for their MG 338 machine gun as acquired by US SOCOM and the objective

here is to get much of the performance of an M2HB HMG in a substantially lighter and more portable package. If the .338 Norma Magnum round does provide the basis for an M2HB replacement in some applications, it will be an incredibly important development for the European small arms ammunition sector.

Certainly in Eastern Europe, national small arms production capabilities still exist in parallel with small arms ammunition production. Poland provides an excellent example of this. Fenryka Broni "Łucznik" in Radom is producing the Modular Firearms System (MS-BS) GROT rifle for the Polish military, while Mesko, another Polska Grupa Zbrojeniowa (PGZ) company, produces a complete range of small arms ammunition in 5.56x45 mm, 7.62x39 mm, 7.62x51 mm, 7.62x54R mm and 9x19 mm amongst others.

Another model for European small arms ammunition acquisition is illustrated by MEN Metallwerk Eisenhütte GmbH in Germany, a European rather than a national solution. MEN was selected to provide the 7.62x51 mm ammunition for the French Army fusil de précision semi-automatique (FPSA) DMR requirement won by the FN SCAR-H PR. The company provides a comprehensive set of ammunition solutions in three categories: military, police and sniper. Calibres covered include 9x19 mm, 5.56x45 mm, .223 Remington, .300 AAC Blackout, .300 Winchester Magnum (7.62x67 mm), .338 Lapua Magnum and 12.7x99 mm (BMG).

There are of course other options if European countries wish to return to the manufacture of small arms ammunition. Back in 1919, the Manurhin company was established at Mulhouse in Eastern France. Its primary purpose was the manufacture of ammunition and the manufacture of the machinery necessary for ammunition production lines. The company focussed on small calibre ammunition from 4.6 mm to 14.5 mm and medium calibre natures in 20 mm, 25 mm and 30 mm.

After the end of the Cold War, ammunition demand in Europe declined massively and this saw the company refocus towards the provision of ammunition production machinery and turnkey ammunition production facilities. Today, more than 60 countries use their ammunition production machinery, while countries such as Oman have purchased turnkey multi-calibre ammunition production. In 2018, the company was acquired by Emirates Defence Industries (later EDGE Group) of the United Arab Emirates (UAE) and was then rebranded as La Manufacture Due Haut Rhin (MHR). So should there be a demand for an increase in onshore European small arms ammunition manufacture, companies such as MHR are well placed to provide the industrial backbone necessary to meet such demand. ■

MEN Introduces New .300 AAC BLACKOUT Service Ammunition

(jh) MEN – Metallwerk Eisenhütte GmbH, headquartered in Nassau on the Lahn, Germany, introduces new service ammunition with a lead-free deformation bullet in .300 AAC BLACKOUT calibre.

After the successful introduction of the full metal jacket soft core cartridge for use and training as well as the lead-free and low-pollutant LFI (Lead-Free Indoor)

training cartridge, the product range is now extended by the QD (Quick Defence) lead-free service ammunition with 7.8g heavy deformation bullet.

The lead-free and low-pollutant service ammunition is primarily designed for high energy output at the target. This is achieved by rapid deformation in combination with a high bullet cross-section (approx. 200%), whereby the residual mass is almost 100%. This generates a very good effect at the target and in parallel minimises the background hazard.

Of course, the development in the field of medium-distance rifle calibres will be continued, with priority assigned to subsonic cartridges in .300 AAC BLACKOUT calibre.



Photo: MEN

Viewpoint from New Delhi

Photo: Suman Sharma



India's Defence Budget

Suman Sharma

India's defence budget this year has put its 'Guns versus Butter' debate to rest when it stepped up its capital outlay by 19%, the highest in 15 years, and hiked its overall budgetary allocation for 2021-22 by 7.4%. This year's allocation for defence in the annual budget has been US\$66.39Bn, which is an increase of 7.4% compared with the US\$61.81Bn allocated in 2020-21.

Dr. Laxman Kr. Behera, Associate Professor, Special Centre for National Security Studies, Jawaharlal Nehru University says, "This is the first time that the MoD (Ministry of Defence) budget is driven by capital expenditure which was not the case earlier".

With nothing to write home about as far as revenue expenditure is concerned, which includes pensions for veterans and salaries for serving officers, this year's defence budget clearly stresses on the need for buying sophisticated weapons and bolstering preparedness.

With a nine-month old Indo-China border conflict at the LAC (Line of Actual Control), cost of the Indian armed forces in terms of troop deployment and use of weapons has gone up, thereby pushing for new military purchases.

Indian Army's retired Maj Gen BK Sharma, Director United Service Institution, defends the Government's decision saying, "Low budgetary allocation in the past has caused huge operational hollowness and widened the military power asymmetry between India and China. China would continue to spend about five times more than India. In fact, a defence spending trend analysis by SIPRI reveals that by 2035 China's military budget will surpass that of the US. We need to take a long-term view of defence budget management. Reactive increase in the wake of a crisis is at best a symptomatic solution. There has to be a minimum assured budgetary support for our 15 years long-term military modernisation perspective plans. Likewise, additional financial resources are needed to materialise the acquisitions approved by the Defence Acquisition Council."

The allocation under capital expenditure which relates to modernisation and infrastructure development of armed forces has been significantly increased this year. The budgetary share under capital for acquisition of modern weapons is almost US\$19Bn for 2021-22 representing a 19% increase as compared to 2020-21. Defence Minister Rajnath Singh hailed the defence budget terming the "Nearly 19% increase in defence capital expenditure" as the "highest ever increase in capital outlay for defence in 15 years."

"The most significant component is the capital component—the budget allocation in 2020-21 was US\$15.8Bn, this has gone up to US\$18.7Bn, which is a substantial increase of close to 20 per cent," reiterated Expenditure Secretary T.V. Somanathan.

Defence expenditure accounts for over 15% of central government spending and is the second largest expenditure head of the Central government. In the past two financial years, the increased percentage for capital acquisitions has been 10%.

Given the present regime's thrust on economic reforms, employment generation, capital formation and creating infrastructure in India, coming in the wake of the ongoing farmer protests and post-Covid debilitating effect on the economy, the renewed focus on increase in capital budget is being seen as a welcome step by defence observers

The other area which has been given a boost is the capital allocation for the Government owned defence research agency – DRDO (Defence Research & Development Organisation) with an increase to the tune of US\$1.58Bn, hiking it by 8% over 2020-21 and 8.5% over 2019-20. The allocation for BRO (Border Roads Organisation) has been increased to US\$838.89M which is 7.48% increase over 2021-22 and 14.49% over 2019-20. BRO has been tasked with building roads and infrastructure at the border, their most recent piece of work which caught global attention was the 240 kilometre long road being constructed at the Indo-China LAC in the northern region of Ladakh, which sparked off tensions with China.

Stagnation clearly visible in the overall defence budget with not much of an increase with a modest 7.4% increase against an expected 10%, the budget is still being hailed as it has hiked the purchasing power of the armed forces with an aim to plug gaps. The shopping list includes warships, missiles, submarines, fighter jets, tanks and constructing infrastructure like bridges, roads at the borders. Dr Laxman Behera explains, "The 15th Finance Commission has also urged the MoD to reduce dependence on defence import. The meagre hike in the defence budget 2021-22 could only be explained by a sharp but inexplicable contraction in the pension budget, Allocation under Non-Salary Revenue to meet operational requirement has been increased to US\$7.59Bn which indicates a 6% growth over 2020-21.

Small Arms Ammunition Developments in the United States

Sidney E. Dean

The United States military operates a large variety of small arms. While some weapons – primarily those utilised by special operations forces – require uncommon sized ammunition, the majority of infantry weapons are chambered in a few NATO standard calibres.

The standard handguns of all US services utilise the 9x19mm NATO ball cartridge. For years this was the M882. The full metal jacket (FMJ) projectile consists of a copper alloy jacket and a lead core, and has a standard round tip. Like most standard military cartridges, the M882 has a brass casing.

Photo: USMC



5.56mm assault rifle ammunition in stripper clips, boxed 9mm parabellum pistol ammunition, and shotgun slugs, laid out for a USMC shooting match.

Handgun and Submachine Gun Ammunition

With the introduction of the Sig Sauer M17 Modular Handgun System (MHS), the Pentagon opted for two new 9mm rounds. The M1152 FMJ ball round features a flat-faced tip and has a muzzle velocity of circa 1,300 fps. The M1153 SP (Special Purpose) is designed to maximise stopping power. This fully jacketed round is nearly 30 percent heavier than the M1152, and has a hollow point tip; velocity is circa 960 fps. The US military procures the 9mm ammunition from two sources: Winchester (a subsidiary of Olin Corporation), which produces the 9mm rounds at its Oxford, Mississippi factory; and Federal (Anoka, Minnesota).

A few special operations units continue to utilise upgraded variants of the .45 calibre Colt 1911 semi-automatic pistol. While the larger round's 840 fps velocity is circa 20 percent lower than the 9mm's, the projectile is almost twice as heavy, resulting in superior stopping power. Winchester continues to supply the US military's .45 FMJ ammunition.

Rifle/ Machine Gun Ammunition

For decades, the US armed forces have deployed assault rifles, sharpshooter rifles and light to medium machine guns chambered for either 5.56x45mm or 7.62x52mm munitions. Under a contract signed in 2019, Winchester operates the

government-owned Lake City Army Ammunition Plant in Independence, Missouri. This facility produces 5.56 and 7.62 calibre ammunition for the US military. In August 2020, Federal was also awarded a contract to supply 7.62x51mm ammunition to the armed forces.

Assault Rifle Ammunition

The standard service rifles of the US Army and the US Marine Corps (USMC) are currently all chambered for the 5.56x45 NATO round (equivalent to .223 calibre). This calibre is also used by the M249 Squad Automatic Weapon (SAW)/Light Machine Gun (LMG). The 5.56mm ball round was chosen in 1980 for two reasons. At 62 grains projectile weight, it is 50 percent lighter than the previously standard 7.62x51mm ammunition, enabling infantry to carry additional ammunition. The lighter weight projectile also has a tendency to tumble or yaw after

impact, which increases wound trauma on enemy personnel.

The currently used M885A1 EPR (Enhanced Performance Round) was introduced in 2010. The actual projectile is 1/8 inch longer than the original M855 variant, but (by compressing the propellant) it is seated more deeply in the casing in order to maintain the overall 2.248 inch cartridge length. In contrast to the earlier 5.56 rounds, the EPR has a copper core rather than a lead core. The arrowhead-shaped tip or penetrator weighs 19 grains – roughly twice the weight of the M885's penetrator. Also, the EPR's penetrator is fully exposed, while the older munition's tip was copper jacketed. Army performance data shows that the M885A1 projectile, while not designated as armour-piercing, can penetrate 3/8 inch steel at 350 metres. Depending on the weapon used, the EPR can also penetrate concrete blocks at 40-90 metres. The EPR also demonstrates enhanced lethality against unarmoured personnel by beginning to yaw earlier, after



Foto: US Army / C. Todd Lopez

Comparison of the effectiveness of the Army's 5.56mm M855A1 Enhanced Performance Round fired from an M4 Carbine against a 3/8 inch mild steel plate, versus the performance of a 7.62mm M80 round fired from an M14, during a test fire event at Aberdeen Proving Ground, May 4, 2011. The M855A1 round penetrated the plate at 300 metres; the M80 (which was replaced by the upgraded M80A1 in 2014, did not.

only seven centimetres of body penetration, leading to trauma cavities of 10-15 centimetres. Army firing range testing in 2010 demonstrated a 95 percent likelihood of rounds landing within an 8x8 inch target area at 600 metres (although in the field, the effective range tends to fall to 300 metres). Winchester cites a muzzle velocity of circa 3,000 fps.

Next Generation Squad Weapon Family

The US Army is currently testing three competing entries for the Next Generation Squad Weapon (NGSW), a family of

infantry weapons consisting of a "rifle" and an "automatic rifle" to replace the M4 assault rifle and M249 SAW in most infantry squads. A production decision is expected by October of this year, with IOC by the fourth quarter of fiscal year 2022. The USMC and US Special Operations Command (SOCOM) are expected to adopt the NGSW as well.

Both the assault rifle and the SAW will be chambered for 6.8mm ammunition. Each of the three competing teams presents a different ammunition concept.




1) Sig Sauer presents a conventionally configured projectile with a hybrid casing. The brass body of the cartridge

case is thinner than usual, reducing weight by at least 20 percent and allowing a larger propellant load. The casing's stainless steel base (case head) provides enhanced stability during extraction from the chamber, reducing the risk of jamming. The case head and the brass casing wall are held together by a washer, and is rated to withstand 80,000 fps of pressure.

- 2) General Dynamics has partnered with ammunition manufacturer True Velocity. That firm's polymer-composite-cased cartridge weighs 30 percent less than a conventional 7.62x51mm round. True Velocity also touts the reduced heat transfer of the composite casing, which is expected to reduce wear on the chamber and bolt face.
- 3) Textron has partnered with Olin Winchester and is proposing a Cased Telescoped Ammunition (CTA) solution. CTA uses a plastic or polymer cartridge case instead of a brass case. The CTA projectile is completely enclosed in the case, together with the propellant. The casing is sealed with a flat top like a shotgun shell. CTA munition is generally lighter and shorter than conventional brass-cased munitions.

Regardless of configuration, the Army expects the 6.8mm ammunition to display considerable performance enhancement over current 5.56mm rounds, while being smaller and lighter than 7.62mm rounds. Recent combat experience has shown opposing forces deploying firearms with greater range than US forces (especially in Afghanistan, where engagements routinely took place at distances exceeding the 5.56's effective range of 300 metres). Another vital consideration are advances in body armour technology, with modern

Projectile Calibers/Configurations

	5.56mm M855 62 grains, Low Downrange Energy
	7.62mm M80A1 130 grains, High Drag Shape Highest Recoil
	6.5mm Low Drag Profile 125 grains, Best Downrange Velocity & Energy, Lower Recoil

Comparison of the 6.5mm projectile with conventional calibres

Photo: US Army



Photo: US Army

Comparison of the standard 7.62x51mm round with Cased Telescope Ammunition in three calibres

armour becoming impervious to 5.56mm rounds. "The capabilities of 5.56mm ammunition have largely plateaued," said US Army Major Samuel Butler, assistant product manager for the NGSW program. The 6.8mm ammunition will enable soldiers to engage targets effectively at 600 metres, Butler said. Army leaders also state unequivocally that the 6.8mm round will defeat any currently utilised body armour as well as future armour, without providing further details. Both the extended range and the improved armour penetration capability are largely the result of a heavier bullet fired at a higher (but currently undisclosed) muzzle velocity when compared with current rounds.

Photo: US Army



Using a stripper clip to load M885 5.56mm ammunition into an M-16 magazine

Marksman and Sniper Rifles

Prior to 1980, the standard US military assault rifle calibre was the 7.62x51mm (.300 calibre) ball round. It remains in use for marksman and sniper rifles, as well as for medium machine guns and miniguns.



Photo: Nammo

M993 armour piercing 7.62mm ammunition linked for use in a machine gun

Various manufacturers supply 7.62mm ammunition to the Pentagon, including Federal, which was awarded a contract in August 2020.

The M80A1 7.62mm NATO round in service since 2014 is more than twice as heavy as the 5.56, but the circa 2,800 fps muzzle velocity is lower. When fired from dedicated marksman rifles, the copper-core 130 grain 7.62mm round consistently achieves an effective range of circa 600 metres. The armour-piercing variant is the M993 round produced by Nammo. It penetrates 18mm rolled homogenous armour (RHA) at 100 metres, and 7mm RHA at up to 550 metres.

Sniper rifles achieve superior performance than marksman rifles. The US Army cites a range of 1,200 metres for the .300 WinMag (Winchester Magnum) round fired from the M2010 Enhanced Sniper Rifle. The M110 SASS (Semi-Automatic Sniper System) achieves 800 metres range against personnel and lightly armoured targets firing the 7.62mm round. Marksman and sniper rifles are also chambered in .308 Winchester, while the most powerful sniper rifle is the M107 which fires a .50 calibre round and achieves an effective range of 2,000 metres.

These are not the only ammunition options. In 2018, SOCOM conducted a three-day test to compare the performance of the 7.62mm NATO, the .260 Remington, and the 6.5mm Creedmoor round. For the test, three different sniper rifle models were used. The normally 7.62mm weapons were outfitted with new chambers and barrels to accommodate the other calibres. Shooters' hit-probability at 1,000 metres doubled

when firing the Creedmoor, while recoil was considerably reduced. According to Colonel Joe Babbitt, Program Executive Officer for the SOF Warrior programmes, the 6.5mm Creedmoor round has an effective range of 1,200 metres. SOCOM is currently acquiring conversion kits to retool a portion of its SASS inventory to the 6.5 round.

The US Army, USMC and SOCOM are also introducing or preparing to introduce new marksman and sniper rifles including the Barrett Mk 22 Multi-Role Adaptive Design (MRAD) sniper rifle. Each MRAD can be rechambered in the field to fire any one of eight calibres: 338 Lapua, .338 Norma, .300 Norma, .300 Winchester Magnum, .308 Winchester, 7mm, .260 Remington, and 6.5mm Creedmoor. For each mission, planners can choose the ammunition with the optimal mix of weight, velocity, range and penetration.

Not the Last Word

While small calibre ammunition receives much less public attention than major weapon systems, infantry remains the core element of modern warfare. The individual soldiers – and by extension those soldiers' firearms and ammunition – ultimately determine success or failure on the battlefield. For this reason, armed forces and industry will continue to investigate potential performance enhancement – whether revolutionary or incremental – for small arms munitions. Current advances in ammunition accuracy, range, lethality and portability are ultimately waypoints on the road to even more potent developments in the future. ■

Photo: USMC



From left to right, the 7.62mm NATO, .300 Winchester Magnum, and .338 Lapua Magnum rounds before a 2016 evaluation to inform Marine Corps acquisition leaders about future Marine sniper weapon system requirements. Marine Corps snipers conducted the test using different rifles at distances ranging from 900 to 1,500 metres to target.

European Man-Portable Anti-Tank Guided Weapons

Christopher F. Foss

Ever since the tank first appeared on the battlefield just over 100 years ago, there has been a continuous battle on how to defeat this threat and which has shown no signs of ending.

In broad terms, anti-tank guided weapons (ATGW) fall full into three groups: short, medium and long range, with the latter generally being integrated on to a platform. There are however exceptions with some of the more recent ATGW covering the medium and long-range capability. Early generation ATGW had a single high-explosive anti-tank (HEAT) warhead to enable conventional steel armour to be penetrated. This was followed by a tandem HEAT warhead to defeat threat tar-



Photo: MBDA

The ENFORCER is under development by MBDA to meet the requirements of the German Army and will have a maximum range of 2,000 m.

gets fitted with explosive reactive armour (ERA). Main battle tanks (MBT) have the highest level of protection over their frontal arc with many incorporating advanced armour to provide a high level of protection against threat weapons fitted not only with a HEAT warhead but also with armour piercing fin stabilised discarding sabot (APFSDS) rounds. This led to some ATGW being fitted with a top attack warhead, which is designed to penetrate the more vulnerable upper surfaces of a MBT. Some of the latest ATGW now have rocket motors and their warheads of the insensitive munition (IM) type.

Many of the man-portable ATGW currently deployed still have a semi-active command-to-line of sight (SACLOS) guidance system which means the operator has to keep his sight onto the target until missile impact. Latest generation ATGW are of the fire-and-forget type which means the operator can then move to another fire position or reload and engage another target. Some recent ATGW allow the target to be designated by another platform. In addition to being fitted with a tandem HEAT warhead, some contractors are now also offering the missile with a high-explosive fragmentation (HE-FRAG) warhead which is of more use in counter-insurgency

operations where there is no threat from armoured fighting vehicles (AFV).

Today's ATGW launchers are fitted with a sensor pack that includes a thermal sight enabling targets to be detected, confirmed as hostile and engaged under almost all weather condition. While these are generally called man-portable, most of these ATGW systems are carried by two people with one carrying the launcher and another one or two missiles.

