Day 2 • 27 February 2024

ENFORCE TAC

OFFICIAL SHOW DAILY

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(Photo: German Federal Police)

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People talk

On the right track with Enforcer

Hall 7
Booth 405

(All photos: MBDA Deutschland GmbH)

Guido Brendler, director sales & business development, MBDA Deutschland

Mr. Brendler, the lightweight weapon Enforcer (Leichtes Wirkmittel 1800+) for the German Army has been showcased at Enforce Tac for years. As we know, your company is now pushing ahead with an Enforcer family, i.e. light missiles for various applications. Can you tell us more about it?

Guido Brendler: We developed Enforcer in response to the operational experiences of the Bundeswehr and allied nations. Dismounted troops lacked a precise and lightweight effector against covert positions and lightly armoured moving targets at ranges up to 2,000 metres.

With Enforcer X, we will offer an anti-tank variant of the guided missile, which we would classify as "Light Anti-Tank/Light Anti-Tank". Unlike Enforcer, which has a multi-effect warhead with a multi-mode fuze, Enforcer X will have a tandem shaped charge warhead, enabling it to engage heavily armoured vehicles and those equipped with third-generation reactive protection.

We are also working on an "Enforcer Air Launched" version for arming drones and a C-UAS [counter-drone] version – the so-called "Small Anti-Drone Missile".

We base all Enforcer versions on the technology of the *Leichtes Wirkmittel 1800+* original. This offers the customer significant time and risk minimization, and we can provide the missiles quicker.

The Enforcer missile system is showcased at Enforce Tac 2024. It can be seen in full-scale seize at MBDA's booth.

PHOTONIS
EXOSENS GROUP

BOOTH 8-208

- **STATE-OF-THE-ART IMAGE INTENSIFIER TUBES**
- **PHOTONIS PIONEER IN 16MM**
- **THE BENCHMARK IN ALL MAJOR EUROPEAN ARMY PROGRAMS**

PHOTONIS IS THE WORLD LEADER IN THE DESIGN AND MANUFACTURING OF IMAGE INTENSIFIER TUBES

Within Exosens, Photonis is the world leader in the design and manufacturing of image intensifier tubes. Photonis provides a comprehensive range of innovative products through state-of-the-art technology which meets the need of soldiers in low light conditions.

4G+: cutting-edge technology for modern warfare

In modern warfare, individual operations under the cover of darkness underscore the tactical and operational importance of superior night vision capabilities. By offering cutting-edge image intensifier tubes, Photonis have greatly expanded the mobility of the soldier by improving the speed and accuracy of night-time maneuverability.

The 4G+ image intensifier tubes meet the stringent requirements of modern warfare at night to deliver end-users the highest possible performance in all field conditions. The 4G+ technology offers extended bandwidth for high image quality in all environment, an ultra-fast auto-gating and a small halo providing more details around light sources. Moreover, thanks to the very high FOM (Figure Of Merit) performance and the extended sensitivity of 4G+, operators benefit from the widest range in all types of environment (desert, snow, forests, urban landscapes...)

While it is important to maintain the best performance of an image intensifier in all light conditions, it is nearly equally important to make this opto-electronic system as easy and comfortable to use in battlefield conditions allowing effective soldiers to operate safely.

Thanks to its expertise, Photonis was the first manufacturer in the world to develop white phosphor image intensifier tubes and is also the only company to offer a 16mm format tube. A new standard which enabled the design of modern, lighter and smaller night vision binoculars.

4G: preferred technology for European Armed Forces

Available in a 16mm format, the 4G technology has become Photonis' high runner over the last 10 years and is today the benchmark in all major European Land Forces programs: Germany, Belgium, United Kingdom, Spain, The Netherlands, Poland notably.

The 4G is perfectly suited to the stringent requirements of night combat operations by providing operators with high image quality and long detection ranges in the most challenging light conditions: brightness of equipment, longevity of intensifier tubes, ability to see farther in increasingly low levels of darkness and very fast auto-gating.

With the broader availability of night vision devices, the challenge is to have the best performance image intensifier-based equipment that is always more efficient than the one of the opposing forces.

As an European pioneer of advanced technologies in the field of optics, Photonis is committed to making major breakthroughs in night vision, with cutting-edge solutions. That's why, Photonis has not yet said its last word...

The missile system has been fired for the first time with an alternative fire-control-system, the FCS14-RE, which is manufactured by the Swedish company Aimpoint last year. What is the difference between the Enforcer Leichtes Wirkmittel 1800+ with the HENSOLDT sighting system and the Enforcer with the sighting system provided by Aimpoint?
Guido Brendler: The missile, with its operational modes and capabilities, remains as it is. The functionality of Enforcer will be the same, no matter what sight an operator uses. Enforcer has been designed with an open system architecture and offers compatibility with both sighting systems and can be easily adapted to other potential systems. We can provide Enforcer with both sights. The customers has the choice to decide which sight they prefer.