Short-Range ATGW

To fill the short-range gap in their product portfolio and to meet French Army requirement, MBDA France developed the ERYX short-range ATGW, with sales being made to a number of countries including Canada, France, Malaysia and Norway. There was to be local production in Turkey but this never took place. ERYX has a range of between 50 and 600 m and is fitted with a single HEAT warhead and can be shoulder-launched or from a tripod. Unlike many earlier ATGW, it is of the soft-launch type and can be launched from within buildings. Production of the ERYX has been completed and it is no longer being marketed by MBDA, although the company continues to support existing customers.



Photo: Saab

A key feature of the Saab NLAW is that it can be fired safely from within a confined space which is very useful during urban operations.

Following a competition, MBDA Germany was awarded a contract for their ENFORCER which is described by MBDA as a “low-cost, high-precision infantry weapon” to meet the German Army requirement for a “Leichtes Wirkmittel 1800+” to supplement the currently deployed WIRKMITTEL 90 shoulder-launched anti-tank weapon. The complete ENFORCER system weighs only 9 kg and is a single shot fire-and-forget weapon with a maximum range of up to 2,000 m. According to MBDA, it has a lock-on-before-launch capability and is fitted with a multi-effects warhead that is capable of defeating lightly armoured and soft-skinned vehicles and can be fired from a confined space. While the first version is man-portable, its modular design is said to allow for spiral development including a full anti-armour capability and potentially even air-to-ground applications. Serbia has developed the BUMBAE (BUMBLE BEE) short-range ATGW which is similar in concept to the MBDA ERYX and can be shoulder-launched or using a tripod. It has a maximum range of up to 600 m and is fitted with a single HEAT warhead and like all Serbian weapons it is marketed by Yugoimport although it was developed by the Military Technical Institute with HR Krusik responsible for production.

Saab have now manufactured over 20,000 of their NEW LIGHT ANTI-TANK (NLAW) with production still underway and with sales being made to a number of countries including Finland, Malaysia, Sweden and the UK. Effective range against stationary tar-

Photo: MBDA



The MBDA MMP ATGW is now deployed by the French Army, with the first version being infantry deployed.

gets is being quoted as 600 m and against moving targets 400 m. It has a single canted HEAT warhead to penetrate the more vulnerable upper surfaces of the target. Its soft-launch capability allows it to be fired from a confined space and once fired, the launcher is discarded and the night sight retained for potential future use.

Medium-Range ATGW

For many years, the MBDA MILAN was the standard medium-range ATGW of NATO and many other countries, with production being undertaken in France, Germany, Italy and the UK and sales were made to 43 countries. Further development resulted in the MILAN EXTENDED RANGE (ER) which increased range from 2,000 m to 3,000 m as well as a new tandem HEAT warhead. Launch customer for MILAN ER was South Africa. MILAN was to have been replaced by the TRIGAT Medium Range ATGW but this programme collapsed, with France procuring the US Lockheed Martin/Raytheon JAVELIN as a gap filler, Germany opted for the RAFAEL SPIKE and while the UK opted for JAVELIN.

The MISSILE MOYEN PORTEE (MMP) ATGM was developed by MBDA of France to replace the MILAN. The initial French Army MMP contract covers the supply of 400 firing posts, 3,200 missiles with first deliveries being made late in 2017. The first batch consisted of 50 missiles and 20 firing posts and under the terms of the first contract 400 firing posts and 1,750 missiles should be delivered by 2025. There is also one unidentified export customer.

MMP is fitted with a tandem multi-purpose HEAT warhead to defeat targets fitted with ERA but the operator can also select an anti-infrastructure mode to neutralise entrenched infantry. Both modes have an anti-personnel effect. It has a maximum stated range of over 4,000 m, but during demonstrations in 2018 it reached 5,000 m. In a statement MBDA said, “4,000 m is the qualified range and valid for all weather conditions, 5,000 m range was obtained in

Lock-on-before launch (LOBL) with target impact.” The operator of the MMP can select one of two modes of operation – LOBL which is the fire-and-forget mode and lock-on-after-launch (LOAL) which is the man-in-the-loop for non-line of-sight (NLOS) target engagement. According to MBDA, “LOBL is often associated with a fire-and-forget capability. However, the operator can remain in the loop even during a locked target fire.” MMP can also be launched from a variety of platforms, and late in 2020, MBDA announced that a successful firing had been carried out from an Arqus SABRE (4x4) Special Forces vehicle at the Canjuers camp in the South of France. The French Army’s JAGUAR (6x6) reconnaissance vehicle, which is the replacement for the AMX-10RCR (6x6) and SAGAIE (6x6) armoured cars and the VAB (4x4) in the anti-tank role armed with HOT ATGW, has a retractable pod of two MMP. These are integrated into the right side of the turret of the JAGUAR (6x6) with an additional two MMP in reserve for manual loading. Other applications for the MMP include the MULTI-PURPOSE COMBAT VEHICLE (MPCV) and unarmed ground vehicles such as the Milrem Robotics TheMIS fitted with the MBDA IMPACT Lightweight Turret.

In January 2020, MBDA announced that first firing trials of MMP from the IMPACT Lightweight Turret had successfully been carried out. In addition, a successful target engagement took place of MMP with the target being designated by a Novadem drone linked via radio to its weapon terminal.

For many years, the standard medium range ATGW of the German Army was the MBDA MILAN which, in addition to being deployed in the standard tripod mounted version, was also fitted to its MARDER 1 infantry fighting vehicles (IFV). This has been replaced by RAFAEL’S SPIKE missile which is manufactured in Germany by EuroSpike which is consortium formed by Diehl Defence, Rheinmetall and RAFAEL.

EuroSpike manufacture the SPIKE II LR with a maximum range of 5.5 km and this is called MELLS in Germany.

Photo: RAFAEL



Head-on view of the RAFAEL SPIKE MR with missile on the left and optical package and gunners sight on the right

The most recent German Army contract was placed in late 2019, with deliveries running from 2020 through to 2023 but with options for additional MELLs for the period 2024-2031. MELLs is also being integrated on the German MARDER 1 IFV, a pod of two on the left side of the PUMA Armoured Infantry Fighting Vehicle and the WIESEL 1 air-portable AFV which was originally deployed with the Raytheon TOW ATGW.

SPIKE is now a complete family of ATGW to meet all user requirements and today consists of SR (2 km), MR (2.5 km), LR 2 (5.5 km), ER2 (10 km) and NLOS (30 km). Many other European countries use members of the SPIKE family, including the Czech Republic, Italy, Latvia, Netherlands, Poland, Romania, Slovenia, Spain and the UK with the latter having the SPIKE NLOS in a trolley-mounted version. In some cases, there has been a transfer of technology to allow for local production. So far, some 35 countries have ordered members of the SPIKE family of ATGW, with over 34,000 manufactured and 6,000 fired in combat or tests.

Serbia has manufactured the Russian MALYUTKA for many years. It has been deployed in standard ground-mounted versions as well as being integrated onto a number of platforms, with marketing being carried out by Yugim-

port. The latest versions have a SACLOS guidance system and while first versions have a single HEAT warhead, further developments resulted in a complete family of warheads including tandem HEAT (designated 2T) and thermobaric (designated 2F). The baseline missile has a range of 3,000 m but versions with a longer range have been developed.

The BILL ATGW was originally developed by the Swedish company Bofors and launched as far back as 1985 but subsequently became part of the Saab product range. The first customer was the Swedish Army under the designation of the RBS56 with a maximum range of 2,200 m. When introduced, the RBS56 BILL 1 was unique in that it had a single canted HEAT top attack warhead designed to penetrate the vulnerable upper surfaces of an AFV. This was followed by the RBS56 BILL 2 which featured two HEAT charges for higher penetration. Production of the RBS56 Bill 2 ceased in 2019 but in a statement Saab said, "Operational systems are still being maintained."

In the past, Turkey has imported its ATGW but in recent years has aimed to become self-sufficient in many key areas, including the design, development and production of ATGW with the local company of Roketsan being the prime contractor. Two ATGW

have been developed, the OMTAS (or MIZRAK-O) medium range and the air launched L-UMTAS. OMTAS is now deployed by the Turkish Land Forces Command (TLFC) in the standard tripod version as well as by two locally designed and manufactured AFVs, the FNSS Savunma Sistemleri PARS 4x4 and KAPLAN-10 tracked AFV, with both of these having a remote-controlled turret (RCT) with two missiles in the ready to launch position plus a 7.62 mm co-axial machine gun (MG). The RCT has been developed by FNSS Savunma Sistemleri and can also fire the Russian KORNET-E laser guided missile which has been deployed by the TLFC in its tripod configuration for many years.

The OMTAS medium-range ATGW has a minimum range of 200 m and a maximum range of 4,000 m and can be supplied fitted with a tandem HEAT warhead or a HE blast fragmentation warhead. It has two operating modes – fire-and-forget and fire-and-update with the operator able to select either direct or top attack modes depending on the type of target to be engaged. The missile is fitted with a nose-mounted imaging infrared seeker. A useful feature is that the TV/Camera sighting unit can be removed and used as a general surveillance device. ■



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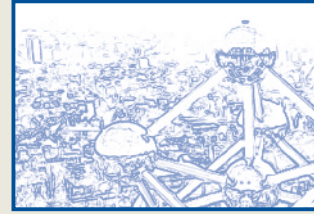


Photo: WH



Biden's Foreign and Defence Policy from a European Perspective

Joris Verbeurgt

In March 2021, Joe Biden will enter his second month in office as the 46th president of the United States. He made clear from the outset that his presidency would signal a break with the past and that he would reverse many measures taken by his predecessor, Donald Trump. Immediately after his inauguration, Biden rejoined the Paris Climate Agreement and the World Health Organisation (WHO), which the US had left under Trump. In his first foreign policy speech as president, Biden told the State Department staff that "America is back. Diplomacy is back. We're going to rebuild our alliances". With this speech, Biden confirmed that Trump's 'America First' agenda was over and that the US would resume its role as a global leader. In his first weeks as president, Biden made clear that this policy reorientation would have consequences for Russia, China and the Middle East. Of course, the changes will also affect Europe.

Russia

Towards Russia and President Putin in particular, the Trump administration took a rather sympathetic stand and tried to avoid confrontation, downplaying Russia's intentions. For Trump, there were no big issues as such with Russia. In a gesture of goodwill towards Putin (and also to send a message to German Chancellor Merkel and the EU that they should start taking care of their own defence), Trump decided to withdraw American troops from Germany. Biden immediately overturned this decision as soon as he became president. In the personal phone call he made with Putin after enter-

ing the White House (the first world leader he called), Biden asked for the immediate release of Russian opposition leader Alexei Navalny who, five months earlier, had allegedly been poisoned by the Russian Secret Service. In public, Biden also condemned the arrest of thousands of protesters in Russia demonstrating against the jailing of Navalny. Biden assured that "the days of the US rolling over to Russia" were over and that he would not hesitate to raise the cost on Russia and defend vital American interests and the American people.

However, taking a stronger stand towards Moscow does not mean that Biden is seeking a confrontation. The New START Treaty, limiting the number of nuclear warheads and vectors that each power can hold, was extended by Biden although Trump had set additional conditions which were refused by Russia. Although Biden stressed that he would increase pressure on Russia when the rule of law, democracy or the freedom of the press was threatened, he also sent the message that he was not looking for a new arms race and that the nuclear arms issue was best kept out of these discussions.

China

Towards China, the tone and language of the US president may be different from his predecessor's, but the message remains the same: in his first phone call with Xi Jinping, Biden criticised the repression in Hong Kong, the situation of the oppressed Uighur people and Beijing's economic policy. Although Biden confirmed that the US wished to cooperate with China to tackle

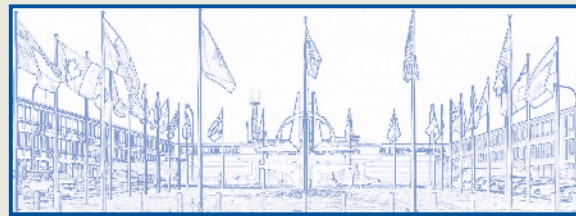
worldwide health problems, the proliferation of arms and climate change, the recent incidents over trade, espionage and China's course of action in the corona pandemic, create considerable tension between the two powers. Biden is particularly concerned with the unfair and sometimes coercive economic practices of Beijing and China's

Photo: WH



President Joe Biden wants the US to resume its role as a global leader.

growing assertiveness towards Taiwan. Xi Jinping stressed the fact that he wanted better relations with the US after the Trump era and that both powers should try to understand each other and respect each other's interests. China wants an end to the economic sanctions that Trump imposed on the country and to turn away from the path leading towards a trade war. However, the Biden administration will maintain the limitations and tariffs on the export of technology until economic relations are more



balanced. Regarding Hong Kong, Xingjiang and Taiwan, China maintains its classical position that these issues are a matter of sovereignty and territorial integrity. In other words: the Americans should mind their own business. For Biden it may become difficult to take a hard stand on China, since Washington cannot take European alignment against China for granted.

Israel

Relations between the US and Israel were never better than under the presidency of Donald Trump. Trump and Netanyahu (and their respective families) were very close, at a personal and political level. From the outset, Biden made clear that he would make some changes in US-Israeli relations. For example, it is tradition that the prime minister of Israel is among the first to receive a phone call from the newly elected American president. Mid-February, one month after Biden's inauguration, Netanyahu still had not received that phone call. During his presidency, Trump took the historical and unprecedented step of recognising Jerusalem as the official capital of the State of Israel instead of Tel Aviv. He also promptly moved the American embassy to Jerusalem. It is very unlikely that Biden will reverse that decision. The Golan heights will remain Israeli for Biden and he will honour and probably continue to build on the peace agreements between Israel, the United Arab Emirates, Bahrain, Sudan and Morocco (the so-called Abraham agreements). Nevertheless, the final statute of Jerusalem will remain a matter of debate under Biden, and he will not allow the further construction of Jewish settlements on the West Bank. The abundant financial, military and technological support that Israel received from

the US under Trump, will probably be scaled back. A return to the soured US-Israeli relations which existed under Obama, might become reality again. After all, Biden was vice president under Obama. The upcoming elections in Israel are another reason why Biden is not keen on contacting Netanyahu: he is charged with corruption and conflicts of interest and may not be prime minister for long.

Saudi Arabia

Another Middle-Eastern country not particularly pleased with the coming to power of Biden is Saudi Arabia. This long-standing US ally has also been passed by with regard to receiving a phone call from the newly installed president, implying that the 'royal treatment' Saudi Arabia received from Trump is a thing of the past. Biden immediately stopped American support for the Saudi military operation in Yemen; the offensive operations against the Shia Houthi-rebels no longer have the blessing (or the indispensable technological and logistical support) of Washington. And although sanctions against Houthi rebel leaders are kept in place, the rebel movement was removed from the list of terrorist organisations. Hence, humanitarian aid is allowed again, and the appointment of a special envoy for Yemen by Biden indicates that he will try to seek a diplomatic solution between Saudi Arabia, the people of Yemen and Iran.

Iran

The most problematic issue between Israel and the US will probably be how to deal with Iran. Biden is keen to revive the nuclear deal with Teheran brokered

under the Obama administration. That is, on the condition that Iran reduces the enrichment of uranium to acceptable levels – meaning not fit for military use. So far, Iran demands that the economic sanctions imposed by Donald Trump are lifted before there can be any talk of renewing the nuclear deal. Militarily and ideologically, Iran will remain high on the list of American (and Israeli) foes. However, it is likely that Biden – just like Obama did – will try to find more diplomatic ways to solve the issues in the region, a course of action that is applauded in Brussels. Biden also confirmed that the US wants to resume its role in the talks with Iran, alongside Germany, China, France, the UK and Russia. Stronger sanctions against Iran that were proposed by Trump during his final days in office were cancelled and the harsh restrictions imposed on Iranian diplomats in the US were slightly softened. Biden is showing a lot of goodwill, but he will want something in return from the Ayatollahs if they want the nuclear deal to succeed and the economic sanctions lifted.

Turkey

Finally, there is Turkey, a NATO-ally that needs to be handled with care. During the American presidential election campaign, Biden called President Erdogan 'an autocrat'. He also openly criticised Turkish policy regarding the Kurds and Erdogan's treatment of the opposition. When human rights were violated in Turkey, Trump had looked the other way. He wasn't too upset either when Turkey – NATO's largest ally in numbers of troops after the US – purchased Russian S-400 anti-aircraft missile systems and he also allowed Ankara to launch an offensive in northern Syria. When jihadi militia backed by Turkey committed atrocious crimes in Syria, Trump looked the other way. And when tensions were increasing between Greece and Turkey, the Trump administration seemed to favour Ankara over Athens. Those days are probably over, because it is likely that Biden, for political and ideological reasons, will narrow Erdogan's playing field within NATO and in the Middle East.



Biden wants to revive the nuclear deal with Teheran brokered under the Obama administration.

Photo: Pixabay

Advances in Night Vision Technology

Tim Guest

The ability to see in the dark confers a real advantage to a warfighter over one who can not. With advances in night vision (NV) technologies apparent for all players worldwide, however, it is best to assume anyone choosing to conduct operations in the dark also has a halfway decent NV capability, at the very least.

The various NV devices on the market are all based on one of three different technologies: intensifying ambient light, making infrared (IR) light from surroundings visible, or making thermal radiation from an object visible. While it is not possible to go into great technical depth in this brief article to explain how NV has reached its current capabilities, nor cite all the inventions, innovations and scientific breakthroughs along the way, what this article hopes to do is offer a glimpse of how NV has evolved since its early beginnings in Europe, passing through various generations using different technologies to reach the present day, when powerful night-seeing capabilities are available to almost any battlefield stakeholder.

Photo: Rheinmetall



Brief, Illuminating History

Seeing at night is a game changer that began with technological developments in Europe, and then the US, prior to WWII. AEG in Germany came up with the first 'Generation Zero/0' devices during the 1930s, (US and European NV terminology differs, explained later), based on infra-red (IR), which were used during the war, examples being the FG 1250 IR systems used by PANTHER tanks, (combined with telescopic rangefinders), and the VAMPIR device on StG 44 assault rifles; IR illuminating lights bathed the battlefield area of interest in IR light reflecting off all objects to produce a visible image in the lens of the users' scopes. IR night sights including the T-120 and M2 sniper scopes were later developed by the US and also deployed by war's end. All these systems were bulky, a factor that remained a major drawback even through to the Vietnam War in the 1960s and '70s when the US fielded starlight scopes, which relied on intensifying ambient light – image intensification (II) – rather than relying on IR. These 'passive', Generation 1 systems relied on an S-20 cathode to intensify light some 1,000 times, but operated best under moonlight/starlight condi-

The ability for all stakeholders on a battlefield to see at night is now a foregone conclusion, with latest Gen 3 technologies enabling clear night vision capabilities like never before. The GLADIUS system puts German Bundeswehr infantrymen on the global cutting edge in terms of networking capabilities, command and control, operational efficiency and latest NV capabilities.

tions. As II improved, passive Generation 2 systems emerged in the 1970s able to intensify light some 20,000 times using an S-25 cathode and a micro-channel plate (MCP), which helped brighten images and resolution on even moonless nights, or in any low-ambient-light conditions. Generation 3 NV then emerged at the start of the 1980s using Gallium-Arsenide (GaAs) as the photo-cathode material inside the II tube and producing better resolution imagery than ever before.

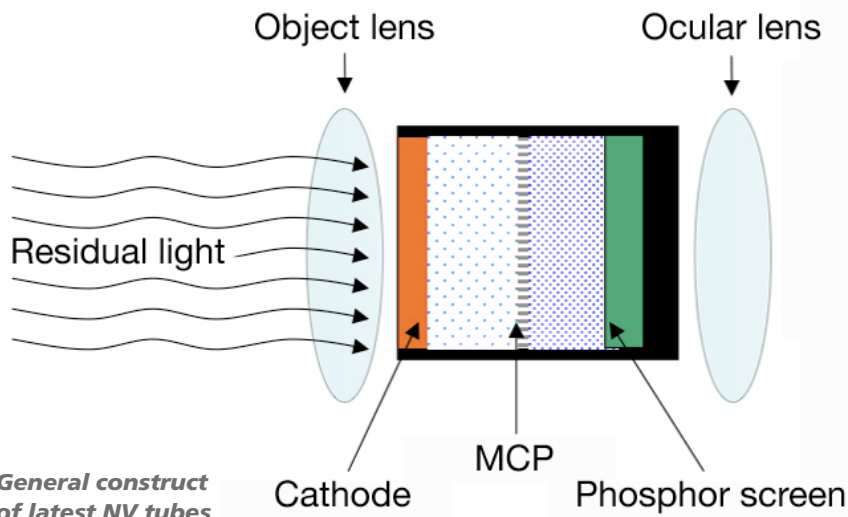
NV in a Nutshell

NV tech developments over the years are very complex and involved, so this brief snapshot is only part of the picture. Until quite recently, NV devices have typically produced images that appear greenish-yellow to the observer, though a more

natural black/white appearance using white phosphor technology has now been achieved in products such as the latest O-NYX systems from Thales using Photonis II tubes, adopted by the French Army. This creates less strain on the user's eyes and greater contrast and clearer images and is probably the latest European NV development to benchmark where the NV industry is today. And while NV device generational nomenclature has been mentioned above, originally introduced by ITT and adopted by the US, there are differences among Gen 1, Gen 2 and Gen 3 tubes, including additional subdivisions of Gen 1+ and 2+. However, European nomenclature and latest products follow different classifications, including: CommGrade 1441/1451, CommGrade ECHO, SuperGen, XD-4, XR5 and Intense 4G, as proffered by Europe's Photonis. 'Thin-

Beyond the Generations

It is impossible to go into the technological detail of developments determining all the various generational differences to date in such a brief article. Suffice to say for tier 1 security and military use latest Gen 3 systems are, typically, the order of the day and suit demanding, extremely low-ambient-light conditions, and include solutions such as ECHO, SuperGen, XD-4, XR5, Intense 4G. They differ from Gen 2+ tubes in their construction of the cathode tube, which, as mentioned, now uses a GaAs coating with greater sensitivity to IR; light amplification of some 30,000 times to as much as 55,000 times is possible and the most powerful Gen 3 tube now has an FOM value of more than 2,300, as cited earlier. Gen 3 tube life expectancy is between 10,000 and 15,000 hours, some three to four times greater than Gen 2 tubes and an auto-gating function supports tactical challenges and protects the tube from excessive wear and abrasion; auto-gating electronically switches the tube on and off at high speeds imperceptible to the eye allowing the user to operate in bright ambient light conditions, or even in daylight by reducing the glare, or halo from light sources that might otherwise obscure threat objects in the tactical field of view.



General construct of latest NV tubes
Source: AlphaPhotonics

filmed' or 'unfilmed' are also terms that apply to Gen 3 tubes, with latest unfilmed technologies delivering higher performance levels than thin-filmed. Another term of importance is figure of merit (FOM), used to highlight the advanced military nature and performance of a tube. An FOM value, (tubes with very high S/N ratios and very high resolution, in lp/mm, have highest FOM values), is applied to all modern types of tubes;

it is also used by US agencies to determine their exportability. High-FOM tube exports are, understandably, restricted. FOM values can currently reach 2,000, in Gen 2, Gen 2+, ECHO, SuperGen, Gen 3, XD-4 and XR5 tubes, although Europe's Photonis has achieved possibly the highest average FOM value to date of 2,340 with its Intense 4G tubes, technology restricted to select military and security users.

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Source: Alpha Photonics

Conditions/ Technology	Full moon 0.1 Lux	Half moon 0.05 Lux	Quarter moon 0.01 Lux	Starry night 0.001 Lux	Cloudy night 0.0001 Lux
With no NV device	230m	130m	45m	–	–
Gen 1	300m	200m	150m	100m	50m
Gen 2 Gen 2+	630m	630m	590m	390m	145m
Gen 3 * ECHO, Super- Gen, XD-4, XR5, Intense 4G	>810m	>810m	>770m	>530m	>200m

NB: * examples of Photonis systems.

The average DRI ranges to a body-sized object/target, (for each of the technologies tabled), under good contrast conditions between an object and its background.

While construction aspects of latest NV solutions and their optics from the likes of BAE Systems, Thales, Rheinmetall and other European players, play their critical part in achieving the performance characteristics demanded from today's military end users, it is those performance characteristics that must ultimately determine the adoption of a system and whether it is suitable for use by a particular military/security end user for a particular mission profile. And one of the most crucial performance requirements on a battlefield where players on both sides can

be expected to have NV capabilities, is that of observable range, or the detection, recognition and identification (DRI) range. NV users need to be aware that DRI range achievable for an observed object or target depends on the ambient light, atmospheric pressure and conditions, and on the contrast of the observed object against its background. In high ambient light conditions, for example, such as on a moonlit night, or where additional light sources are in view, and atmospheric pressure is low, the DRI range increases, particularly if the

background of the observed object or target is bright, such as in snowy or sandy scenarios. Conversely, the DRI range decreases significantly under low ambient light conditions, with higher atmospheric pressure, combined with dark backgrounds, such as a rising hillside or trees behind a target object.

NV Global Market Footnote

Setting the detailed technology aside in these final lines, in the latest 'Global Night Vision Device Market' report for 2020 to 2025, (which features makers such as ATN Corporation, BAE Systems, FLIR Systems, L3 Technologies and Thales Group), researchers project the NV device market will reach US\$10.086Bn by 2025, up from US\$6.258Bn in 2019. Things like the rising number of terrorist attacks worldwide are cited as fuelling the need for NV devices by the defence and security sector, as well as an additional urgent application contributing to the market growth, the trade in wildlife, and the need for increased anti-poaching capabilities through NV use. By product, the night vision goggle segment is anticipated to hold a substantial share in the global NV device market throughout the forecast period owing to increasing demand from the defence sector and the devices' falling costs and decreasing power requirements through improved technology. ■

Photo: Thales



O-NYX Goggles for the French Army

The French DGA has placed a new order with Thales for 3,000 O-NYX goggles to be delivered in 2021 for deployment into French Army units alongside the 3,500 O-NYX goggles already delivered. Weighing less than 350 g, O-NYX goggles have a patented low-profile design that shortens the distance between the eyes and the centre of gravity of the equipment to minimise neck strain and improve wearing comfort for prolonged use. The goggles deliver significant improvements in optical performance with a 51° field of view, expanding the observed scene by 70% compared with conventional goggles, and the combination of pin-sharp resolution and a wider field of view augments the soldier's perception and enhances situational awareness. With its low energy consumption, the new goggle will work for up to 40 hours on a single charge and can run on standard AA batteries when needed. Thales's partner, Photonis enhanced the performance of its image intensification tubes and worked with the DGA and the French Army to validate its latest 4G tube technology, which increases optical performance by 50-60% compared with existing solutions.

Enhancing Observation

Tim Guest

From daylight conditions to low-light, obscured scenarios and darkness itself, a soldier's ability to function and fight in whatever conditions relies on the individual's own observational skills, enhanced by any latest technologies and observation equipment available to them.

Acute and effective observation skills are crucial in most battlefield scenarios. From individual soldiers watching their own arcs of fire and relying on daylight or night-vision skillsets enhanced by latest image intensification (II) or electro-optical/infra-red (EO/IR), or an artillery forward observer using binoculars during the day and a thermal-imaging (TI) device at night, detecting an advancing enemy under whatever conditions, or being able to identify and relay target information to the guns, even at night, will both determine the course of a battle. Latest observation technologies and equipment are potential operational differentiators. With much activity in the sector, this brief article takes a look at just a few TI, II, and EO/IR solutions and applications.

EO/IR Happenings

The Swiss Armed Forces will soon have a new land-sighting and observation capability to support its TASYs tactical reconnaissance system, following an award in December by the Swiss federal office for defence procurement, Armasuisse, to L3Harris Technologies for EO/IR sighting systems. L3Harris will provide some 100 WESCAM MX-RSTA systems, which will be delivered and installed on General Dynamics' European Land Systems (GDELS) fleet of EAGLE 6x6 light armoured reconnaissance vehicles by the end of 2024. The EO/IR solution is a modular integrated mission system that supports surveillance, recon and target acquisition missions from armoured combat and reconnaissance vehicles, as well as amphibious and marine systems. The EO/IR system has multi-sensor imaging/lasing payload options that include a mid-wave, large-format cooled thermal sensor; a dual-channel EO option with separate colour CMOS and low-light EMCCD cameras; a high-magnification spotter for long stand-off operations; a laser rangefinder for target data acquisition and a near-IR laser target marker. The whole family of WESCAM MX-Series EO/IR imaging sys-

Photo: L3Harris



Armasuisse will be equipped with 100 L3Harris Wescam EOIR MX-RSTA observation, surveillance and sighting systems.

Photo: US DoD



L3Harris' high Figure of Merit (FOM) green and white image intensifier tubes, delivered to the USAF following selection last year are said by the company to be the most technologically advanced on the market.



Photo: Dstl/L3Harris

L3Harris' WESCAM MX-10MS has been integrated on Dstl's MAST-13 ASV for the UK's ongoing USV technology demonstrator programme.

tems are designed to operate in extreme temperatures, at excessive speed and in harsh environments, including intensive dirt, dust and smoke. For the Swiss, the MX-RSTA digital sensors and advanced image processing will deliver real-time image enhancement of all sensors and high-performance haze penetration together with improved feature recognition and ID capabilities, image blending between IR and EO sensors and a video tracker facility. The equipment is ruggedized for both ground/land/vehicular ops and shipboard use. L3Harris has now

begun the production phase of the Swiss contract, which will deliver an advanced mounted and dismounted multi-sensor intelligence, surveillance and reconnaissance capability for the Swiss Armed Forces, day and night. Prior to the initial selection by the Swiss last March, the WESCAM MX-RSTA system was mounted on a telescopic mast for mobile and static observation and surveillance. Armasuisse will be the first European land force to field this in significant quantities. A sister EO/IR integrated mission system to the WESCAM MX-RSTA, the WESCAM MX-10MS maritime sensor, has been integrated with the Maritime Autonomy Surface Testbed (MAST-13) Autonomous Surface Vehicle (ASV) system, operated by the UK's Defence Science and Technology Laboratory (Dstl). Trials in 2020 underpinned the system's image quality, stabilisation control and detection, recognition and identification (DRI) ranges as suitable for the project. The deployed MAST-13 ASV features 24/7 high-definition vision to support real-time situational awareness, reconnaissance and surveillance operations, coastal observation in daylight, low-visibility and night-time scenarios.

For long-range remote weapon systems and designed to maximize performance and stand-off range is the cooled, mid-wave IR (MWIR) ThermoSight V4000E from FLIR Systems. The sight has a wide field of view of 10 degrees to scan for threats and targets, and a narrow, two-degrees field of view for target assessment and accurate timing. It also has superior automatic detail enhancement (ADE) and a fast and reliable calibration mode (NUC) making it easy to use. The powerful optics and a cooled MWIR detector make it possible to identify vehicle-size targets at nearly 4km making it suited as an accurate aiming device for use with longer range, larger calibre weapon

systems such as 30mm cannon, as well as with missiles. Another of FLIR's EO/IR systems is its Ranger HDC MS long-range, pan-tilt, multi-sensor, which integrates the long range, mid-wave HD Ranger HDC with a variety of powerful daylight sensors, and optionally a laser range finder, GPS, digital magnetic compass, and automatic video tracker. All of the system's sensors are mounted on the pan-tilt unit. Powerful, continuous-zoom telescopes enable the detection and identification of more targets from farther away and make the system suited to border, coastal, and force-protection surveillance.

Image Intensification Moves

A leading player in the military image intensification space is Photonis, with facilities across Europe and in the US; its night vision solutions, including monocular and binocular goggles for soldiers on the ground, airborne forces, fast jet and other pilots, as well as targeting devices for weapon sights, are in use throughout NATO and worldwide. In December, its US facility announced the release of its Photonis Defense Professional (PD-PRO) series of night vision goggles (NVGs), built around 16mm and hybrid 18mm 4G filmless II tubes, said by the company to be one of the smallest, lightest and highest performing military grade II night vision systems. The PD-PRO series is able to provide vital awareness of uneven terrain, natural obstacles and situational awareness of potential threats. They are equipped with advanced capabilities such as out-of-band detection, otherwise known as extended bandwidth, allowing users to see 30% more of the available light spectrum than can be obtained with current military-issued night-vision gear. This enables the user to see IR and laser illuminators that cannot be detected with



Photo: Photonis

The Photonis Image Intensification Tube 4G range includes its II Tubes 4G, 4G+, the XR5, and the XD-4. 4G technology in general is now the expected European standard for low-light-level imaging, and Photonis 4G II tubes are widely used in NATO, including with the Austrian, Danish, Dutch and German armies, as well as the Swiss.

standard military-issue night vision goggles (NVGs). While the PD-PRO will initially only be available in the US, Photonis 4G-based products are used internationally and in all NATO countries. Its II Tube 4G, for example, is in use with and particularly suited to the very high demands of special forces, delivering excellent DRI range. DRI is an important factor as the further the user can see, the better and quicker he/she can react; spotting the enemy in the dark before they can spot you can literally be the difference between killing and being killed. The II Tube 4G also has the smallest halo, ultra-fast auto-gating, and a spectral range from 400nm to 1,000nm – UV to near-IR. According to Photonis, 4G technology has enabled DRI range increases of 40% over earlier technologies and the technology standard has extended the bandwidth of photon collection to deliver a consistently high image quality in all environments, from below 400nm to above 1,000nm, as per the company's II Tube 4G, just mentioned. It also prevents the halo size from exceeding 0.7mm around the brightest objects in an observed image, thereby delivering the greatest details possible for objects in the vicinity of any light sources. 4G also delivers a Figure of Merit (FOM) above 1,800, (FOM is calculated multiplying the signal to noise ratio by the resolution); and for 4G, a resolution even in the most polluted light environments such as urban areas or when entering a building where the light is suddenly switched on must always exceed 57 lp/mm (line pairs per mm). The company's II Tube 4G range also includes its II 4G+ tubes the XR5, and the XD-4. 4G technology in general is now the expected European standard for low-light-level imaging, and Photonis 4G IIs are widely used in NATO, including with the Austrian, Danish, Dutch and German armies, as well as the Swiss. The company's 4G II tubes have recently been selected by the French DGA (General Management of Army), for the French Army as part of the O-NYX contract awarded to Thales LAS. The 4G II tubes will equip some 10,000 bi-ocular NVGs providing a 51-degree field of view. There are currently some 15,000 FELIN NVGs in the French Army and there is talk that new 4G tubes could upgrade them to the same levels of performance as the O-NYX NVGs by 2025. At time of writing it was announced that the DGA has awarded Thales a follow-on contract for the delivery of an additional 3,000 O-NYX NVGs for army unit deployment this year adding to the 3,500 units already delivered.

Another development from L3Harris, this time involving its II technologies, sees its high-FOM green and white image intensifier tubes being delivered to the USAF following selection last year for operational upgrades to existing night vision goggles. These latest II tubes are said by the company to be the most technologically advanced on the market and will provide the user with more visual and observational information for assessment and acquisition; they are being fielded for the HH-60 Pave Hawk helicopter NVG update for combat SAR crews. Tom Horwath, Director of Business Development, Integrated Vision Solutions, L3Harris said that the high-FOM tubes enable the user to see clearer at further distances and the company's 'industry-leading' white phosphor tubes enable low-light and night-time manoeuvres to appear more natural in black and white, with added contrast detail in shapes and shadows, providing the user with more visual information for assessment and acquisition purposes. L3Harris has stated that it continues to invest considerably in its image tube performance and capabilities for aviation, mobility and ground forces in NATO and worldwide.

Masthead

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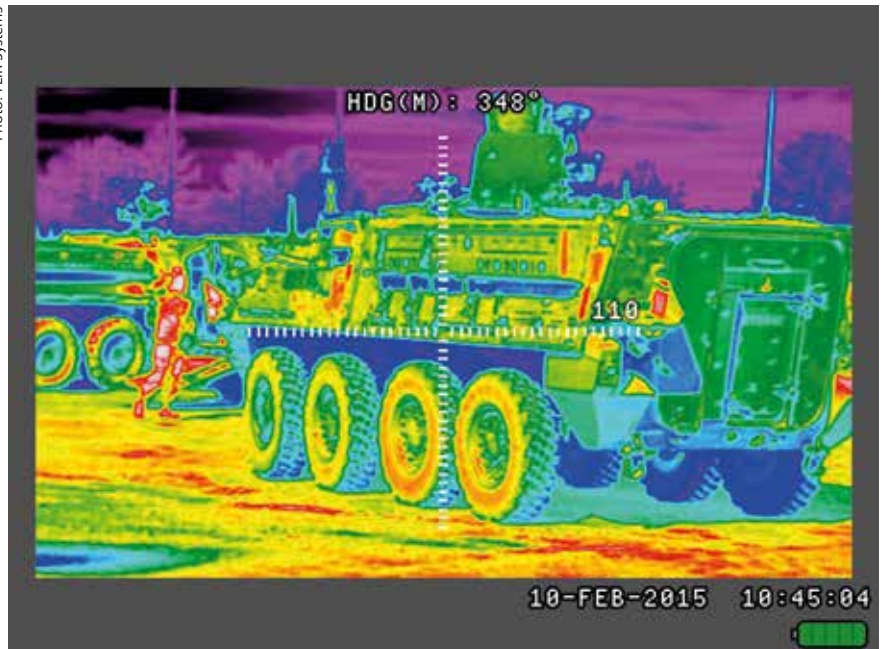
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Thermal Imaging Reveals

When it comes to TI, (as well as other optical technologies mentioned above), FLIR Systems is a leading player. One of its TI family of systems is its Recon range, which has been widely adopted by military and security agencies; one product is the FLIR Recon B2-FO dual-channel day/night thermal bi-ocular, a multi-sensor system that combines long-range imaging (visible and thermal) and target geo-location in a compact, portable, lightweight package. It can be integrated with a 'remote kit' for wireless operation and live video streaming, and a x 2.5 magnification extender can also be added in the field to increase target range detection to over 10 km for vehicle-sized targets.

The latest thermal monocular version to FLIR's Recon series is the new Recon V UltraLite, which forms part of FLIR's Soldier Solutions family. It weighs less than 1.4 kg, some 1.1 kg lighter than previous versions and allows users to see high-resolution colour images during the day as well as heat signatures day or night. It offers long-range detection, recognition, recording and geo-location and is equipped with a high-definition colour display, laser range finder, GPS and digital magnetic compass. Used as a handheld device or mounted to a tri-

Photo: FLIR Systems



Part of the Recon series, the FLIR Recon V is a compact and light yet rugged multi-sensor thermal binocular designed for 24/7 day and night field operations that require enhanced imagery and long standoff range. Its internal GPS, DMC, and long-range laser pointer provide accurate range to target as well as precise location. Its 10x continuous zoom optics, MEMS-based electronic stabilisation, and high-definition colour video display deliver highest quality images.

pod or other fixed location, the Recon V UltraLite also has Wi-Fi connectivity and Android Tactical Assault Kit (ATAK) network capabilities to provide users with

network-centric awareness. The thermal monocular uses commercially available AA batteries providing four hours of continuous use.