Small drones have become a serious challenge on the potential battlefield. Especially when drones are attacking in overwhelming quantities during a swarming mission. Is your "Small Anti-Drone Missile" good enough to master the challenges of UAS swarming?
Guido Brendler: Effective protection against drones can only be ensured in combination with different factors: lethal effect within an adequate distance; multi-target engagement with high agility; and high accuracy against small and medium-sized drones. These are just some of the capabilities we designed the "Small Anti-Drone Missile" with. So, yes!

The "Small Anti-Drone Missile" is more than good enough to master these challenges. In addition to its operational capabilities, the "Design-to-Cost" approach was also consistently implemented, which enables a favourable cost ratio between the spectrum of the threats and the missile. Combined with other effector systems, such as Rheinmetall's Skyranger 30, this results in complementary range combinations that are extremely useful in operational terms.

We were informed that MBDA's subsidiary TDW GmbH received a new order to manufacture and deliver 2,600 anti-tank directional mines called PARM (Panzerabwehrrichtmine in German Bundeswehr parlance) to the German Bundeswehr. Would it be fair to describe the DM22 PARM as a Cold War-era weapon system? I am wondering how to put the resumption of production of the system into context. Is your company planning an upgrade?
Guido Brendler: NATO and EU states have recognised that they must protect their borders from aggressors. Although intended as an anti-tank weapon system originally for the Cold War, PARM has proven to be a reliable and effective weapon against state-of-the-art main battle tanks [MBTs] on modern battlefields. That's why there is currently an increasing demand.

In parallel with the work leading to serial production, TDW will develop a new version of PARM. The successor to the PARM DM22 will be "PARM NextGen". The current optical cable will be replaced by a variety of sensors, which may include acoustic, vibration and infrared. These may allow identifying the type of target considerably increasing the system capacity. A networking capacity might also be added, allowing the creation of a "smart minefield" where information is shared among the mines as well as providing a global picture to an operator. DM22s can be upgraded with all or part of those capabilities, thanks to the modular conception of the PARM.

MBDA showcases its new laser for the army at Enforce Tac. What can you tell us about this new system? What progress has been made?
Guido Brendler: There is great interest in small, portable laser effectors, especially from the army and police. We have developed a laboratory prototype of a small portable laser – called MILOS-D – for army and police applications and presented it to the customer. Compared to last year, the power was increased significantly from 100 W to 3 kilowatts. Trials against static targets were successfully carried out over distances of 100 and 400 metres. The prototype has proven that it can, for example, disrupt or even neutralize sensors within seconds.

What needs to be done until the army laser is ready for delivery?
Guido Brendler: We aim to increase the laser power to several kW, reduce weight by using composite materials, miniaturize it further, and focus on safety and handling so that we can deliver a prototype to German Armed Forces for their own tests. We also aim to implement applications for use against drones and other moving targets for future variants. I am convinced that we are on the right track to achieving all these goals. ■

The interview was conducted by **Dr. Theodor Benien.**

MBDA's subsidiary TDW GmbH received an order in November 2023 to manufacture and deliver 2,600 anti-tank directional mines called PARM to the German Bundeswehr.

Comment
Grim prospects

The year 2023 ended as it began – and 2024 looks not different. There are at least three disputes or conflicts in the neighborhood of Europe: the Balkans, the Israel-Hamas War and, not to be ignored, the Russo-Ukrainian War, the last of which continuing with great losses among the civilian population in particular. What can be seen from day-by-day media releases (since 7 October) is that the ongoing brutal war in Ukraine was step-by-step replaced from the agenda by the tragic events in Israel and in the Gaza Strip. With the Israel-Hamas War raging for nearly five months, Ukrainian President Volodymyr Zelenskyy reminded the west of the ongoing war in Ukraine. He furthermore expected strong support in his country's defensive battle against an aggressor that continues to be ruthless. From now on, the West found itself in a quandary – supporting Kiev as in the 24 months before and standing on the side of Israel to help with the hostage crisis. Between 200 and 250 people, mostly civilians, were taken hostage by Hamas during the very early hours of the attack.