A final thermal imaging mention for the individual soldier, perhaps sniper, from Germany's Hensoldt, a leader in optronics' systems large and small, which offers a range of rifle sights and sight attachments including thermal sights for night and low-light ops. Its thermal sight attachment IRV 900 A1, for example, is the enhancement of the operationally-proven IRV 900, which was developed for sniper rifles and machine guns. This in-line system meets the exacting requirements of specialised troops and can be used either as a clip-on system with 1x magnification, or as a stand-alone targeting optic with digital zoom. A colour monitor with false colour presentation enhances target reconnaissance making assessment easier. Its sister thermal sight attachment is the IRV 600 A1, with a detector size of 640 x 480 pixels, offers, according to the company, the highest geometric resolution available on un-cooled devices. Like the IRV 900 A1, the 600 A1 can be used either as a clip-on system with 1 x magnification, or as a stand-alone targeting optic with digital zoom. It also has a colour monitor for the same reasons as stated above. ■



Photo: FLIR Systems

The FLIR ThermoSight HISS-XLR clip-on thermal weapon sight allows snipers to detect and recognise man-size targets in excess of 2,000 metres, an increase in engagement range of more than 25% compared with previous models and, designed to mount on any MIL-STD-1913 rail interface forward of an existing scope, HISS-XLR can interface with a wide range of day scopes and weapon platforms.

Vehicle Mounted Mortars

Henry Richardson

The days of tactical fire support being provided by static emplaced mortars are long gone, with modern indirect fire systems operating in a highly lethal battlefield where counter battery fire is fast and accurate.

The contemporary norm has been for increasing calibres, enabled by soft recoil, automated loading, and mounting mortars in turrets to reduce the burden of larger calibres on crews. 120 mm is now a de facto standard for Western systems, and in essentially all cases new mortar procurements seek integrated vehicle mounted systems.

The West: a Plethora of Mobile Systems

At the heavy end of the market stands the Patria Hägglunds AMOS (Advanced MOrtar System), a 120 mm twin barrel breech loaded turreted mortar system, fed by an autoloader in a fully remotely operated turret. Subject to the host platform, the system is able to fire through a full 360° azimuth and at -3° to +85°. The twin barrel configuration allows a very high sustained rate of fire for a 120 mm mortar, with the weapon system as a whole able to sustain a 12 rds/min rate. Under the right target conditions, the system is able to conduct a 16 round multiple round simultaneous impact (MRSI) fire mission, producing significant effect on target and a steep change in capability over a traditional mortar system. Patria states that a single AMOS has an effect equivalent to a traditional battery of 120 mm manual mortars.

Recognising that not all users desire a system as heavy and complex as the AMOS, they developed a lighter development, the NEMO (New MOrtar). Alongside a range of other changes, the NEMO mounts only a single barrel but retains the same high-level automation of laying, loading, and firing processes. The system has been successful, with exports to Finland, Saudi Arabia, Slovenia, Sweden and the UAE, the latter in the Patria NEMO NAVY variant for mounting on patrol boats.

Author

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Photo: US Army

Patria's NEMO (from "NEw MOrtar") is a single barrelled 120mm remote-controlled mortar turret. It is a lighter version of the AMOS mortar system, which has been in use within the Finnish Defence Forces since 2013. The NEMO can be fitted to most APCs.



Photo: Elbit

The Elbit SPEAR MK2 Mortar System used by Azerbaijan in the war against Armenia

The NEMO has also been developed into a standalone container-based system, whereby the turret is mounted to the top of a standard size 20 ft or 40 ft ISO container, with the interior fitted out with the requisite turret control, ammunition handling, storage and targeting equipment, as well as crew accommodation. The resultant system can then be mounted to any land or sea platform that can carry ISO containers and absorbing the recoil impulse, or simply sited at a static location, such as a fire base. It allows a very flexible approach to the mobile mortar and opens efficiency savings around the host vehicle selection.

One of the strengths of NEMO is that vehicles can fire the mortar whilst on the move if in a high threat environment where stopping is not possible. Where shoot-and-scoot is desired, the vehicle can stop, fire a five round fire mission and be on the move again before the

first round has even impacted the target. The Israeli SPEAR MK 2 system manufactured by Elbit Systems is offered as a flexible 120 mm muzzle-loaded mortar system thanks to its use of a soft recoil system whereby the weapon is held against a gas spring which releases momentarily before firing, propelling the weapon in the opposite direction to recoil. The effect is that the recoil impulse generated by firing has to first stop the forward movement of the weapon before accelerating it to the rear, resulting in shorter travel and significantly lower recoil forces being transferred to the platform. The result is an ability to mount larger mortars on lightweight vehicles including tactical utility 4x4 vehicles. In the case of the SPEAR MK 2, Elbit have regularly demonstrated the use of a Plasan SANDCAT 4x4 as the host platform, with a 20 second in and out of action time and a range of 7 km for standard mortar rounds, extend-

ing to 10 km with guided rounds and in either case at a maximum rate of fire of 16 rds/min with 27 rounds typically carried. The system is understood to have one customer to date, with an undisclosed number of systems delivered to Azerbaijan in 2018.

Spain's Everis Aerospace and Defence and New Technologies Global Systems (NTGS) ALAKRAN light mortar system (LMS) is a lightweight 120 mm mobile mortar offering large calibre mortar capabilities on lightweight tactical 4x4 vehicles. Procured by Ukraine on the Bogdan BARS-8 4x4, where it is designated the BARS-8MMK, the ALAKRAN uses a deployed configuration where the mortar is hydraulically lowered from the rear of the vehicle to a firing position on the floor, meaning there are no issues associated with the large firing impulses of a 120 mm mortar being transferred into the chassis, suspension, and tyres of the host vehicle. The in and out of action time is approximately 30 seconds and, once in position, a digital fire control computer allows automatic laying and includes the ability to conduct MRSI fire missions. A water cooling system has been offered for the weapon, which allows a sustained 4 rds/min firing rate for 20 minutes.

M120 RAK is a turret-mounted 120 mm breech-loaded mortar system fitted to either a tracked chassis (resulting in the M120G designation) or a wheeled chassis (resulting in the M120K designation). In the latter case, the system has been ordered by Poland and fitted to their ROSOMAK 8x8 AFV, a licence-built version of the Patria ARMoured Modular Vehicle (AMV). The M120 RAK joins the wider ROSOMAK formations and can fire up to 8 rds/min via a 20 round autoloader, with a further 26 rounds in reserve magazines. Mortar bombs having a range of up to 10 km with MRSI capability for up to four round fire missions.

Sweden has procured its own tracked vehicle mounted mortar, the Granatkastarpansarbandvagn 90 (Grkpbv 90), referred to as MJÖLNER in marketing materials by its manufacturer BAE Systems Hägglunds. Though early prototypes of the MJÖLNER system used the turreted twin barrel autoloader AMOS system, the production vehicle is a manually loaded twin barrel 120 mm weapon in a limited traverse turret. In both the prototype and production cases, the system is mounted on a CV90 chassis.

The mortar is loaded from under armour, with crew placing mortar bombs into a mechanical system that then raises to the muzzle and drops for firing at a burst

Expal's 81mm On-board Mortar

Expal has reached an important milestone in the development of the new Dual-EIMOS on-board mortar system, which is completing its validation under the Spanish Army UTEX Experimental Tactical Unit programme. During official tests on 26 November 2020, which were carried out at CENAD San Gregorio (Zaragoza), members of the Spanish procurement authority, the Spanish Marine Corps, Army and the Navy Logistic Support Head Office (JAL) learnt about the system in a demonstration. The new Dual-EIMOS is an 81mm on-board mortar mounted on a 4x4 light tactical vehicle. The system brings several advantages, including its robustness and survivability, with the capacity for deep fording of up to 1.5m without preparation on the VAMTAC ST5 platform of the Marine Corps. Moreover, the system allows for versatility and speed in operation thanks to 360° pointing without changing the position or orientation of the vehicle and without the deployment of additional elements, allowing high shoot & scoot capacity, and it allows for increased pointing precision and integration of the latest generation INU by means of the stress absorption system integrated into the vehicle.

Alberto Fernández Cuervo, EXPAL's Systems Product Manager, said: "Hand in hand with the DGAM and the Marine Corps, important improvements have been implemented in the versatility of the system, through an evolution that will offer benefits that, until now, did not exist in the market worldwide. We are confident that the system will be deployed very soon." EXPAL continues to focus on the validation of the new capabilities, completing the extensive validation and experimentation test plan, whose completion is scheduled for March 2021.

Photo: Expal





Photo: Yuri Laskin

The Russian LOTOS is intended to replace the NONA family of self-propelled mortars in the Russian airborne troops. The gun employs 120 mm calibre to use a variety of conventional and guided projectiles with a firing rate of 6-8 per minute.

rate of up to 16 rds/min. Rounds are fed manually from hull racks inside the fighting compartment. Though the turret is not a 360° power traverse system, it does allow a 60° slew range in azimuth with elevation range of +45° to +85°. The relatively simple design is stated by the manufacturer to offer significant cost savings over the very complex and thus expensive alternative modern mortar turrets.

In January 2020, France ordered 54 new mobile mortar vehicles as part of its SCORPION modernisation programme. Based on France's new VÉHICULE BLINDÉ MULTI-RÔLES (VBMR) GRIFFON 6x6 AFV family, the MEPAC (mortier embarqué pour l'appui au contact – Embedded Mortar for Contact Support) vehicle has roof hatches in the rear compartment to allow the firing of the Thales 2R2M (Rifled Recoiled Mounted Mortar) system from within the vehicle. The 2R2M is a semi-automatic rifled 120 mm mortar system in use with several other users including Italy, Oman, and Malaysia. The weapon fires up to 10 rds/min and is claimed by Thales to have enhanced accuracy over the legacy towed 2R2M owing to a new muzzle brake design and the latest digital fire control system.

Though Germany has yet to commit to procurement of a mortar carrier variant of its BOXER 8x8 platform, it is likely that, if this decision is taken, it will mount a 120 mm semi or fully automatic mortar system. One option for that vehicle may be the 120 mm MWS 120 RAGNAROK turntable mounted mortar marketed by Rheinmetall Norway. Sharing over 80% commonality with the smaller 81 mm MWS 81 system, which is already in service with the Norwegian Army, the MWS 120 is manually loaded by equipped with automatic laying via a digital fire control computer.

A Fire in the East

The systems thus far have been Western products. Russia, however, has been far from complacent in its ongoing development of mobile mortar systems.

The 4S21 DROK is an 82 mm mobile mortar system, mounting the 2B14 PODNOS mortar in a turret on the Remdizel TAIFUN K-4386 4x4 armoured utility vehicle. Developed as a prospective capability for the Russian airborne forces, the VDV, it is a lightweight fire support platform that can be delivered by aircraft and parachute. The armament is lighter than many contemporary developments in its class, but still offers a 6 km range and a fire rate of 12 rds/min with an on-board capacity of 40 rounds. Reflecting the nature of the VDV's offensive and isolated role, the weapon can be lowered to a direct fire position, as well as being able to be removed from the turret and fired from a baseplate.

One of the most modern vehicle-mounted mortars in service in Russia is the 2S34 HOSTA, introduced in 2010. A modernisation of the long serving 2S1 GVOZDIKA self-propelled howitzer, HOSTA replaced the 122 mm 2A31 howitzer with a 2A80-1 rifled gun-mortar capable firing both mortar bombs and direct fire munitions. The 2S42 LOTOS is another proposed mortar vehicle that entered state trials in mid-2019 as a notional replacement for the 2S9 NONA-S, and though it outwardly looks like a direct fire tank-like capability, it is in fact fitted with a turret mounted the same breech loading 2A80-1 120 mm rifled gun-mortar as the 2S34 HOSTA. The turret is fitted to the same chassis as the SPRUT-SDM1 light tank, itself a development of the BMD-4M airborne assault vehicle. The LOTOS can fire rounds out to 13 km at a rate of 8 rds/min,

with the ability to direct fire at a depression of up to -4° if required.

For operations in the arctic, Russia has been developing an all-new system, the MAGNOLIA. MAGNOLIA uses the same 2A80-1 gun as the HOSTA but fits it to the rear module of the DT-20PM articulated all-terrain vehicle. The DT-20PM is one of, if not the most mobile tracked vehicle in the world, with extremely low ground pressure and fully amphibious capability, and in the MAGNOLIA configuration reflects Russia's renewed emphasis and commitment to high mobility arctic operations. The 2A80 is fitted to a turret in the rear module and is equipped with 80 rounds of ammunition fed from below by autoloader, providing a high rate of fire of 8 rds/min for conventional artillery rounds and 10 rds/min for mortar bombs out firing to a range of 9 km and 7 km respectively, or guided rounds to 10 km.

At the heavy end of Russia's capability, and indeed representing the heaviest vehicle mounted mortar in global usage, is the 2S4 TYULPAN. In service since 1972, the 2S4 mounts a 240 mm M-240 breech loading mortar, fired from a deployed position where the weapon is lowered to the ground behind the GM-123 tracked chassis which is also used for the 2S5 GIATSINT-S and 2S3 AKATSIYA artillery systems.

The primary munition of the 2S4 is the 130.7 kg 53-F-864 mortar bomb carrying a 32 kg high explosive charge to a range of up to 10 km. 2S4 is also capable of firing rocket assisted submunition and tactical nuclear rounds, all of which are rather unique in the world of mortars. The enormous size of the weapon and its munitions mean that the 2S4 achieves only a one rd/min typical firing rate and has a very slow in and out of action time compared with the lighter systems in use around the world. ■

“The Hungarian Defence Forces know exactly what to purchase.”



Foto: SGD/DNA

There is an ongoing comprehensive modernisation process regarding military equipment within the Defence and Force Development Programme concerning all branches, according to Gáspár Maróth in an interview for European Security and Defence. ESD had the opportunity to talk to the Government Commissioner for Defence Development and National Armaments regarding the KC-390 multi-purpose transport aircraft and the modernisation of the Hungarian Air Force.

ESD: Hungary signed a contract for the acquisition of two Brazilian manufactured KC-390 multi-mission military transport aircraft in Budapest. How does this procurement fit into the Air Force’s modernisation programme?

Maróth: With the procurement of the KC-390 aircraft, the expansion of the transport capabilities of the Hungarian Defence Forces has been completed. The process began three years ago with the procurement of two Airbus A-319s and the FALCON 7X fixed wing aircraft. At that time, the public expressed their opinion regarding the lack of cargo aircraft and said that we misunderstood the situation, that we did not know what we should procure. Now, those doubts have been answered. According to our acquisition plans, we were certain that Hungary would procure cargo aircraft with ramps, but we were waiting for the finalisation of the latest developments.

ESD: Why did Hungary choose the Embraer?

Maróth: We selected this type of aircraft because it is currently the most adequate for both the market and military requirements. Embraer aircraft possess the latest technological developments. The air-to-air refuelling capability was one of the key elements of the operational and tactical requirements, which can only be

fulfilled by a limited number of aircraft on the global market currently. Furthermore, the Embraer aircraft was suitable regarding size criteria and operating costs. For NATO, it is important that procurements contribute to the strengthening of allied capabilities. These are jet engine aircraft that are much more beneficial regarding their operational costs compared to similar turboprop aircraft, and their payload capacity parameters are suitable for the equipment that Hungary needs to transport for its operations in the long run. The KC-390 is one of the few types of aircraft, which can take off and land in difficult circumstances. These aircraft are able to fulfil medical emergency evacuations with the on-board addition of standard medical care and intensive care units. Our troops can even perform operations on board. With the departure of the Antonovs, the capability to deploy paratroopers has also been re-established.

ESD: Are there any other plans to procure further aircraft of this type?

Maróth: As of today, only two aircraft have been procured and we will assess our capacity and any additional procurement requirements during the operation of these aircraft. However, I would like to emphasise that under the agreement with the German Luftwaffe, the Hungarian Defence Forces provide military personnel for the operation of Airbus A400M aircraft, which means we have access to these aircraft as well. Furthermore, Hungary has flight time at the multinational air transportation unit at its Pápa Air Base, which can be used during C-17 operations.

ESD: To what extent does Hungary coordinate with its allies during these development and procurement programmes?

Maróth: Hungary constantly considers the requirements of its allies. The Hungarian Defence and Force Development Programme is being implemented in a coherent manner, in line with, and according to the requirements of NATO capability planning processes and doctrines. The investments are all supported by the Alliance. Regarding the KC-390 aircraft, I would like to re-emphasise the air-to-air refuelling capability, which allows us to provide a gap-filling, niche service to NATO in the region. It is true that the demand for European multilateral cooperation is strong; however, Hungary already fulfils this with the above-mentioned cooperation with the Luftwaffe. Therefore, we chose the more cost effective solution regarding sovereignty. Even though the Brazilian aircraft originate outside of NATO, they are still completely in accordance with NATO standards.

ESD: What tasks are foreseen for the Defence Forces with the arrival of these two transport aircraft?

Maróth: As with all new equipment, bringing the KC-390s into service requires a considerable amount of work. We are not only talking about training aspects in this case, but also about internal structural changes and reorganisation. The Command of the Hungarian Defence Forces is doing heroic work during the transition to modern technology – this is at least as big a task as the Defence and Armed Forces Development Programme is dealing with. New organisational structures, new attitudes, a



Photo: Rheinmetall

In December 2020, Rheinmetall signed a contract to establish a joint venture in Hungary to manufacture the LYNX in Zalaegerszeg.

change of mentality – simply a new way of thinking is needed for such equipment, as is also the case with the FALCON. At the same time, we buy these new assets for the long term, so we are talking about investments. If used properly, and not forced to deploy on the battlefield, they may be interchangeable at some point in their life cycle. In other words, we can finally break the tradition of driving everything until it ends up in the junkyard. With proper on-the-fly replacements, the equipment of the Hungarian Defence Forces will be characterised by a standard that is in the common interest of us all. The technical readiness of the Defence Forces will remain at the most modern levels.

ESD: That is, a complete cultural change will take place.

Maróth: Yes. In addition, the engineering, technical skills and preparedness of the Hungarian soldiers provide the political leadership with a sense of security for innovative new decisions, as we can build on this reliability during the procurement of devices that still do not have extensive user experience, such as the LYNX infantry fighting vehicles, or the GRIPENS. As for the LYNX, our decision has already led to very serious interest from others, even in the direction of specific purchases. We are the third country in the world to put the KC-390s into service. We started the negotiations in parallel with the Portu-

guese, though they reached the finish line a little earlier.

ESD: In summary, at which stage is the development of the Air Force?

Maróth: With the replacement of the Antonovs, the airlift capacity will be re-established. The rotary-wing capability will be rebuilt and the first rotary-wing fleet will be complete this year, with the arrival of the last Airbus H145M helicopters. Furthermore, the multi-purpose medium Airbus H225Ms are also in production. We procured two Airbus 319s specifically for the transportation of personnel and troops; however, they can also be used as cargo transport planes. The FALCONS are performing courier and special operations services for the Hungarian Defence Forces.

ESD: One of the most prestigious investments was the establishment of the Airbus factory in Gyula. How is this process going?

Maróth: The planning has finished and the construction of the factory has begun, however, due to the COVID situation there have been minor delays. For example, the laying of the foundation would have happened the last week, but has had to be postponed because of the current circumstances. Nevertheless, everything is proceeding according to schedule, including the surface treatment factory that is to be constructed in parallel. The investment is also crucial for the county of Békés and we believe in the region's capability to develop. We are talking about a targeted investment project of the Hungarian Government here. This is proven in itself by the fact that we had to negotiate for nine months with



Photo: Rheinmetall

Rheinmetall has been commissioned by the Hungarian Ministry of Defence to supply tracked vehicles and related services worth over €2Bn.



Photo: MTI / Csaba Bús

As part of Hungary's Zrínyi 2026 armed forces modernisation programme, Gáspár Maróth as Government Commissioner signed a contract with Germany's Dynamit Nobel Defence (DND).

Airbus in order for the county of Békés to be chosen. I would like to mention that two new considerable aerospace investment opportunities have arisen, one of which we hope to reach an arrangement on by the beginning of next year. We are talking about a complex rotary-wing industrial investment and development opportunity. Furthermore, there are ongoing negotiations of a considerable investment concerning the drone industry, through which we hope to join the ranks of other drone producing states.

ESD: Defence industry companies usually settle in a certain place for longer periods of time. Should we expect Airbus, Rheinmetall and similar companies to do the same?

Maróth: If we consider a proper defence industry investment, permanency is certainly one characteristic. It is not uncommon for defence corporations with a rich history to be working at the same location for a hundred or a hundred and fifty years.

The automobile industry switches locations much more frequently by comparison and is able to relocate factories or complete production capacities within a year. This is not the case for defence industry factories, even though many short-term defence investments might suggest otherwise. I am referring to those that only serve a given state's procurement needs. We, however, do not believe in these solutions. In our view, it is unwise to invest state funds of the Hungarian Government and Hungarian taxpayers into opening a factory only for five years in order to serve a Hungarian procurement programme, train three or four hundred people who will then be fired after the conclusion of the programme. Instead, we exclusively consider investments and types of cooperation that the respective corporation plans to uphold for thirty to forty years. Naturally, it is common to look into the future for a much longer time in this sector, but this is the maximum period that is usually acknowledged.



Photo: DND

DND will produce explosive-reactive armor (ERA) and components of shoulder-launched anti-tank missiles in Hungary.

ESD: The role of German companies is quite prominent throughout current developments with Airbus, Rheinmetall and Dynamit Nobel Defence. In this context, what are the criteria determining the fate of certain agreements?

Maróth: Central Europe has always been considered a resource-based region for German industry. In this regard, we are talking about a positive symbiosis regarding Hungarian industrial traditions and military developments. This all seemed to collapse though at the end of the 20th century when German industry changed its focus, and turned towards Asia. But the relocation to Asia was not as obvious for them, as it was for the Americans for example. In the case of the defence industry, the fact that Asia can only be considered with certain restrictions due to protected technologies actually benefits our situation.

It was an opportune moment to clarify our relationship with our German partners and for a visit to Hungary by defence industry actors who do not link their relocation to sales or acquisitions, but maintain a focus on their long-term interests.

Rich engineering traditions, a highly trained workforce, a beneficial taxation environment, and the existing industrial culture all point towards choosing Hungary. This, of course, could not have been successful without political leadership, as the current government has supported this process wholeheartedly from the beginning with the taxation environment in place and the determination to succeed. It is clear-cut that the strongest driver of Hungarian economic development is its symbiosis with German industry.

ESD: Vehicles for the land forces are clearly in the focus of your development programme. Beyond the already significant acquisition of LEOPARD 2 tanks, PzH 2000 self-propelled howitzers and LYNX infantry fighting vehicles, what other programmes could you mention in this regard?

Maróth: Equally important, both from an acquisition and a defence industry viewpoint, is the case of the 4x4 armoured vehicles. Following the direct acquisition of the first few dozen Nurot Makina EJDER YALCIN vehicles, licenced production and further development will take place in Kaposvár, Hungary, under the name GID-RAN. Our joint venture with Rheinmetall, established to manufacture the LYNX at Zalaegerszeg, will participate in this effort as well. I would also like to emphasise that beyond these projects, our cooperation extends to research and development of innovative future vehicle projects.

ESD: Before combat vehicles, Hungary also re-established small arms production in recent years.

Maróth: Manufacturing this essential category of arms was the defence industry's primary goal. The Arzenál factory at Kiskunfélegyháza launched activities with the licenced production of CZ BREN 2 assault rifles, EVO 3 SCORPION submachine guns, P07 and P09 pistols beginning in 2018. In 2020, we expanded their portfolio with precision sniper rifles, AR-10 and AR-15 carbines, in cooperation with Unique Alpine.

ESD: Do you have a solution how to supply ammunition to your new weapon systems?

Maróth: Hungary possessed ammunition-manufacturing capabilities before, but unfortunately, this is no longer the case. In cooperation with Rheinmetall, we intend to rebuild this capability. We plan to begin with medium calibre 30 mm ammunition manufacturing, which will be joined by large calibre 120 mm and 155mm ammunition at a new facility in Várpalota. We intend to establish PBX explosives production capabilities there as well.

ESD: One of the latest announcements is regarding the NASAMS air defence missile

system which will be procured from the Norwegian Kongsberg and the American Raytheon corporations.

Maróth: The Hungarian Defence Forces will receive these modern, ground-based air defence systems from 2023 and they will serve a crucial role in the defence of Hungarian airspace. This is a historical moment, as this is the first time the Hungarian air defence sector has undergone a development of this magnitude. The NASAMS systems are widely used in other NATO member countries and have been chosen as the most adequate system for the fulfilment of allied requirements. Hence, our defence forces will regain their safeguarding capabilities to a 21st century standard after having been dismantled following the regime change of 1989. Thus, we are finally saying goodbye to the KUBs after fifty years. Compared to the former Soviet era equipment in use since 1976, the newly acquired NASAMS will considerably increase the size of the territory able to be protected, the number of destroyable targets able to be engaged, and therefore result in the enhanced battle efficiency of the country's air defence sector. Furthermore, the NASAMS can

engage different aerial offensive devices such as unmanned aerial vehicles and autonomous aerial devices – which the current air defence system is simply unable to effectively deal with.

ESD: What kind of new defence acquisitions and investments can we expect in the upcoming period?

Maróth: There is a comprehensive modernisation procedure regarding military equipment. The public knows exactly which branches of the armed forces remain untouched by developments so far. I would like to assure everyone that almost all of these will be addressed. The modernisation programme put together by the Hungarian Defence Forces covers the entire spectrum of the defence sector. Everyone can rest assured that the Hungarian Defence Forces are well prepared enough to know what needs to be procured. The defence community is in possession of serious intellectual resources and are therefore well aware of the developments required in specific fields. I can only reiterate that every field will be addressed. We will announce a number of further developments already this year. ■

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Special Operations Forces Ground Vehicles

Sidney E. Dean

Special Operations Forces (SOF) operate a wide range of vehicles optimised for different mission requirements. Many SOF vehicles are highly versatile, reflecting the broad spectrum of potential missions and operating zones.

A large percentage of these vehicles are actually variants of military vehicles also deployed by regular armed forces; some are even militarised variants of civilian utility vehicles. This article presents representative SOF vehicles produced in the greater Atlantic community, and discusses both operational state of the art vehicles and some advanced developmental projects.

North America

Ground Mobility Vehicle 1.1

The joint-service US Special Operations Command (SOCOM) contracted with General Dynamics Ordnance & Tactical Systems (GD-OTS) in 2013 for procurement of 1,297 units of the M1288 Ground Mobility Vehicle 1.1 (GMV 1.1) through 2020. In August 2020, SOCOM issued a second contract for additional procurement of an unspecified number of vehicles through August 2022, an unmistakable sign that the military is highly satisfied with its choice.

The GMV 1.1 is based on GD-OTS' FLYER 72 vehicle, with 90 percent of components being identical. The 462 x 201 cm vehicle can be internally transported by CH-47 or V-22, or sling-loaded under a UH-60. With a kerb weight of 2,358 kg, it has a rated payload capacity of 2,585 kilograms, which equates to a payload-to-weight ratio greater than 1:1. Numerous configuration options are possible, including a choice of primary weapons ranging up to a 30mm BUSHMASTER chaingun or TOW Anti-Tank Guided Missiles (ATGMs). The TenCate modular armour kit consisting of ballistic plates and transparent armour windows is available to add 360 degree (plus roof and underbody) protection against small arms fire and small anti-personnel explosives. This versatility permits the GMV 1.1 to deploy on many mission types including strike, search and rescue, and deep reconnaissance. Top speed on road is 153 kph. Cruising range is 483 km at mission con-

Photo: Arquis



The Arquis AREG 4.2 ton special operations vehicle

Photo: Deferature



The ATTIVECTOR has a deep fording capability of up to 840mm.

figuration, or more than 800 kilometres on flat ground at 70 kph. With a 60 percent grade climb capability, the vehicle is highly mobile over complex terrain even in extreme climate zones.

Photo: US DoD

Polaris MRZR-A

Like the GMV 1.1, the Polaris MRZR is suitable for various climate zones. SOCOM currently operates the Diesel-fuelled MRZR-D in the Light Tactical All Terrain Vehicle (LTATV) role. In May 2020, SOCOM awarded Polaris a seven year contract for a new, even more versatile LTATV designated the MRZR-A. It will be capable of operating in the Arctic, which has become a new SOF focal point. In addition, the "Alpha" variant will feature new on-board systems including Raytheon's Intelligence & Space's Multi-spectral Targeting System. This system combines electro-optical and infrared surveillance and tracking sensors with a tactical high-energy laser (HEL) suitable for counter-UAS operations. The system's internal battery can support up to four hours of surveillance or engagement of up to 30 UAS on one charge; when attached to a generator the system can operate nearly indefinitely.

Like the MRZR-D, the MRZR-A comes in a two and a four person variant and seven mission packages. The 1,000 kg chassis of the "Alpha" has been redesigned for greater durability and a higher payload (910 kg). For Arctic operations, the new vehicle comes with an enclosed cab, a heater, and snow tracks. Low Rate Initial Production (LRIP) is scheduled for early 2021.

Oshkosh

Oshkosh Defense offers three tactical vehicles designed or adapted for special operations missions. In 2019, the firm presented a SOF-oriented variant of its JLTV (Joint Light Tactical Vehicle). The special operations optimised vehicle presented at SOFIC 19 was equipped with a Kongsberg Common Remotely Operated Weapon Station (CROWS) with Javelin Integration Kit (JIK) and .50 calibre machine gun (MG), but Oshkosh refers to a wide selection of possible armament including 30mm cannon as well as non-kinetic weapons to engage land and air targets. The 6,400 kg vehicle's modular design also permits customised integration of sensors, communications, and other systems including a complete interface for battlefield C4ISR networks and plug-and-play situational awareness equipment. JLTVs are equipped with two armour levels: the A-structure, or base vehicle, includes a v-shaped hull to deflect blast energy from mines or IEDs, bulletproof windows, and an armoured crew cabin. Additional surviv-

Photo: Oshkosh Defense



A US Special Operations Command AGMS operating in Iraq



The MRAP ATV Special Forces Vehicle has a 500 kilometre cruising range.

ability equipment includes blast-protected seats and an automated fire extinguishing system. The modular B-kit add-on armour suite provides enhanced protection against enhanced small arms, fragmentation, and underbody threats, effectively increasing crew protection to MRAP levels.

Oshkosh's S-ATV (Special purpose – All Terrain Vehicle) introduced in 2012 is designed for SOF requirements around the world, but with an emphasis on the Middle East. The mission profile includes special reconnaissance, counterinsurgency operations, long-range surveillance, site seizure and direct combat operations. Oshkosh stresses the S-ATV's capability for high speed and manoeuvrability over challenging terrain including rock, sand and soft soil. Cruising

range is 800 kilometres at 110 kph, with a top speed of 145 kph. The 3,740 kg vehicle can be internally airlifted by CH-47 or CH-53, and is weapons ready within 60 seconds of debarkation. Crew capacity is five or seven depending on configuration. The M-ATV SFV (MRAP ATV Special Forces Vehicle) variant was introduced in 2013. The basic M-ATV – which has sold over 9,500 units – offers a high degree of occupant protection against IEDs and other threats. Like the JLTV and S-ATV, it is equipped with the proprietary Oshkosh TAC4i suspension which enables off-road performance exceeding that of the unarmored Humvee, while ensuring a more comfortable ride and reducing crew fatigue. The SFV variant, developed

Photo: MIRA



The Nimr Rapid Intervention Vehicle RIV was designed for export markets in Eastern Europe.

Photo: MBDA



MBDA's fifth-generation MMP Medium Range Missile was successfully test-fired from a French SOF Sabre vehicle on Dec. 14, 2020, destroying a target tank at a range of 3,500 metres.

Photo: GD-OTS



The GMV 1.1 is suitable for all operating environments.

in collaboration with SOCOM, features a modified protected cargo deck intended to accept specialized equipment based on each mission's requirements, the option of mounting an RWS, a fully configurable and integrated C4ISR system, and larger front windscreens for increased visibility.

Armoured Ground Mobility System

The heaviest SOF vehicle operated by US forces is the Armoured Ground Mobility System (AGMS) used by Delta Force and the 75th Ranger Regiment when conducting overt direct action missions in high-risk environments such as ambush-prone urban settings. The current AMGS is a customised variant of the 13.5 ton 6x6 PANDUR I APC, acquired from Steyr-Daimler-Puch (now General Dynamics European Land Systems – GDELS) beginning in 2000. Major modifications include a shielded driver's cab, applique armour, a shielded CROWS remote weapons station on the roof (7.62mm minigun, .50 calibre MG, 40mm grenade launcher, or ATGM), a custom up-armour kit, and electronic anti-IED countermeasures.

In March 2020, SOCOM issued a Request for Information (RFI) for a replacement AGMS. The new vehicle will be designated the Joint AGMS (JAGMS) to reflect planned use by Army SOF and the Navy SEALs. Like the current vehicle, the JAGMS must be air transportable by C-130. The new vehicle must be heavily armoured and carry 9-11 passengers plus commander and driver, compared with the seven in the current vehicle. Other anticipated key requirements include a 2,200 kg payload capacity, a remote weapon station, and additional distributed sensors to enhance situational awareness. Procurement program begin is targeted for 2022/2023; SOCOM's goal is testing of a new vehicle in 2023/2024, with fielding in 2024/2025.

Europe

EAGLE V

The MOWAG EAGLE family of vehicles (now produced by GD ELS) is suited for a multitude of missions. The latest variant, the EAGLE V, is available in 4x4 and 6x6 versions, both of which share the same chassis and drive train components. Basic weight is 7,000 kg and 7,700 kg, respectively. Payload and personnel capacity range from 3.3 to 6.9 tons and four to 14 soldiers, depending on variant and configuration. The EAGLE V is in service with the German, Danish and Swiss armed forces and used for armoured personnel transport, patrol, armoured reconnaissance, electronic warfare, command and support; the manufacturer expressly includes SOF missions in the

capability profile. The basic level 2 ballistic armour and level 2a mine protection can be augmented through add-on armour kits including RPG protection. The v-shaped hull is designed to deflect blast from mine and IED explosions, while blast absorbing seats reduce the risk of shock-induced injury, providing MRAP-level occupant protection. Optional equipment includes an RWS mounting a machine gun (up to 12.7mm) or a 40mm automatic grenade launcher (AGL) and an NBC-overpressure system. Operational range is 650 kilometres, with an on-road speed of up to 110 kph.

ATTV/VECTOR

The ATTV (Air Transportable Tactical Vehicle) produced by Defenture entered service with the Netherlands army's commando regiment in late 2017, and with the Netherlands Marine Corps' special operations unit in 2018. The Netherlands SOF command officially designated the vehicle as the VECTOR (Versatile Expeditionary Commando Tactical Off Road). It is utilised for combat patrol, special reconnaissance and interdiction/strike missions. The 510 cm long ATTV has a kerb weight of 3,000 kg and a payload capacity of 1,440 kg. It seats five soldiers. Weapons options include a ringmounted 12.7mm MG plus a second MG at the commander's position. The 4x4 vehicle has an operational range of 800 kilometres. The turning circle is 13.5 metres with standard steering, or 9 metres with optional four-wheel steering. Modular ballistic and mine armour up to STANAG Level 1 is available. The vehicle can be airlifted as a sling load or inside a CH-47.



Photo: Nimr

The AJBAN Special Operations Vehicle

KMW SOV

Krauss-Maffei-Wegmann (KMW) and Bremach have jointly developed a 4x4 tactical Special Operations Vehicle (SOV) based on the Bremach T-Rex utility truck. The SOV was introduced in 2014 and was designed to meet recent demand by German SOF for a long-range reconnaissance/patrol vehicle. Operational range is 900 kilometres, with a maximum road speed of 130 kph. Heavily armed for its size, the SOV mounts up to three automatic weapons including a heavy MG or 40mm AGL on the roll bar or on the optional ring mount; offensive

weapons are augmented by the Wegmann 76/40mm smoke/obscurant grenade launch system. The SOV is airlifted internally by CH-47 or CH-53, and is combat ready within two minutes of rollout.

The SOV is particularly suited for desert operations (the original T-Rex military truck is operated by the Saudi armed forces). The heavy-duty chassis provides a robust foundation with excellent cross-country handling. The six-metre vehicle has a kerb weight of five tons. It has a payload capacity of 2.5 tons (more than many vehicles of this size and weight class) and seats up to six soldiers. The vehicle can be configured to meet operational requirements. It is available with an open top, an enclosed and protected cabin, or as an up-armoured pickup or flatbed truck. The undercarriage is protected against mines and IEDs, and crew seats are elevated to enhance survivability. The standard chassis has only light ballistic protection. The operational concept relies on speed and manoeuvrability for survival.

Arqus

Arqus makes a full range of dedicated SOF vehicles which are marketed in France and globally. The lightest is the highly mobile 4.2 ton AREG which is optimised for deep penetration and strike missions. Payload capacity is 1.2 tons, plus four seated soldiers. The 4x4 vehicle can be internally transported by CH-47. Three vehicles will fit in a C-130. The AREG is air droppable, allowing for missions to begin behind enemy lines. Vectronics and other equipment can be customised to meet customer needs;



Photo: German Army

German army EAGLE equipped for winter operations



Photo: KMW

The 12 ton 4x4 Torpedo is an open-bedded truck, an infrequent design for dedicated SOF vehicles. It was developed from the VLRA family of trucks used for conventional logistics and personnel transport missions. The heavy-duty off-road vehicle is designed for sturdiness and ease of maintenance in austere environments. The Torpedo's cab accommodates two and can be configured open or closed. Up to six operators can ride on the open bed, which can be equipped with communications scramblers and jammers. Intended for autonomous operations, the vehicle can carry additional fuel tanks to increase the basic 1,200 km range. Armament options for the PATSAS and Torpedo are the same as the SABRE's, including ATGMs; both vehicles are air transportable by C-130/A400.

The-KMW-Special-Operations-Vehicle

an enclosed passenger cabin is optional. A ring mount accommodates a machine gun up to 12.7mm or an AGL, with a 5.56mm or 7.62mm MG by the commander's seat. The 11-ton SABRE is classified as a multi-echelon and joint combat vehicle. Its size provides high endurance for long-range missions. The heavily armed vehicle has a central ring mount and three additional weapons points for machine guns and grenade launchers, allowing the five-person crew to maintain a 360-degree arc of fire. The vehicle can also carry ATGMs. A wide

range of communications systems can also be installed, enabling deployment as a command or fire-control platform. The 12-ton PATSAS is an SOF-optimised variant of Arquus' BASTION armoured personnel carrier. Unlike the fully protected Bastion, the PATSAS has an open cab with two side doors and a rear door. The sides retain the heavy armour of the original vehicle, affording the five-person crew a higher level of protection than most SOF vehicles. Armament options are the same as the SABRE's, including ATGMs.

Middle East

SAND-X

The SAND-X T-ATV-1200 (Tracked All Terrain Vehicle) is one of the world's smallest and lightest SOF vehicles, and possibly the fastest as well. A truly international project, the T-ATV was designed in Switzerland and customized/marketed in Dubai. Performance parameters are equally global. SAND-X cites the ability to operate on all terrains including sand, snow, ice, marsh, roads, and rocky terrain, in ambient temperatures ranging from -50 to +60 degrees centigrade. The firm cites an acceleration rate of 0-100 kph in three seconds, with a top speed of 185 kph and a range of



Photo: German Army

German army EAGLE protected vehicles serving in the UN stabilisation mission in Mali (MINUSMA)

350 km. An extremely low centre of gravity minimises rollover risk even at high speeds. Payload capacity is 380 kg including a maximum of two tandem-seated riders; payload can be increased by attaching a small cargo trailer. With two front tyres and a single kevlar/rubber composite rear track, the vehicle looks and handles like a hybrid between a trike and a snowmobile. The T-ATV can also be remotely operated from a briefcase-sized control station. UAE-based Streit Group has contracted with SAND-X to offer a B6 protection level armoured variant which includes a protective front shield for the driver. A forward-pointing weapons mount for a light MG or assault rifle can be installed beside the shield.