The unprecedented attack of the Palestinian armed group Hamas on Israeli territory on 7 October – during the Jewish holiday of Simchat Torah on Shabbat – appeared to have been a complete surprise to Israel's leadership and the population. The firing of more than 5,000 rockets from positions in the Gaza Strip, and the actions of insurgents inside Israeli territory, including an attempted amphibious landing by Hamas militants, led to a rapid military response. And the situation was confusing from the very beginning of the conflict.

To be sure, the Gaza Strip is home of 1.34 million Palestine refugees registered with UNRWA, the United Nations Relief and Works Agency for Palestine Refugees in the Near East. This narrow strip of terrain was again the 'gravity centre' in a conflict that has kept the region in suspense for decades. At the time of writing, another Israeli ground offensive has been in its early phase to roll into the Gaza Strip in the direction of Rafah, aimed at destroying Hamas, but protecting the local population from harm. But this seemed to be a risky enterprise since Tehran warned Tel Aviv of regional escalation if the Israeli military enters Gaza for the expected ground invasion. And then there is Iran-backed Hezbollah in the north.

Dr. Stefan Nitschke

Pendar X10 – Maximum safety while handling unknown substances

Hall 9
Booth 305

Pendar X10 raman spectrometer can identify unknown substances within seconds from a two meter distance. This very cool instrument is also shown in the scenarios of the Enforce TAC village. (Photos: Analyticon instruments)

Fire department, police, customs and military personnel are very careful when handling unknown substances. Caution also means keeping the maximum possible distance during identification. Until now, this was not possible as Raman or FTIR spectrometers, which are typically used for detection, require direct contact with the sample.

Analyticon instruments's Pendar X10 is a groundbreaking Raman spectrometer with a completely new measuring technique (SERDS). This innovative handheld device can identify unknown substances in a few seconds from a distance of up to two meters. As its laser intensity is low, even dark substances (e.g. black powder) can be measured without igniting.

The device has already received great international recognition and several awards. It achieves reliable and reproducible results regardless of the external lighting conditions. This gives emergency services additional options. For example, they can examine suspicious substances through closed windows or identify inaccessible substances, e.g. in barrels, more easily. The Pendar X10 is ideal for identifying solid and liquid hazardous substances, narcotics and explosives. A simple connection to remote-controlled manipulators is also possible.

Spectrometers and analyzers from analyticon deliver precise analysis results on site in seconds - exactly where they are needed. In addition to the Pendar X10, the company's X-ray Fluorescence, FTIR, NIR, mass, and Ion mobility spectrometers are innovative devices that enable anyone to carry out reliable chemical analyses autonomously. Employees in recycling companies, quality inspectors, metal processors, scrap gold buyers, archaeologists, disarmers, police officers, firefighters, soldiers, and customs officials – among others – benefit from the analyses of analyticon's mobile hand-held devices, which are carried out in seconds. Spectrometers can also be installed within permanent sensors monitoring networks to oversee complex production processes in chemical and pharmaceutical companies. *(mb)*

Martelet Tactical UAS – born to be silent

For its first participation in Enforce Tac, Dutch company **Height Technologies** presents its **Martlet family** of Class 1 Tactical UAS.

As the demand for this kind of system skyrockets in Europe – and globally- Height Technologies offers three different UAS built specifically built for military and law enforcement applications.

"We developed our products around four key axes: endurance, autonomy, connectivity and low observability" Ernst Thijsen, CEO, explains. *"We use aerospace-grade materials and field-proven sensors to deliver the best possible performance to end users. Our UAS are extremely silent, their shape is difficult to detect, their sensors are persistent. They are ideal ISR assets for covert day and night operations."*

In effect, the company was founded in 2015 and it is already well known in the Netherlands, with its systems in service with Dutch special forces since 2017. Since then, military and law enforcement bodies in Germany and other central European countries choose the Martlet family, and orders are coming from numerous customers.

The Martlet family includes three models, MI-1, MI-2 and MI/MP-3 and the company is working on new versions and products to meet new requirements such as vehicle launch. This will require dedicated, different products, rather derived from the SAMS family (Osprey, Albatross, Raptor) of drone-in-a-box solutions.

Hall 8
Booth 413

The control station can be portable or integrated into vehicles or Command and Control (C2) centres.

The MI-1 is a foldable version from Height Technologies' Martlet series, fulfilling client's needs for a more portable ISR drone [micro-UAV] with maximal endurance and EO/IR performance.
(All pictures by the Show Daily Editorial Team)

The Mi-1 is now the smallest drone of the Martlet Family, designed for one-man operations. This easy-to-use system is both lightweight and rugged to be used in the most demanding environments. The system provides the operator with advanced and tactical in-flight features to enhance the ability to act on aerial intelligence. Its endurance is 40 minutes (including payload) within a 5km range from the operators. Thanks to its low noise signature, the system is unable to be detected or heard from a 120m distance, while its EO/IR camera can detect a human from more than 5.000-m distance and a vehicle from >20-kilometer distance.