AJBAN SOV

NIMR Automotive's AJBAN LRSOV (Long-Range Special Operations Vehicle) takes a more conventional approach. The highly mobile 4x4, which entered service with UAE armed forces in 2016, is designed for long-range reconnaissance. Mission configurations include patrol/assault, with one ring-mounted machine gun (7.52 or 12.7mm) plus up to two door-mounted 5.56mm MG; an AA version with four MISTRAL missiles ready to fire plus four in reserve; or an AT kit with four-plus-four MILAN ATGM. It also features an integrated C4/ISTAR capability. A modular armour kit is available. The open-topped base vehicle weighs 6,500 kg with a 2,500 kg payload capacity. Standard accommodations seat four, with an option of a fifth seat. Ballistic and blast protection kits are optional.

While the LRSOV is optimised for Middle Eastern environments, Nimr's RIV (Rapid Intervention Vehicle) – designed and developed by Mira Body and Interiors – specifically targets distant markets ranging from Eastern European to Southeast Asia. Prototypes were tested at temperatures ranging from -32 degrees Celsius to +65 degrees. The RIV comes with standard underbody blast protection, and the option for applique ballistic chassis armour. Standard armament consists of a roof mounted 12.7mm MG. The lightweight, high-mobility SOF vehicle is intended for high-speed response to tactical situations and counter-insurgency missions in remote sites. It can be transported internally or sling-loaded by CH-47, and is combat ready upon arrival.

Covert Vehicles

While most SOF vehicles, regardless of configuration and size, are clearly recognisable as military vehicles, there remains one category to discuss. These are the



Photo: Oshkosh Defense

The S-ATV can operate in ambient temperatures up to 54 degrees Centigrade.



Photo: Navistar

The Navistar SOTV-B (Special Operations Tactical Vehicle - B) can pass for a standard Toyota HILUX, but features hidden ballistic armour for crew protection.

so-called covert vehicles, mostly modified civilian SUVs and off-road-capable pickup trucks that allow special operators to blend into their surroundings. One example is Navistar Defense (soon to be acquired by VW-subsi-dary Traton) which provides modified, highly survivable variants of civilian vehicles to US SOF and to NGOs operating in dangerous environments. Navistar's SOTV-B (Special Operations Tactical Vehicle B) is designed to pass for a Toyota HILUX four-door pickup truck, a vehicle ubiquitous in many non-western theatres of operation. The SOTV-B can also be configured to mimic different vehicle models, to best blend into the operational environment.

The external panels of the crew-cab hide an armoured safety cell, which provides B6-level ballistic protection to up to seven

occupants. Vehicle performance is also set to SOF standards, with a 4.5 litre Cummins four cylinder, 250 hp turbo diesel engine providing 600 pound-feet of torque. The engine can optionally run on JP8 military jet fuel. The fully independent suspension is optimised for off-road operations including rocky mountainous terrain and climbing a 60 degree slope. An override function permits the driver to attain speeds of up to 160 kph off-road.

Several firms besides Navistar offer protected covert vehicles to SOF, military contractors and related clients. By definition these vehicles are (even less) visible than their overt counterparts, but special reconnaissance and direct action missions against insurgents, terrorists and cartels will sustain demand for protected "deniable" vehicles for a long time to come. ■

On The Rail – Performance Enhancements for Small Arms

David Saw

In recent years, driven by combat experience, there has been a vastly increased emphasis on improving the effectiveness of the individual soldier. This has seen significant improvements in such basic areas as combat uniforms and boots, personal load carrying equipment, helmets, body armour and so on.

There have also been tremendous efforts in improving the firepower of the individual soldier. If you compare the M16 assault rifle used by the US Army in Vietnam in the 1960s with the M4/M4A1, the current US Army assault rifle, there are obviously many similarities. Unsurprisingly, the M16 and the M4/M4A1 use the same operating system. The current rifle is a descendent of the M16.

Both use a 5.56x45 mm round, although the performance of current 5.56x45 mm NATO rounds is far in advance of what could be achieved by the 5.56x45 mm M193 round of the M16. The M16 was equipped with iron sights, and here is the crucial difference, whereas the M4/M4A1 can be equipped with a whole range of sighting options from close quarter battle sights, to longer-range

sights, night sights and a whole range of other devices.

The integration of optical sighting solutions are obviously a major contributor to enhancing the effectiveness of the individual soldier. They enable targets to be acquired, identified, engaged and neutralised. The problem was that whilst it was perfectly acceptable to equip a sniper with an optical sight, a wider issue of optical sights was never really attempted. Obviously, cost was a factor here and a belief there was no real need to equip ordinary infantry with an optical sight.

Post-1945, the British Army moved to replace the majority of its small arms with a new assault rifle in the 7x43 mm intermediate calibre known as the EM-2. This weapon had an integrated optical sight. When the US manoeuvred NATO into adopting the 7.62x51 mm round, that marked the end of the EM-2 and led the British to adopt the FN FAL with no optical sight. Elsewhere, Canada was arguably the first to adopt the FN FAL; they purchased two prototype FAL batches from FN. The EX-2 second prototype batch of 500 weapons incorporated an optical sight, but the main production Canadian batch of the FAL, known as the C1/C1A1, were purchased without optics.

Optical Path

As we shall see, both Britain and Canada would embrace the logic of optical sights in their next generation of rifles in the 1980s. However, it was Austria that was first to equip itself with an assault rifle with an integrated optic. At the end of the 1970s, Austria replaced its FAL battle rifles with the Steyr AUG (Armee Universal Gewehr) 5.56x45 mm assault rifle. This included a Swarovski 1.5x sight integrated with the AUG receiver. By the end of the 1990s though, the A3 ver-

Photo: Bundesheer



An Austrian soldier provides small arms training during the Flintlock 2019 exercise held in Burkina Faso and Mauritania in February 2019. The Steyr AUG originally came with an integrated 1.5x optic. The AUG variant shown here is fitted with a rail system and higher performance sight solutions.

sion of the AUG had dispensed with the integrated sight. Instead, it featured a US MIL-STD-1913 Picatinny rail which we will discuss shortly.

Meanwhile in Britain, the decision had been taken to replace the SLR (British version of the FAL) with a new assault rifle in the shape of the L85 in 5.56x45 mm calibre, which entered service from the mid-1980s onwards, and came equipped with the L9A1 Sight Unit Small Arms Tri-lux (SUSAT), a 4x optic. Other users of the SUSAT included Sweden who used the sight on a limited issue basis on their AK5 (FN FNC) assault rifles for designated marksmen.

In 1984, the Canadian Forces decided to replace their C1/C1A1 battle rifles with a new 5.56x45 mm assault rifle, selecting the Colt 715 as the basis for their locally produced C7 rifle. Subsequently, the C8 carbine variant was also taken into service. Canada decided that they wished to equip their rifle with an optical sight and selected the ELCAN SPECTER OS, a 3.4x optic, classified as the C79. Initially, the C79 was attached to the C7 using a Weaver rail. This was later replaced by a MIL-STD-1913 Picatinny rail.

While the British also integrated the SUSAT with the L86 Light Support Weapon (LSW) variant of the L85, at that point they had not decided to integrate an optic with their machine guns. The same was true of Canada, who initially only applied the C79 to their assault rifles. However, surely it must have been logical to integrate an optic with machine guns; it had been done before. German MG34 and MG42 machine guns in 7.92x57 mm calibre in the sustained fire role were placed on the LAFETTE tripod mount which had an attached optic in the form of the MGZ34, MGZ 40 and later the MGZ44. Later on, both the British and the Canadians would be fitting their in-service optics to machine guns, such as the FN MINIMI and FN MAG. The US Army took a different approach, opting to acquire a dedicated machine gun optic in the form of the M145, which was the ELCAN C79, using that optic on the M249 and M240.

Another optic that entered the field in this era and has been consistently upgraded since is the Trijicon Advanced Combat Optical Gunsight (ACOG). This became the primary sighting system for US Army as the M150 in 4x32 magnification. It was also adopted by the US Marine Corps in 2004 as the Rifle Combat Optic (RCO). The British Army acquired the ACOG as an Urgent Operational Requirement (UOR) for Afghanistan, but its primary



Photo: Avr Melissa Gloude, Canadian Armed Forces

A Canadian soldier with a C8 carbine and attached ELCAN sight takes part in a live fire exercise in Starychi, Ukraine, at the International Peacekeeping and Security Centre (IPSC) in January 2021. Operation Unifier is the Canadian Forces' mission to support the Ukrainian Security Forces.

effort to upgrade its small arms sights was a Surveillance and Target Acquisition (STA) programme, part of their broader Future Infantry Soldier Technology (FIST) programme. This saw the acquisition of 10,835 ELCAN Specter OS 4x optics, the Shield Close Quarter Battlesight (CQB), a 1x red dot sight, the Qioptiq FIST Thermal Sight (FTS) and enhancements to the Qioptiq Common Weapon Sight (CWS) and MAXIKITE III.

Rails

While the sights had arrived, effective integration with weapons had yet to be settled. It was a few years until a de facto standard emerged in 1995 in the form of the Picatinny rail, the official description being the MIL-STD-1913 Accessory Mounting Rail For Small Arms Weapons. Today, when people think of rail systems for small arms, Picatinny is usually the



Photo: ELCAN

The future of small arms sighting systems will see the integration of complete fire control solutions such as this ELCAN Digital Fire Control System shown here during firing trials at Hiawatha, Utah. The shooter presses a button and the DFCS takes into account temperature, humidity, atmospheric pressure, distance and the ballistics of the weapon and its ammunition, providing an optimum firing solution.



The Canadian Forces selected the Colt Canada C20 in 7.62x51 mm to meet its Intermediate Sniper Weapon (ISW) designated marksman requirement. The C20 uses the M-LOK rail system to which is attached the Schmidt & Bender 3-20x50 PM II Ultra Short scope.

answer. Ironically, there was actually a NATO standard dating back in 1961, although cancelled in 1979 for what was described as “Rule governing the interchangeability of securing and holding devices for infra-red scopes on carbines, rifles and machine guns.”

By the end of the 1970s, there was great enthusiasm for NATO standardisation. One project that came to pass was the standardisation of the Belgian SS109 5.56x45 mm round as the NATO standard. Other programmes existed though. The aim was to have a standard NATO rifle magazine, even a standard NATO bayonet attachment and a standard NATO accessory rail. As previously noted, the Picatinny rail had emerged in 1995 and it did become the de facto standard. Eventually, the NATO rail STANAG 4694 was officially adopted in 2011, though it should be noted that this rail is backwards compatible with the Picatinny rail.

One would assume that all of this has assured rail commonality within NATO but unfortunately, this is not the case. Alternative rail systems such as KeyMod and M-LOK have emerged. M-LOK is particularly interesting. It was developed by the Magpul company; they are perhaps best known for the PMAG polymer magazine and their EMAG NATO STANAG 4179 compliant export standard magazine, although this STANAG was never ratified. The British Army are reported to have contracted for one million EMAGs for their L85A2 rifles from 2010 onwards. Magpul then went on to develop the M-LOK modular locking accessory mounting system. This became available from 2014 onwards and Magpul appear happy to license the system as long as its standards and specifications are complied with.

Colt Canada used M-LOK on their Modular Rail Rifle based on the C8 carbine and on the C20 semi-automatic sniper rifle in 7.62x51 mm that has been adopted by the Canadian Forces for their Intermediate Sniper Weapon (ISW) DMR requirement. Here Canada has chosen the Schmidt & Bender 3-20x50 PM

II Ultra Short scope for integration with the C-20 via M-LOK. Returning to the subject of the M-LOK system, the 16,000 R-20 RAHE (MARS-L) weapons being acquired by the Estonian Defence Force in 5.56x45 mm (assault rifle) and 7.62x51 mm (DMR) are equipped with the M-LOK system.

Capability Growth

The conflicts in Afghanistan and Iraq would act as the catalyst for major developments in small arms sights, accessories and rails. In parallel with this were advances in associated technologies. The involvement of US Special Operations Command (USSOCOM) in driving developments should not be ignored either. Back in 2005, they turned to ELCAN to develop a sight that combined a CQB red dot sight with a rifle combat optic in new 1-4x optic known as the SPECTER DR, with the DR standing for Dual Role. SPECTER DR was adopted by USSOCOM, Norway, Italy, Australia, plus Canadian and British Special Forces.

The SPECTER DR has continued to evolve. It is now in its fourth generation, with improvements in fit, form, function and durability. For example, the sight supports both left and right-handed shooters, allowing rapid changes in field of view, and a small rail on top of the sight allows the installation of a laser target pointer/aimer. Denmark will take delivery of the SPECTER DR this year, acquiring the Specter DR in the 1-4x variant for its Colt Canada assault rifles and the M60E6 machine gun, with the 1.5-6x version of the sight to be used on the M2HB heavy machine gun.

Dual role sights are now the sight to have. The US Marine Corps is replacing its Trijicon RCO with the Trijicon Variable Combat Optical Gunsight (VCOG) 1-8x28 optic. The VCOG was selected to meet the Marine Squad Common Optic (SCO) requirement and Trijicon was awarded a US\$64M contract for the SCO. The SCO began fielding in January 2021 and will be mounted on M27 and M4/M4A1 weapons. As an aside, the

Marines will be mounting suppressors on the M27 and other small arms.

Into the future, the aim will be to field a combined fire control system and optic. The US Army Next Generation Squad Weapons (NGSW) programme is evaluating three different weapons in conjunction with two fire control solutions from L3 Harris and Vortex Optics competing for the NGSW- Fire Control (NGSW-FC) element of the programme. Others are already on course with their own fire control systems for small arms. Elcan have their SPECTER Digital Fire Control Sight (DFCS). This system is already being tested by a number of NATO armies on AR and other platforms.

The DFCS weighs in at 1570 grammes and is compatible with Picatinny and NATO STANAG 4694 rails. Designed for ambidextrous operation, the system also includes a high performance laser coating to protect the operator from laser light, without reduced light transmission or fogging. The optical element is a 1-8x and this is linked to a fire control computer. The computer takes into account temperature, humidity, atmospheric pressure, distance and the ballistics of the weapon and its ammunition. Currently, 17 different standard NATO weapon and ammunition combinations are programmed in. All the operator does is press a button on the DFCS, the calculations are made and the sight reticle moves to the optimum position for target engagement.

Last but not least in terms of systems to be attached to small arms are tactical lights. In European Security & Defence 10/2021, there will be a comprehensive feature on tactical lights. One of the leaders in this field are Streamlight of Eagleville, Pennsylvania. Established in 1973, the company provides lighting solutions to military, law enforcement, firefighter, industrial and other customers. In their military portfolio, they offer a number of different options, including the TLR RM1 laser rail mounted tactical lighting system. This mounts on a Picatinny rail and is a 500 lumens light with an integrated 640-660 nm red laser. Another solution is the TLR RM2 rail mounted tactical lighting system. Again, this mounts on a Picatinny rail and offers a 1,000 lumens light with a 200 metre beam distance.

These days you will find rail systems on pistols, assault rifles, sniper rifles, grenade launchers and machine guns. If you have a compatible rail there is no shortage of options for an operator to consider. Perhaps the biggest challenge is to resist the temptation to overburden and unbalance a weapon with all of the possibilities that exist from sights, lasers, lights to even more exotic solutions. ■



Viewpoint from Paris



Photo: Dennis Kolesnyk

France Updates its 2017 Defence and National Security Strategic Review

Dennis Kolesnyk

Shortly after winning the presidential election in May 2017, Emmanuel Macron tasked a team to draft the Defence and National Security Strategic Review to update the existing White Paper that dated back to François Hollande's administration.

On 11 October the same year, the Strategic Review was presented to the President of France during a Security Council meeting. This solid 110-page document examined the core interests of France, its defence ambitions, and evaluated the security environment. The Review was also a key document for the preparation of the Military Planning Law for 2019-2025, aiming to bring the French defence expenditures up to 2 percent of the GDP.

The 2017 Strategic Review underlined several challenges, the growing ambitions of certain regional and global powers, as well as the general deterioration of the security environment. The issues of disinformation and cybersecurity did not go unnoticed, especially given that Emmanuel Macron's presidential campaign was targeted by the Russians.

Since then, and according to the French Ministry of Defence, certain trends underlined in the Strategic Review have been confirmed and some others have emerged.

Therefore, the necessity to update the document in order to improve the analysis of the evolving strategic environment has been imposed. On 21 January 2021, the French Minister of Defence, Florence Parly, presented the update to the Strategic Review.

The development of the document was carried out mainly by the Ministry of Defence and coordinated by the Directorate General for International Relations and Strategy with the involvement of some other actors at the national and allied level.

This 56-page update starts with taking stock of the developments described in the 2017 Strategic Review and, with no surprise, acknowledged the deterioration of the strategic context that jeopardises "the international security architecture".

The resumption of strategic and military competition by Russia and China is confirmed in the document and considered one of the main threats. Interestingly enough, the Strategic Review Update

contains 22 mentions of Russia, but only 13 times in the Strategic Review itself. It suggests that Moscow's hostile actions are being taken more seriously than a few years ago.

The document notes that health protection measures are having an unprecedented negative impact on the global economy leading to a severe economic recession. In addition, the "power strategy" adopted by Moscow and Beijing, including in the COVID-19 context, is underlined. It also notes Russia's ambitions, despite constraints on financial resources, to deploy its strategic ambitions beyond the usual theatres.

Russia and China are considered to be the most active in using so-called "hybrid strategies" that includes, but is not limited to the use of lawfare, non-state armed groups, as well as manipulation of information.

The document stresses the importance of cooperation with partners and allies with the President of France putting "the revival of European defence at the core of France's international action." The necessity of convergence and cooperation, including within the EU, NATO and ad hoc initiatives, in particular the European Intervention Initiative (EI2) received particular attention. Paris also seeks the enhanced engagement of its allies and partners to fight terrorism and build the defence capabilities of the G5 Sahel countries.

The document also underlines the risk of the European continent being "downgraded" or even "withdrawn" from world affairs, painting a grim picture for European countries.

The authors of the document believe that "direct confrontation between major powers" can no longer be ignored. And finally, the document sets out the ambitions for 2030, where, among other things, the need to improve interoperability with allies and partners and the reinforcement of the reserve forces are noted.

For France, which considers herself a stabilising power, it is of paramount importance to be able to back up the political efforts by a "strengthened, effective and agile defence apparatus" and pay particular attention to cyber (informational) and space domains.

CBRN Mass Decontamination

Dan Kaszeta

Decontamination is an inherent component of response to incidents involving chemical, biological, radiological, and nuclear (CBRN) materials. Military decontamination is heavily concerned with decontamination of equipment, such as tanks and artillery pieces.

In both military operations and civil protection, “decontamination” (decon for short in the trade) actually encompasses a number of systems, technologies, processes, and product. But “personnel decontamination” – the process of removing decontamination from people and their clothing is an important part of both force protection and emergency response to CBRN (and hazardous materials) incidents.

“Mass decontamination” comprises systems and technologies for processing large numbers of people, often the general public, through a decontamination process to remove contaminants. Mass decon involves both providing both “ambulatory” (i.e. walking) and “non-ambulatory” (mostly, people who are victims requiring medical assistance) people. Non-ambulatory decon is often rightly

Major Manufacturers

Within this market segment, there are a number of major manufacturers that produce mass decon systems. Major European manufacturers compete not just in Europe, but globally. These players are also major players in heavy equipment decontamination, and the systems they produce are often bundled with mass decon. Kärcher (GE), which is a household name in sprayers and pressure washers, is a key player in military and civil decon. They produce the DSAP, a large tent-based system for both ambulatory and non-ambulatory decon. This is their core mass decon offering. It travels in a standard cargo container and folds out into an impressive decontamination station that can decontaminate 180 ambulatory persons per hour, controlled by a “traffic light system”. Throughput is slower if non-ambulatory victims are decontaminated, as this is a more laborious process. Kärcher also produces hot water modules, the HWM 40 and HWM 100 series of various sizes and specifications to provide more modular mass decon options.

OWR is the other German player in this market. Their MPD100 and MPD100i are also a container-based system, which provide hot water showers for personal decontamination. The MPD100 will provide enough throughput for 120 persons per hour, and the MPD100i provides twice that capacity. Again, non-ambulatory decon is much slower.

Cristanini (Italy) also holds a credible position in this market sector, for both military and civil protection customers. The core of their offering is the SAM 125 shower unit, which connects to Cristanini’s pumping and heating hardware. This product is scaleable and can be fitted into the small, medium, and large decontamination tents that Cristanini produces. Cristanini is also highly significant in that it produces BX-29, a decontamination solution that is actually intended for mass decontamination purposes. It is a significant player in a field marked by prolific generics.



Photo: Cristanini

Mass decontamination requires that the decontamination equipment itself remains sterile. The DDMAS (Decontamination / Detoxification Mobile Autonomous System) from Cristanini, shown mounted on an 8x8 military truck, is able to self-decontaminate during the course of large-scale decontamination events.

Author

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considered part of medical countermeasures. Because of hypothermia risk, which can be deadlier in cold weather than many of the CBRN materials being removed, systems for mass decon generally provide heated water.

The Canadian firm DEW is working in alliance with the French manufacturer NBC-Sys (now part of NEXTER) is fielding a mass decon system as well. The DEW product line has had significant uptake in the Canadian military. Hispano Vema has produced mass decontamination sprayer units, but largely for a Spanish market. VOP (CZ) produces a tent-based system (SDO) that is meant to work with their decontamination vehicles to supply the necessary water.

The inflatable tent market is too dense to fully detail here, as many tent manufacturers will add a “decon tent” to their catalogue. Gumotex (CZ), MFC Survival (UK), and Aireshelta (UK) both inflatable tent-based shower systems. These are very much geared towards a civil protection and fire brigade market. produces specialty decontamination tents.

Within the not inconsiderable USA market, there are myriad products aimed at firefighters, as they are the most likely emergency service to get tasked with mass decon. ACSI (Houston, TX), produces a range of mass decontamination trailers, as well as bespoke mass decontamination trucks based on the main North American fire truck models. Other USA-based companies such as HDT make tent-based systems. Literally dozens



Photo: Bundeswehr

The Kärcher Futuretech mass decontamination system

of such manufacturers are on the market. MODEC, an early name in this space, was bought out and their parent company now focuses on decontamination foams for other types of decontamination. Numerous chemical products exist for decontaminating heavy equipment and sensitive equipment such as computers and

avionics. But products for use on human skin, particularly with civilians, are heavily regulated for health and safety reasons. While there are numerous personal decontamination products on the market, many are basically for individual use. Many are for issue to individual military personnel and not licenced for general use. The principal excep-

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Photo: US Army



A soldier sets up the mass decontamination shower as part of a CBRN training scenario.

tion is Cristanini's BX-29 product, discussed above. In addition, speciality decon chemicals are often not priced for stockpiling for mass decon use. This sub-segment of the market has not changed radically since it was covered in 2016 in this magazine.

Competition

Dedicated technologies and products in mass decontamination face deep and widespread competition from generics and improvised alternatives. The operational concept behind mass decon is that hundreds or even thousands of people may need to be processed. More often than not, the default decontamination solution will be warm water. If anything beyond water is used, it is likely to be inexpensive soaps. The more sophisticated decontamination chemicals are designed for surfaces and

equipment, not human skin. They require contact time, and are usually not licenced by medical regulators. Few organisations can stockpile speciality goods in sufficient quantity. So, mass decon remains largely a soap and water operation.

The other competition factor comes from the fact that the majority of mass decon customers, globally, are firefighting services. Even small fire departments with older equipment are capable of putting a lot of water onto people. Use of fire engines to do emergency decontamination is routine practice in a lot of places. Further, many of the specialised "mass decon" products are easily duplicated with cheaper generic products. Many an enterprising firefighter has mocked up showers and decontamination tents out of much cheaper generic products than those marketed as speciality mass

decon systems. This approach can lead to an impression that many of the products on the market are luxuries for wealthier emergency services customers. The speciality manufacturers have some work to do to prove their worth to an often cynical customer base.

With military personnel decontamination systems, it is important to note that numerous secondary missions are often important considerations in system procurement. In the height of the Cold War, many soldiers realised that their comrades assigned to chemical companies and battalions were cleaner. Thousands of chemical troops learned to convert their decontamination units into warm showers. Many CBRN mass decontamination systems designed for military use work perfectly well as field showers. Industry has long acknowledged this, and many decontamination systems provide this as a standard feature, as opposed to an ad hoc adaptation.

Predicting Crowd Behaviour

Mass decontamination is easier to do in theory than in practice. But even then, the theory is not always well thought through. Mass decontamination is actually a degrading and physically unpleasant process for many of the people who will undergo it. The technology and the products do not address the underlying behavioural and psychosocial factors. Planning appears to usually assume a completely compliant population of victims. When it doesn't make that assumption, responders often assume the converse, mass panic wherein people will need to be compelled to undergo decontamination for their own good. Neither are particularly likely scenarios. Fortunately, crowd behaviour and, in particular, public response to CBRN mass decontamination scenarios is now the subject of serious study. Several behavioural scientists at University of Sussex (UK) and Public Health England are actively publishing papers and studies on this important issue.

Mass decontamination is an area where the problem is well-defined, but very few customers have had to actually execute mass decontamination operations. Whether the existing products and technologies, whether specialised, improvised, or generic meet the challenge remains to be seen. ■



Photo: Kärcher Futuretech

With the Kärcher Futuretech system, inflatable tents are connected to the entrance and exit and act as changing areas for people undergoing decontamination.

Helping Customers See Better and Farther



Photos: Raytheon

ESD recently caught up with Dan Pettry, to discuss the importance of optical weapon sights for safer and more effective soldiers in modern, sophisticated armies. Pettry is a former US Army Ranger and now a Product Manager for Elcan SPECTER sights.

Optical sights increase lethality. Lethality increases survivability – survivability for the individual soldier. Weapons are a standard tool for military and paramilitary forces across the globe. Whether they are carried by a soldier or mounted on a larger platform, the weapon is not as effective as it can be without an optical sight.

ESD: Can you give us an example?

Pettry: Sure. Let's start with close quarters. Iron sights don't let soldier see.

To show you what I mean, hold your finger out at arm's length and focus on it. You probably have one eye shut. The area around you, in front and to the side isn't in focus. This is essentially what you're doing with iron sights. By focusing on the front sight, close up, your surroundings aren't in focus. This can be effective but not an advantage.

A reflex optical sight allows you to keep both eyes open while still helping you aim. This gives a shooter better situational awareness. An illuminated red dot draws the eye to the point of aim and improves the shot.

For longer range, we can look at the ADF (Australian Defence Forces). Optics have pushed their engagement distance out, doubled it. Regular infantry are now required to qualify out to 600 m. Why – because they can see. Australia, among others, issue Elcan SPECTER DR dual role sights to each soldier.

On larger platforms, it helps increase the probability of getting the first shot on target. Rather than sighting from splash while shooting from a helicopter or a vehicle, the soldier quickly and accurately acquires the target prior to engagement. This helps keep soldiers safer and makes your most lethal weapons more effective.

ESD: Tell us more about Elcan sights?

Pettry: Elcan SPECTER sights are a family of sights including magnified, reflex, machine gun and digital sights. Specter sights give allied forces the right tool to meet unpredictable and changing requirements in the most extreme environments on earth. Elcan sights have evolved to meet the needs of modern, sophisticated militaries. Our

ESD: What does Raytheon Elcan do?

Pettry: Raytheon Elcan designs and manufactures high precision optical assemblies. Our factory has everything under one roof to design and build opto-mechanical and electro-optical sub-systems. Our design team can design from specifications or concepts and then our operations team builds from our design, or from a customer drawing. Essentially, we have glass and metal come in one end and high precision products go out the other end.

ESD: Is it really that simple?

Pettry: In general, yes. But Raytheon Elcan solves the most difficult challenges for our customers – often challenges that other companies aren't able to tackle. We have about 600 talented scientists, designers, engineers and skilled tradespeople in a world-renowned high precision industry.

ESD: Where can we find optics by Elcan?

Pettry: Our optics are found on the battlefield, in the cockpit and in outer space. We help our customers see better and farther when the application is critical. It could be a telescope on a satellite, a heads up display, an imaging system, infrared countermeasure or a visible rifle sight.

ESD: Let's talk a little bit more about the optical sights. Why are optical sights important?

Pettry: All modern militaries are using optics. This includes allied and enemy forces.



ELCAN Specter sights give allied forces the right tool to meet unpredictable and changing requirements in the most extreme environments on earth.



ELCAN Specter sights are battle-tested in the most extreme environments and conditions on earth including desert, jungle and extreme cold environments for temperature, shock, sand, salt and submersion.

customers have the confidence they are investing in products that last and that will perform.

ESD: Why are Elcan SPECTER sights unique?

Petry: Optical quality, durability and the dual role capability. The brightness and light gathering capability of Elcan SPECTER sights is an advantage in low and limited visibility. The compatibility with I2 [image intensified] and thermal clip-on devices gives the soldier unmatched night vision capability.

The ruggedness and reliability are battle proven. Canada has been using the C79 for 30 years and it is still in service. US SOCOM has had the dual role for about 15 years, and Italy and Norway for about 7 or 8 years. Our sights undergo testing in the factory and are battle-tested in extreme environments and conditions including desert, jungle and extremely cold environments, for temperature, shock, sand, salt and submersion. They have thousands and thousands of rounds put through them without bore-sight or optical degradation.

The Elcan SPECTER DR dual role sight is the only truly dual role weapon sight. It instantly switches from close quarters to long-range engagement at the flip of a lever.

ESD: What is the dual role capability?

Petry: Dual role sights have two fixed magnifications in one sight giving the soldier

close quarters and long-range capability in a single sight, either 1-4x or 1.5-6x magnifications. This means a soldier can respond to changing and unpredictable conditions without having to choose between a reflex and magnified sight.

The close quarters combat mode provides rapid, both-eyes-open target acquisition. The long-range, higher magnification mode allows soldiers to accurately identify and engage targets out to the maximum effectiveness range of the weapon.

Denmark recently selected the Elcan SPECTER DR dual role sight for both AR [assault rifle] and machine gun platforms. The difference is the reticle, customized for the weapon – giving soldiers the right tool for the mission without compromising.

ESD: You mentioned Specter sights have evolved to meet the needs of the modern military. What does this mean?

Petry: The dual role capability was developed to meet the requirements of asymmetric warfare for the US in Iraq and Afghanistan. Special Forces needed to see close up and far away in a single sight. The low profile illumination switch reduced the weight and size of the sight. The change in the battery also increased battery life by about 50%.

Most recently, we have developed more options for the Specter DR sight. Denmark se-

lected the integrated rail option. This variant has a top-mounted Picatinny/STANAG rail incorporated into the optical housing of the sight. This is lighter than adding a mounting plate and allows easy installation of ancillary devices like a laser pointer.

The ambidextrous throw lever makes it easier for left-handed shooters to switch magnifications without moving their hands from the trigger.

Machine gun sights are also a relatively new addition to the line-up. The dual role sights can have customised BDC (ballistic drop compensated) reticles that are designed for use with light and medium machine guns.

ESD: You also mentioned digital sights?

Petry: Yes. The Elcan SPECTER DFCS digital control fire sight. This capability has historically only been available on large platforms like drones or ships. This sight puts that functionality in the hands of the soldier. The sight uses six factors to help the shooter increase the accuracy of the aim point: ammunition, humidity, wind, atmospheric pressure, temperature and distance. The shooter ranges the target with the laser designator and the sight calculates a ballistic solution for the shooter. The digital display shows a disturbed reticle, which allows the shooter to adjust the point of aim and increase the chances of putting the first shot on target.

ESD: Who else uses Elcan SPECTER sights?

Petry: Hundreds of thousands of Elcan SPECTER sights are deployed with allied forces in more than 50 countries including the UK, Denmark, Italy, Canada, the US, Australia, the Czech Republic, Romania and Norway.

Forces without optics are at a competitive disadvantage. Elcan SPECTER sights give allied forces an overmatch advantage on the battlefield helping them see better and farther in the toughest conditions on earth.

ESD: Thank you, Dan.



Fire control mode: With the click of a button, the sight ranges the target, calculates the ballistic solution and disturbs the reticle. The shooter can engage effectively within seconds.

Social Media as a Weapon

Andreea Stoian Karadeli

Cyberwar, Netwar, WWW-war: Social media is now both a battleground and a weapon.

The world that we once knew is no longer the same. The pace of change is now set to fast-speed, triggering multiple interconnected challenges: economic transformation, digitalisation and labour upheavals, an ongoing pandemic and the never-ending debates about vaccinations, climate change and global unrest. Many believe that this is the moment to rebuild our societies for a better, more sustainable and inclusive future, but only few are able to provide a hint as to how such a future might look. While all spheres of our lives are affected by change, we can all feel that the main battle is beyond the physical reach, unfolding in a domain that has already proved its duality: the cyberspace. On stream, the realm of social media that we once believed would actually bring us closer together, sharing our lives from different corners of the world, beyond the limitations of time and distance, is now both a battleground and a weapon in the WWW-war. Welcome to the new normal; are we ready to adapt to the change?

The Covid-19 pandemic has provided a breeding ground for the use of internet and online platforms, which have proved to be a simple alternative to continue our professional and personal daily activities from the comfort of our homes, without facing the risk of infection. This might explain the rise in both the use of internet and social media in the past year.

Based on the data published in January 2021 by "Digital 2021: Global Overview Report", the current global use of internet has reached 59.5 percent of the world's population, indicating a rise of 7.3 percent

Photo: via author



in the last 12 months. In other words (and numbers), there are currently at least 4.66 billion people around the world that have access to internet. Still, the experts argue that this number may be even higher than reflected in the report, as many countries have not provided the necessary data in the past months.

Meanwhile, based on the data made available for the above-mentioned "Digital 2021 Report", social media has also attracted more members in 2020, with a total of 4.2 billion social media users among the global population; this number represents 53 percent of the world's total population. Compared with last year's data, social media user numbers increased by more than 13 percent, with nearly half a billion new users joining these platforms. On average, more than 1.3 million new users joined social media every day in 2020, equating to roughly 15.5 new users every single second.

Continuing with the simple math, since you started reading these lines, at least 450 pioneers have joined various social media platforms and, by the time you get to the article's conclusion, the number will probably have reached even more than 3,000 new users. In the past, only a few would have been selected to participate directly in war. Today, we are all but a click away from a tool that can easily be a bat-

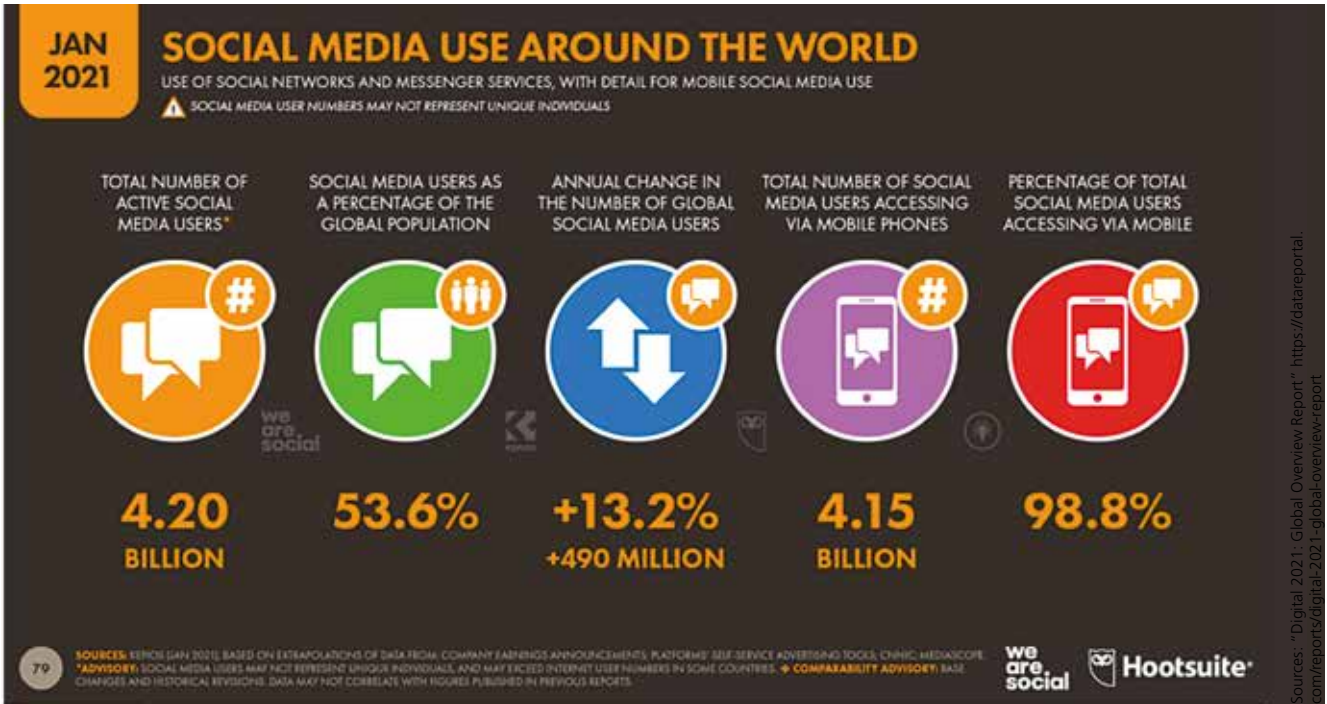
tleground, a weapon and a black hole. And no special training is needed, no rules of the game, and no special requirements to limit the variety of possibilities that open once you are registered. With user numbers of the internet and social media on the rise, there are at least three important questions that we should start looking to answer: 1. Do we really understand the role(s) of social media in the ongoing unconventional war? 2. How does it affect us (directly and indirectly)? 3. What should we do in order to adapt and survive in the new normal?

What is a Weapon?

The term weapon, literally speaking, has a commonly accepted general meaning of an instrument used for attack or defence during combat, and serving the purpose to inflict harm on the enemy. In time, this basic understanding has transformed into a variety of categories of instruments and tools created with the purpose of causing damage to one side, while increasing the chances of winning of the other: white weapons, fire weapons, nuclear weapons, biological weapons, chemical weapons and explosives are all included. But there has always been one weapon that, if used wisely, could overthrow all the others: the weapon of mass influence.