The MI-2 expand such capabilities thanks to an 85-minutes endurance and 10km range from the operator, but it is bigger and may require a second operator, depending on the mission. Lastly, the MI-3 is and packed with useful AI (Artificial Intelligence) features to increase combat effectiveness and force protection. Even though the MI-3 is designed for more complex missions (and a range of 15-20km), the system only needs one person for rapid deployment within minutes, ready to perform manual or fully autonomous missions.

The Martlet family of Tactical UAS is capable of GPS-denied (autonomous) flights and packed with useful features on the Ground User Interface like POI coordinates, live measurements, and more to increase its effectiveness and level of intelligence. The P2P, MIMO, or LTE encrypted datalink ensures instant access to real-time information for individuals and command posts, even when flying beyond visual line of sight (BVLOS). The control station is a portable unit equipped with a tactical interface and Mil-Std. components, built for one-person operations in all weather conditions. Its user-friendly interface – common to the whole Martlet family – incorporates a real-time display and a moving tactical map for a complete mission overview, mission planning, different operational modes, payload control, and UAV monitoring.

(mb)

◁ ***Suggestive view of the MI-3. For commercial applications, the MI-3 platform has been used to create advanced LiDAR and photogrammetry solutions.***

Connection solutions for military and security technology

Military operations are subjected to a variety of challenges. They are characterized by extreme and demanding environmental conditions. Rough terrain, different ground conditions, but also extreme weather conditions such as heat, cold, precipitation and dust should not jeopardize the operational readiness of soldiers, special forces, equipment and mission-sensitive applications. The durability and robustness of the material in use are crucial to the success of military operations. Recognizing and recording environmental conditions can reduce risks for the task force, equipment and infrastructure. In addition, the networking of military units must be ensured and maintained. Operational forces need to act efficiently in resolving all kinds of tasks and thereby require information about their surroundings. At the same time, they must use this information to plan and adapt their actions accordingly. For example, situational information about friendly and enemy forces can prove decisive.

Functionality under extreme operating and environmental conditions: robust – resistant – optimized for demanding applications. These are the features of connection solutions from **ODU** for military and security technology. The ODU AMC® series offers high-speed data transmission with up to 70% less weight compared to conventional solutions. Different transmission variants can be individually configured and deployed even in the smallest of installation spaces. The ODU-MAC® Line is a high-quality, modular connector system. It is robust, vibration-resistant and meets the requirements of the military environment. High load capacity and transmission reliability are guaranteed even under the most technically demanding conditions thanks to a combination of flexible connections, compact dimensions and high speeds. ODU connectors are characterized by performance, reliability and versatility. Thanks to their robust design and the use of resistant materials, they can withstand even the most extreme environmental conditions. The complete solutions ensure intuitive handling in hazardous situations – even when impaired by protective equipment, for example. *(stn)*

The ODU AMC® series offers high-speed data transmission with up to 70% less weight compared to conventional solutions. (Photo: ODU)

Recap Enforce Tac

26 February 2024

Photos: mb / vs / stn

An overview of Rheinmetall's presence at Enforce Tac 2024

The innovative VPAM-7 ballistic vest combining high visibility – thanks also to conformal flashing lights – and protection. (Pictures: Show Daily Editorial Team)

With its 10Kg in the full configuration, the new modular ballistic vest guarantees superior protection against military grade ammunitions, yet at a reasonable weight.

A powerful partner of the armed forces and law enforcement in Germany and around the globe, **Rheinmetall AG** will once again be on hand at this special show.

For users, procurement officials and specialist visitors alike, the Düsseldorf-based technology group has several innovative new products in store as well as additional elements from its tactical portfolio, including items from its Vehicle Systems, Weapon and Ammunition, and Electronic Solutions divisions.

Among other items, its Public Security product portfolio includes components for ballistic protection equipment, special tactical options for law enforcement operations, optics and optronics for round-the-clock observation and surveillance, systems for detecting and countering drones as well as protected emergency response vehicles.

Ballistic body armour

Rheinmetall establishes itself as supplier of ballistic body armour solutions by showcasing for the first time its new **VPAM7-class ballistic vest**, a protective high-visibility vest developed for traffic stops, and a modular ballistic vest for SWAT-Teams.

According to Karin Dixius, Head of Product/Project Management for Light and Body Armour, "*Rheinmetall's amour plates are well known and highly reputed in the law enforcement and military sector. Now we can offer complete body armour solutions to customers through a full supply and value chain that makes it possible to have one single interlocutor for the entire equipment.*"

Modularity is also key, as demonstrated by the ballistic vest for SWAT teams. Karin Dixius commented: "*The vest you see here at Enforce Tac is already in service with the Saxony State Police. Landers in Germany have different requirements, and foreign customers will require further modifications. Possessing all capabilities in-house and choosing a modular design put Rheinmetall in a very good position to respond to demanding requiments.*"

Laser/laser light modules

The LLM-PTAL Light module for pistols and the MTAL Venom laser module for assault rifles are both celebrating their premiere at this year's Enforce Tac.

Already, Rheinmetall is well reputed for its armour plates. ▷ On the left, thanks to a collaboration with CeramTec, a 3D-printed ceramic plate is being developed to specifically suit female bodies.

Personal position marker and warning device

The Functional Protection System Beacon (FPS-Beacon) enables visible, non-visible and thermal position marking and warns in dangerous situations and when detected by lasers.

Soldier System Gladius Light

This is a variant of the Gladius 2.0 soldier system configured for special operations forces.

Caracal

Developed in cooperation with Mercedes-Benz and ACS Armoured Car Systems, Rheinmetall now offers a fast, versatile, powerful and compact 4x4 family of vehicles for airmobile and special forces units.

Survivor R

Highly mobile, superbly protected and versatile, the Survivor R is a special emergency response vehicle for security forces. Based on a 4x4 MAN chassis, it was developed in cooperation with Achleitner, a maker of special vehicles. Germany's Federal Police and the public order units of several German states have already chosen this state-of-the-art special purpose vehicle.

Tactical pyrotechnics

Rheinmetall offers a wide variety of tactical pyrotechnical products, including the 9-Bang stun grenade and the square-shaped Spectac, both of which feature bottom top venting for maximum handling safety.

Paramir

Light and compact, this versatile signalling rocket includes different coloured flares, infrared, smoke and NBC signal variants. It attains an altitude of around 100m, with an illumination time of approximately 15 seconds. *(mb)*

△ *The Squad Support Weapon SSW40 is the world's first automatic, magazine-fed, shoulder-fired 40mm grenade launcher. In terms of weight, dimensions, and handling, the SSW40 closely approximates an assault rifle.*

The tried-and-tested rapid obscuring system ROSY protects land, air and sea vehicles even when on the move with a spontaneous smoke screen. At Enforce Tac 2024, the ROSY_L variant can be seen on the Fieldranger weapon station of the Survivor R protected special vehicle and on the Caracal airborne vehicle.

Tailored for old and new roles

◁ *The C² ATS is Dynamit Nobel Defence's latest development in the field of counter-mobility/anti-tank weapons. (Photo: Stefan Nitschke)*

As the armoured vehicle sector continues to evolve with improvements in the three main basic tank design areas firepower, protection and mobility, there are several international programmes that call for upgrades of existing stockpiles of anti-armour weapons. The Russo-Ukrainian War delivers plenty of arguments for a "renaissance of old thinking". Despite the rapid changes in land battle warfare and the increasing use of unmanned aircraft (drones), there is nothing more critical to operations against armoured vehicles than modern and effective anti-tank weapons. Anti-armour weapons are ranging from shoulder-launched weapons that can be transported by a single soldier, and larger tripod-mounted weapons (requiring a squad or team to transport and fire) to vehicle- and aircraft-launched missile systems. Another type of anti-tank weapon also being eyed by land forces is the anti-tank directional mine as found in the Bundeswehr's future PARM *(Panzerabwehrrichtmine)* ordered from **MBDA Deutschland** *(see Show Daily #1)*. An anti-tank weapon currently on offer in the category of counter-mobility weapons (or "*Panzerabwehrsperrmittel*" in Bundeswehr parlance) is called "C2 ATS" (Command and Control Anti-Tank System). The weapon on order by **Dynamit Nobel Defence (DND)** and on display in Nuremberg can be deployed as a remotely-operated counter-mobility weapon against the spectrum of armoured vehicles. The new weapon is designed to employ a shaped-charge warhead rather than an explosively formed projectile or EFP. However, anti-tank weapons fitted with shaped-charge warheads are unable to defeat reactive armour, as outlined during the war in Ukraine.

The use of shoulder-launched infantry weapon systems is an option, too. The RGW family of disposable anti-tank weapons on offer by DND can be grouped as dual-purpose (anti-armour/bunker buster) systems, which can be employed from enclosed spaces. The latter is an essential capability for combat from protected firing positions and in urban warfare. A weapon on display at Enforce Tac is the RGW 90. It is able to defeat a wide spectrum of hardened targets, including bunker structures. The RGW90 disposable anti-tank weapon system comes with a dual-capacity warhead that will be able to cope with MOUT (Military Operations in Urban Terrain) scenarios known from 1990- and 2000-era conflicts.