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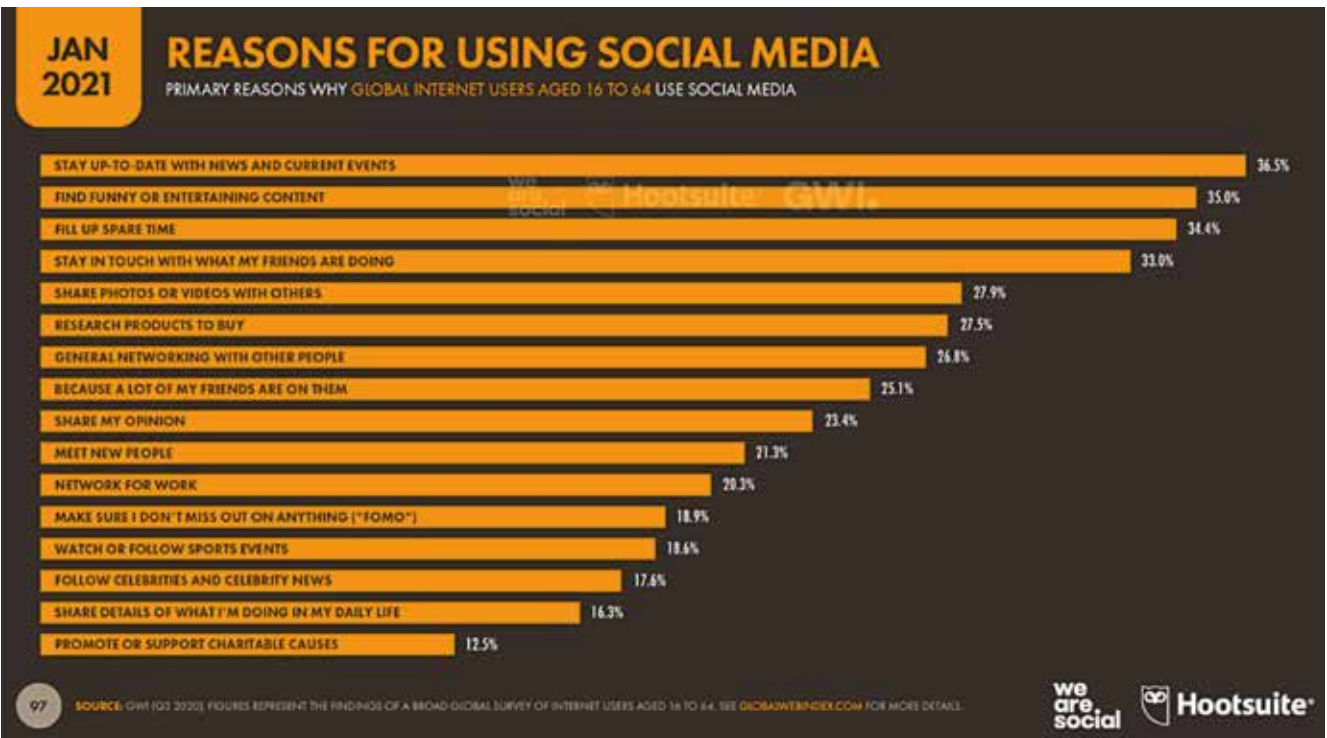


In line with the technological development of our society, the common understanding of the term weapon, has gained deeper connotations that stretched beyond the traditional battlefield. Therefore, a weapon can be explained today as any tool used with the aim of threatening or causing physical, functional, or mental harm to structures, systems, or living things (Rid & McBurney, 2012); although the primary purpose of the tool might have never been to inflict damage at all. This is exactly the point where the weapon of mass influence can find its place and begin to develop its forms, means and subsidiary tools. Furthermore, this might be the right place to position the role of social media in today's unconventional war, although, bearing in mind the design and variety of its platforms, it might prove to be more than just a weapon.

Social Media: Weapon or Battlefield?

Social media has changed most of the main elements that are part of our society, such as interpersonal relations and the social sphere of life, news, politics, marketing and advertising, business and commerce. Beyond the social, psychological, political and economic aspects, today's social media has become both an all-in-one weapon and a battlefield for the contemporary, unconventional wars. A quarter of a century ago it was feared that newly developed cyber-systems and networks would be targeted, but instead, it is the last and most vulnerable cell – the individual – that is threatened today. Social media now has been weaponised intensively in order to disrupt, damage and modify what a target individual

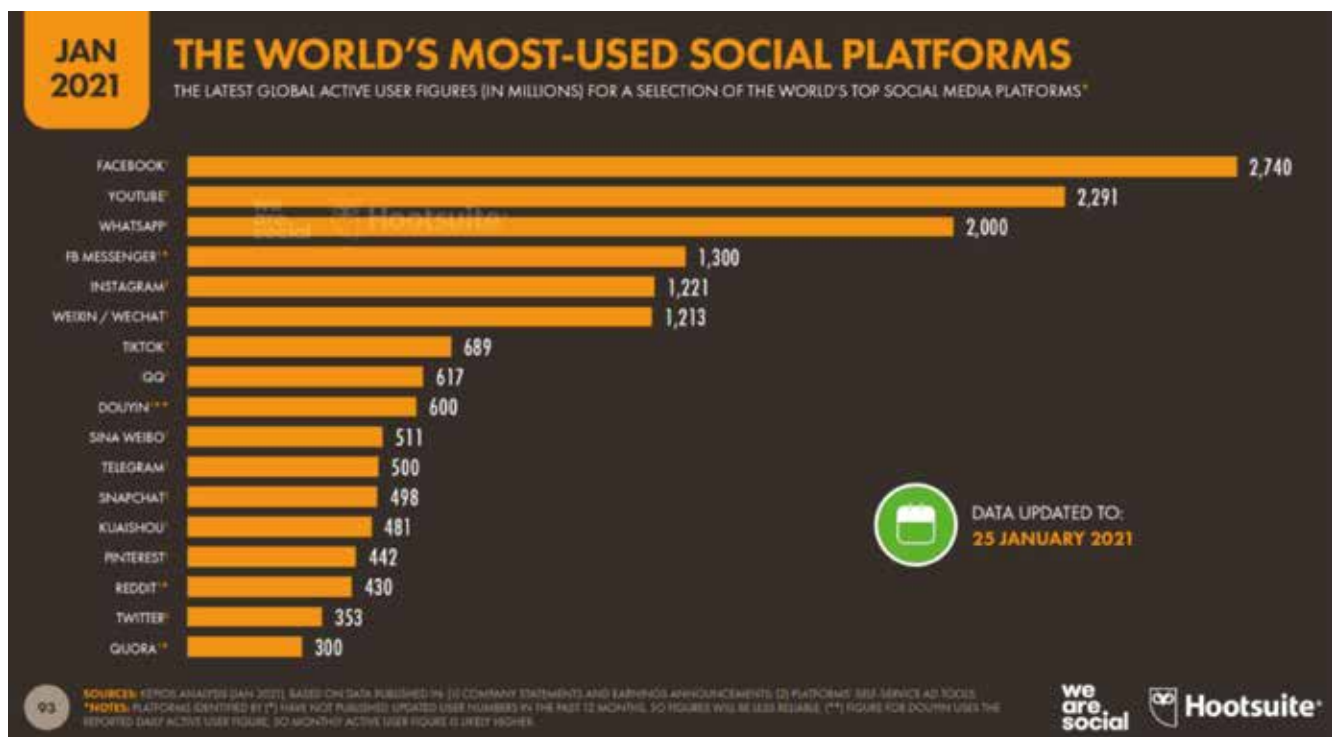
and community 'knows' or is believed to know. In this way, it can serve the purpose of diverse actors, from democratic governments to extremist groups. Not long ago, Daesh made public one of its media handbooks that instructed its members about the techniques used in order to reach a global public and, eventually, transform the physical – today defeated – Caliphate, into a chimera that not only survived, but bloomed to the present day. One of the lines on the cover of Daesh's media handbook is: "Media Operative, you are a mujaheed, too!" Those words have gained more and more importance today, when many of the terrorist acts that continue to haunt European countries, and elsewhere, are the result of the seeds planted by those media operatives in the form of a resilient 'Virtual Caliphate'. Moreover, their means



have not only reached individuals or groups that have resonated with their narrative, but have also been copied by their ideological enemies: both far-right and far-left groups. Furthermore, the common social media and propaganda tactics used by groups from all three ideologies have proved the double standards of our national and international legislation that has, on numerous occasions, turned a blind eye to the “enemy from within”, while focusing intensively on the fight against the “external” threat. The weaponisation of social media is immediately exemplified through the carefree examples of those extremist groups that have used the online environment for propaganda, radicalisation, control and com-

mand purposes. However, those groups are just some of the senior pioneers on this battlefield, using old techniques adapted to the new technological resources of the 21st century. While dichotomies of “right” and “wrong”, and messages of both resistance and hatred are the foundation for the weaponised narratives that spread through the social media’s global reach, traditional armies have been replaced with their online versions, using the virtual battlefield to achieve real-life goals. In fact, many of the main elements that define the concept of war and conflict have remained in place and simply adapted to the evolving contexts, technological evolution, needs and demands of the main targets.

The weaponised social media tools such as information operations, political manipulation, digital hate speech, radicalisation and recruitment have been used in their most professional form by terrorist groups, but governments and regimes around the world have tasted both the benefits and negative consequences of these tactics. For instance, the Russian government employed coordinated disinformation campaigns designed to disrupt decision-making, erode social cohesion and delegitimise adversaries in order to portray the White Helmets humanitarian organisation in Syria as a terrorist group, which contributed to violent attacks against the organisation. In the same way, political manipulation has been widely used in the



election process of many states, systematically manipulating political discourse, influencing news reporting, silencing dissent, undermining the integrity of democratic governance and electoral systems, and strengthening the hand of authoritarian regimes. One of the main debates in this regard is the Russian involvement in the US elections in 2016, which used three key elements: the development of core narratives; on-boarding of influencers and fake account operators; and dissemination and amplification on social media. While examples of digital hate speech are also widespread, one of the most tragic contexts is

among the population in Myanmar, where incendiary digital hate speech targeting the minority Muslim Rohingya people has been linked to riots and communal violence. Lastly, the radicalisation and recruitment tactics have been successfully exemplified by the Virtual Caliphate created by Daesh that continues to serve its purpose right up to the present day.

Moreover, just as the telegraph reshaped the public experience of war, social media has transformed the concept, understanding, dimensions, ethics and limits of war beyond time and distance, with virtual armies and qualified algorithms. The internet's

next iteration has already shaped not only a different global society, but also a different type of conflict that requests deeper understanding and adjusted strategies.

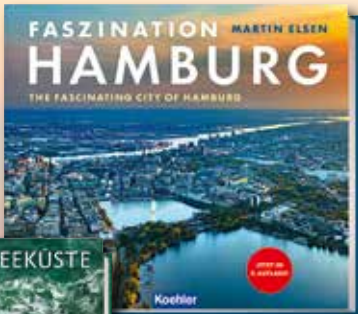
Are we ready for the new normal?

While we try to adapt to the ongoing challenges of the new normal, we should first grasp the whole meaning of social media's weaponisation, including our own individual place in this unusual battleground. Unlike past conflicts and wars, this time, more than ever before, the most valuable resource is the potential to design, construct and drive a message viral in order to attract attention and influence the mass. On the other side, in order to survive the new normal, a new set of abilities needs to be developed: critical thinking, in-depth inquiry and analysis and, above all, digital literacy.

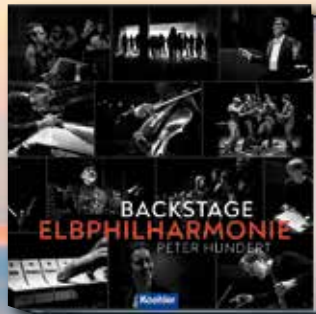
Digital literacy, also known as "media literacy" or "cyber citizenship", incorporate all the skills necessary to succeed in an increasingly digital world. It reaches way beyond the basic ability to find information online, requesting analysis and evaluation skills in order to understand any signs of manipulation. Or, as a RAND Corporation report on the value of such skills as an essential tool to battling misinformation or "truth decay" concluded, it is about "teaching participants how to think without dictating what to think."

While there is an increasing need for promotion and development of digital literacy from an early age, in order to have a certain level of protection from the side-effects of internet and social media, the vast majority of policy, media, and civil society have focused on remedies that do not involve this priority – the human element. Once we understand that we have the obligation to train and equip the next generation with the kind of skills in order to help them thrive in the new normal, we can say that we grasped at least some of the importance of these pressing matters. Only then, will we have understood, accepted and begun to adapt to the new realities of the digital world. ■

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US-Turkey Relations: CAATSA and Beyond

Eugene Kogan

US-Turkey relations have a history of challenges in general but with the ascent of Prime Minister Recep Tayyip Erdoğan in 2002, the challenges reached their peak with the failed coup of 15 July 2016 that Erdoğan blamed squarely on the US-based cleric, Fethullah Gulen.

By becoming the first elected executive President of Turkey, Erdoğan has also transformed Turkey from a secular, democratic and reliable Western allied regime guarding NATO's southeastern flank to an Islamic, nationalist and autocratic regime. Erdoğan's policy is undermining the foundation of US-Turkey relations. This article outlines three cases that highlight the undermining of this relationship.

S-400 vs. F-35

Undoubtedly, Turkey's acquisition of the Russian S-400 air-defence system has severely harmed relations between the US and Turkey. What is often overlooked is that the purchase of the S-400 affects not just the US but also other NATO members and US coalition partners such as Australia, Israel, Japan, Singapore and South Korea which have all purchased the F-35 Joint Strike Fighter (JSF). As a result, the US views Erdoğan's unbending position as a betrayal of the North Atlantic Alliance plus the other allies' values of unity, cohesion and interoperability.

As a result, the US removed Turkey from the F-35 JSF Programme in July 2019. The Undersecretary of Defense for Acquisition, Ellen Lord, said at the time that "At this point, the Turks have made a decision. We have said that the F-35 and S-400 are incompatible. We will work forward at this point to unwind the relationship."

Furthermore, Erdoğan's firm position on standing up to the United States and activating and testing the system on 16 October 2020 has further accelerated



Photo: via author

The US considers Turkish acquisition of the F-35 to be incompatible with parallel acquisition of the Russian S-400 air defence system.

a rupture between the two countries. What is more, Ismail Demir, the head of Turkey's Presidency of Defence Industries (SSB), the country's defence procurement organisation, revealed on 8 June 2020 that the country was in discussions for the procurement of a second batch of S-400s with further discussions on joint production and a technology transfer to Turkey as part of the negotiations.

In October, Erdoğan said that the tests "Have been and are being conducted. Whatever your [namely the US] sanctions are, don't hold back." Therefore, Erdoğan threw down the gauntlet to President Trump.

The same month it was reported that the next military partner to receive the F-35 could be the Greek Air Force. What is more, the six F-35s that could be heading to Greece are the same aircraft that were originally destined for Turkey. That would represent a US snub to Erdoğan's Turkey and send a clear signal that such irresponsible behaviour on the part of Turkey would not go unpunished.

Finally, on 14 December 2020, the Trump administration imposed sanctions through CAATSA (Countering America's Adversaries Through Sanctions Act) on NATO ally Turkey over its purchase of the S-400. It should be stressed that it is the first time that CAATSA has been used to penalise a US ally [author's italics]. Matthew Palmer, a senior official at the State Department's Bureau of European and Eurasian Affairs said "Imposing sanctions on a NATO ally is not something we take lightly."

Under the sanctions, Washington is targeting the SSB. Blocking sanctions and visa restrictions through the Department of Treasury's Specially Designated Nationals and Blocked Persons (SDN) list were also announced against the SSB's president, Ismail Demir, and three other senior officials. Through the SDN listing, property and property interests within the US are blocked and US persons are generally prohibited from dealing with them.

The US has also initiated a ban on granting export licences for all goods or technology transfers to SSB, prohibiting loans

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Photo: Russian Presidential Executive Office



Turkish President Erdoğan insists he was forced to purchase Putin's S-400 system after Washington refused to sell it the US Patriot system.

to the SSB greater than US\$10M from a US financial institution in a 12-month period, a requirement for the US to oppose loans benefitting the SSB by international financial institutions, and a ban on support from the US Export-Import Bank for exports to the SSB.

Former US Secretary of State, Mike Pompeo, said in a statement, "Today's action sends a clear signal that the United States will fully implement CAATSA Section 231 and will not tolerate significant transactions with Russia's defence and intelligence sectors."

Apparently, President Erdoğan underestimated the reaction from the US, hoping that because of the strong rapport between him and President Trump, the US administration would not impose sanctions. Nevertheless, Turkey seems to be unwavering under the sanctions and is maintaining its course on keeping, deploying and discussing the procurement of a second batch of S-400s with Russia. This suggests that the tension between the two sides will continue to increase.

The Return of the Prodigal Son

A number of options exist about how this might all eventually end up. The first one is the 'Return of the Prodigal Son'. In this scenario, President Erdoğan's administration transfers the S-400s from its territory to Azerbaijan, Pakistan, Qatar or Ukraine, and ends discussions with Russia for the procurement of a second batch of S-400s. It should be stressed that sanctions may also affect the aforementioned

countries if they were to agree to have the S-400s deployed on their territory. Therefore, this option looks very unrealistic.

The second option foresees giving a second chance to Erdoğan. The S-400s would be dismantled and put back in crates. This solution would require a joint Turkish-American control mechanism under US supervision. If the proposed control mechanism dissatisfied the Turks, the imposed sanctions would be reviewed with the coordination of other NATO allies six or 12 months after their imposition. After that, the Biden administration would need to decide upon the next step that may lead to a second review.

And finally, the imposition of further sanctions might be another option, albeit not a very promising one. If, however, after the second review, the position of Erdoğan's administration remains unchanged, further CAATSA sanctions would be imposed on Turkey. In other words, the US must exert pressure on Turkey.

Justice has to be Served

An additional flashpoint between Washington and Ankara is the ongoing sanctions evasion case in the Southern District of New York (SDNY) against Halkbank, a public lender, majority-owned by the Turkish Government. When Biden was Vice President, Erdoğan reached out to him in the hope that the Obama administration would stop the investigation into the role that Turkey had played in Iran's sanctions evasion schemes. The effort

failed when Biden reminded his Turkish counterpart that "If a US President took legal matters into his own hands, he would be impeached for violating the separation of powers." In other words, the US justice system is independent from any interference and no plea of this kind would help. Furthermore, Biden's answer clearly showed Erdoğan the difference between the US justice system to that of Turkey's.

One possibility would be if Biden allowed the US justice system to run its course with potential convictions and fines that would not only hurt Turkey's ailing economy, but also US-Turkish relations. It is understandable, but justice has to be served whether we refer to the Turkish or any other government. Such a decision also sends a clear message to other governments that no lenience or cover-up from the US justice system can be expected.

Rights and Freedoms

Finally, there are three foreign service national staff members to be considered, namely Turkish citizens working as US Consulate General employees who became targets of politically-motivated charges and a smear campaign. Since 2017, all three have been convicted on unsubstantiated terrorism charges, terminology that usually masks the real charges. Two of them remain imprisoned serving five-year and eight-year sentences, respectively. The third was released from house arrest in June 2019, but barred from leaving the country during his trial. Although Trump remained indifferent to their plight, Biden is likely to be more proactive in efforts to free them.

Without their release from prison, others who continue to work for the US Consulate General service will remain under the constant threat of being imprisoned, while those who are interested in working for the service may be reluctant to apply for positions as a result of these circumstances. Without the protection of the rights of Turkish citizens working as US consular employees, the image of the United States as a protector of rights and freedoms will be severely damaged.

In conclusion, the next two years will be of crucial importance in US-Turkey relations. The S-400 issue will hang over the relationship like a Sword of Damocles while two other flashpoints will demonstrate the Biden administration's willingness to resolve tricky issues without giving in to Erdoğan's demands. ■

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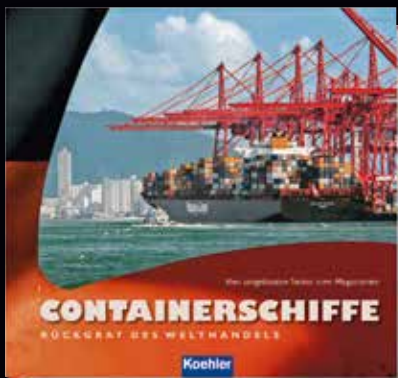
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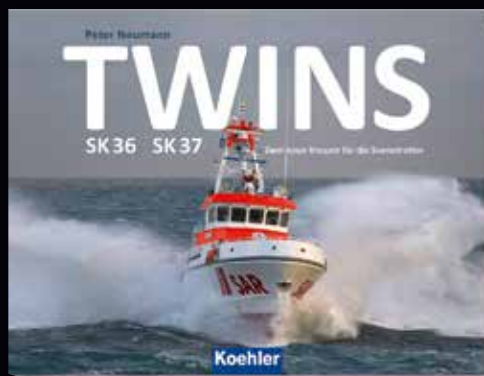
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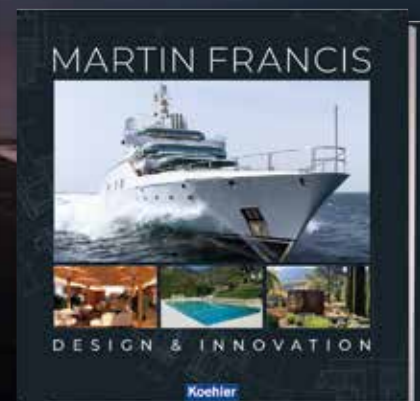
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