DND is also the manufacturer of the combat-proven Panzerfaust 3 (Pzf 3), a third-generation, man-portable, shoulder-launched anti-tank weapon that also saw action in Ukraine. The latest version, Pzf 3-IT, has an integrated dual-mode tandem warhead that can defeat heavily armoured targets equipped with reactive armour. The retractable nose rod is extended before the launch, so that the front warhead can penetrate reactive armour before the larger main warhead can deal with the target's main armour. It should be noted that the Pzf 3 will be replaced in the foreseeable future, however. Basically, the user is satisfied with the performance of the weapon, but the ergonomics (length, weight, balance, operability) must be adapted to today's requirements and the ability to grow up (e.g., warhead against variably armoured vehicles) must be ensured. DND claims to address all of this with the RGW110, also known as the "Next Generation Panzerfaust". This upcoming weapon family will extend the product range of RGW systems to the 110mm calibre. *(stn)*

Reviewer
Analog meets digital

Hall 7A
Booth 334

◁ *The CT-MultiPTT 3C is a central operation and control unit that can simultaneously coordinate three independent communications circuits. (Photo: CeoTronics AG)*

Performance Characteristics – CT-MultiPTT 3C

- equipped with CT-ComLink® technology
- compatible with the CT-WirelessPTT MIL
- protection class IP66 and IP67
- fullfills the military standard MIL-STD-81G

Complex mission situations require innovative and flexible communications systems. In doing so, **CeoTronics** is presenting the latest development stage of its flagship CT-MultiPTT 3C at Enforce Tac. The central operating and control unit can now be connected to both analog and digital sources (radios, tactical hubs, smartphones, intercoms). CeoTronics is the first manufacturer to bridge the gap between the two worlds, offering a unique level of flexibility compared to the competition. The latest innovation from CeoTronics is made possible by the technical advance in internal signal processing in combination with the associated CT-ComLink® cables. Three independent communications circuits are possible: full duplex, simultaneous radio traffic is possible on all channels. Alternatively, a connections via Bluetooth is possible, e.g., to a cell phone.

For more than 35 years, CeoTronics has developed and produced innovative communications systems for demanding environmental and operating conditions. The company is the leading manufacturer of multifunctional operating and control units (CT-MultiPTT), mobile digital radio networks and terminals (CT-DECT), as well as high-quality communications headsets and systems for professional use. *(stn)*

Topics for Day 2:

The Role of Innovation Norway in the Norwegian Defence Industry:
Explore the pivotal role played by Innovation Norway in shaping the landscape of the Norwegian defense industry. Understand how innovation contributes to the nation's defense capabilities.

Challenges in Procurement Processes in the Norwegian Armed Forces:
Gain insights into the challenges faced by the Norwegian Armed Forces in their procurement processes. Identify areas for improvement and potential collaboration with international partners.

The Army Concepts & Capabilities Development Center and its Contribution to German Defence Procurement:
Learn about the significant contributions of the Army Concepts & Capabilities Development Center to German defense procurement. Understand how this center shapes the capabilities of the German Armed Forces.

Podium Discussion/Presentation/Announcement:
Conclude the symposium with a dynamic podium discussion, presentation, or a noteworthy announcement, providing a fitting end to two days of comprehensive exploration and collaboration.

Seen & heard
Thermal imaging

THEON Sensors Hall 7 Booth 670

HENSOLDT Hall 7A Booth 533

VECTED Hall 7A Booth 123

Thermal imaging devices are used for observation and reconnaissance in darkness or poor visibility. (Photo: Elbit Systems)

The future is already here

The plethora of advanced handheld thermal imaging (TI) sensors have been shown in more recent military operations to deliver persistent, accurate and timely pictures of the dynamic battlefield. The industry made significant progress in developing digital devices that allow the user to not only receive a fused picture, but also to transmit this picture to other units on the battlefield and to other levels of command. Systems of this kind enable forces to quantify the opposition's strength by locating and monitoring troop movements while minimising the risk of detection.

Like residual light intensifiers, TI devices are night vision devices. Their use on the battlefield, even during daylight operations, are diverse. The continuous enhancement of TI systems is critical in providing advanced equipment for dismounted infantry, airmobile and air-assault soldiers, special operations forces (SOF), as well as drivers of military vehicles. Recent conflicts underline the necessity of the capability of conducting missions both during daylight and night operations. And TI technology is maturing rapidly – also thanks to the use of artificial intelligence (AI).

For manufacturers such as **VECTED GmbH** or **THEON Sensors,** worldwide exhibitions proved to be a critical investment. Their presence in Nuremberg is no exception. As SOF and dismounted close combat (DCC) troops become more and more embroiled in congested, contested and confined battlespaces around the world, the ability to clearly identify and designate enemy forces has become increasingly important to assault teams seeking to maintain tactical overmatch over opponents. Whether they be weapon-mounted, helmet-borne or handheld, target acquisition and designation equipment must be reliable, energy efficient and accurate, providing personnel with a range of capabilities from infrared (IR) and visible laser pointers and illuminators to red dot and optical weapon sights; even to white light conditions, which can be applicable in certain circumstances. Missions conducted across the increasingly complex contemporary operating environment, however, continue to witness further growth in capability from near-peer adversaries and even less well-equipped violent extremist organisations (VEOs).

Night vision binoculars

The OCCAR-EA European Organisation for Joint Armament Cooperation *(Conjointe de Coopération en matière d'Armement)* recently signed

Performance Characteristics – MIKRON Binocular NVG with 16mm Image Intensifier Tubes

- the lightest night vision binolular
- same performace as 18mm devices with reduced weight
- rugged and user-friendly design based on real user feedback
- binocular steroscopic vision for greater depth perception
- optional manual gain control
- integrated infrared illuminator
- independent flip away & flup up function – reduced silhouette
- enhanced sturdiness and ease of use dovetail design
- smart electronics
- mounts available for a wide range of helmets

In daylight applications, thermal imaging devices demonstrate their inherent advantages as observation devices. (Photo: VECTED GmbH)

Thermal imaging devices of the 640 Series can be used in varying mission scenarios – from a hand-held observation device to an attachment on a rifle. (Photo: VECTED GmbH)

a second amendment to the existing night vision goggles (NVGs) and in-service support contract on behalf of the Belgium and Germany with the industrial consortium of **HENSOLDT Optronics GmbH** and **THEON Sensors SA.** In light of the signing of the base contract, HENSOLDT Optronics and THEON Sensors had established a joint venture – named **HENSOLDT THEON NightVision GmbH** – in June 2022. The second amendment includes 3,500 night vision goggles (NVGs) for Belgium and 16,041 devices and 8,423 head-mounted devices for Germany, with the latter two awaiting approval from the German parliament. The consortium expects to receive the systems at the end of the first quarter of 2024. In addition, the contract includes an option for up to 25,000 additional NGVs for Belgium and Germany. Both countries have the opportunity to buy additional quantities without further negotiations.

A first contract amendment was signed by OCCAR in July 2022, executing an option of the supply of additional 20,000 MIKRON NVGs for the German Armed Forces, while the delivery schedule was accelerated in light of the changed geopolitical situation. The total quantity of 29,550 NGVs resulting from the base contract and the first amendment is planned to be concluded in the third quarter of 2024. The MIKRON NVG can be hand-held or helmet-mounted, while each monocular can also be used separately. Furthermore, each can be flipped up or sideways. A derivative of THEON Sensors' NYX Family, MIKRON is powered by a single-type AA battery, but it can also be used in combination with an external power pack for even longer missions. The full MIL-SPEC, image-intensified, dual-tube binolular can be operated helmet-mounted, head-mounted or hand-held. It offers better depth perception than single tube systems, making it easier to judge distances and relative motion – so, the ability to perform tasks such as driving is greatly improved.

Cooled *vs.* uncooled

Both, cooled and uncooled devices are being used, depending on the requirements. Cooled sensors are more sensitive and therefore allow the use of more compact and therefore lighter and cheaper lenses at high magnifications (focal length approximately >120mm). Uncooled sensors, on the other hand, require significantly larger and more expensive lenses for the same high magnifications. This is why uncooled devices have an advantage in terms of weight and cost for small magnifications, but the opposite is true for large magnifications. Uncooled TI devices (e.g. **VECTED's** 640 Series) are ready for use within a few seconds, while cooled devices require several minutes to bring the sensor to the necessary operating temperature of less than -170° Celsius. In order to achieve these low temperatures, complex and energy-intensive cooling technology is necessary. The latter in turn requires appropriate batteries, which, together with the cooling technology, makes the devices significantly heavier and larger. The uncooled 640 Series of TI devices is characterized by its high display resolution thanks to sensors with 640 x 480 pixels and high thermal sensitivity for large operational ranges. In addition to the sensor resolution, the pixel size is also relevant. The pixels are becoming smaller and more sensitive: 12µm is standard for the 640 Series. The technical advantage is clear: with the same device size, the operational range can be increased, but at the expense of the image field, which is somewhat smaller.

TC-640-60 Performance Characteristics

Detection range:	2,700m	Magnification:	1x, 2x, 4x, 8x
Detection:	980m	Detector resolution:	640 x 480
Identification:	510m	Pixel Pitch:	12µ

The bottom line – AI in thermal imaging

VECTED has been working on the use of AI in the latest generation of TI devices for some time. According to the manufacturer, an important aspect should not be forgotten when using AI: AI is exclusively designed to support the user when it comes do decisoon-making. In the final analysis, it is always the individual soldier or policeman who makes a decision about further actions. *(stn)*

Left: Belgium and Germany rely on THEON Sensors' MIKRON binocular night vision goggles with two 16mm image intensifier tubes and an integrated infrared illuminator. Right: Widely in operational use: MIKRON binocular with 18mm image intensifier tubes. (Photos: Stefan Nitschke)

Hall 7
Booth 810

The AccuRad™ personal radiation detector from Mirion Technologies is designed for law enforcement, fire rescue and other emergency responders to detect and interdict nuclear and radioactive materials. Also pictured is the AccuRad dosimeter under examination by the author, measuring the radioactivity of a sample of the mineral betafite, with the chemical formula: $(Ca,U)_2(Ti,Nb,Ta)_2(O,OH)_7$ (Photos: Stefan Nitschke)

Briefing

Real cause for concern: detecting and assessing radioactive/ nuclear threats

Radioactivity refers to the property of certain atomic nuclei to transform into other nuclei without external influence, and to emit high-energy radiation in the process, according to the Federal Office for the Safety of Nuclear Waste Management *(Bundesamt für die Sicherheit der nuklearen Entsorgung).* The authority added: "Various types of so-called ionizing radiation can be released during [the process of] nuclear decay: **alpha** and **beta** radiation are particles that can be easily shielded [posing a health threat when the emitters are inhaled or ngested]; and **gamma** radiation that is high-energy electromagnetic radiation. The latter is more difficult to shield than both alpha and beta radiation. And the (potential) threat scenario goes even further; it encompasses: nuclear weapon detonation; radiological dispersal devices; radiological exposure devices; deliberate spread of contamination; disruption of nuclear power plant (NPP) or industrial facility; and depleted uranium (DU) rounds handling and recovery, said **Mirion Technologies (Canberra) GmbH.** So, these radioactive materials can be very hazardous if released to the biosphere. Risks emanating from other parts of the nuclear fuel cycle (e.g. uranium ore mining and processing or the removal of nuclear material in decommissioned nuclear power plants), which have much less potential for widespread harm to people or the environment, however, were only discussed in the open literature in one paragraph or two.

Worse, with terrorists possessing information on nuclear facilities and their security measures, the risk of potential terror plots is increasing exponentially. This was shown when Belgian security services reported (in 2014) that Islamic State (IS) operatives may have been looking to target one of the country's two nuclear power plants. It is known that nuclear facilities in Belgium house highly-enriched uranium – the most easily weaponised nuclear material – as well as radiological materials that could be used in a radiological dispersal device or 'dirty bomb'. To be clear, nuclear industry and authorities can counter this trend by controlling the movement of employees, nuclear materials, and know-how. That's because the appropriate methodologies are needed to detect and identify the type of radiation hazard.

When it comes to the identification of radiological and nuclear threats, the use of modern handheld electronic dosimeters is key. This sort of equipment is utilized to assess the nature of radioactive materials with nuclide identification and evaluate surface contaminations. A product shown at Enforce Tac this year – AccuRad™ PRD (personal radiation detector) – from Mirion Technologies is used to provide the dose information directly in the field, including high-level – and neutron dose rates, as well as low-level radiations. The company, headquartered in Rüsselsheim, Germany, is a recognized expert in radiation safety, measurement and sciences. The AccuRad PRD can be worn by military and non-military (security) personnel – under the clothes or in small pockets – or employed as a networked area monitor in localized and situational awareness. The device is qualified in accordance with current military and civil standards.

(stn)

Performance Characteristics – AccuRad™ Personal Radiation Detector

- detection and search – gamma high sensitivity
- solid and durable, with an impact-resistant covering
- IP67
- temperature range: -20°C to +60°C
- dual scree – low burden
- 900 hours of operation from 2 x AA batteries
- built-in radar to assist in search mode
- dose rate range: from background to 10Sv/h
- energy range: 25Kev to 3Mev
- dimensions: 108 x 61 x 36mm
- weight: 200 grams

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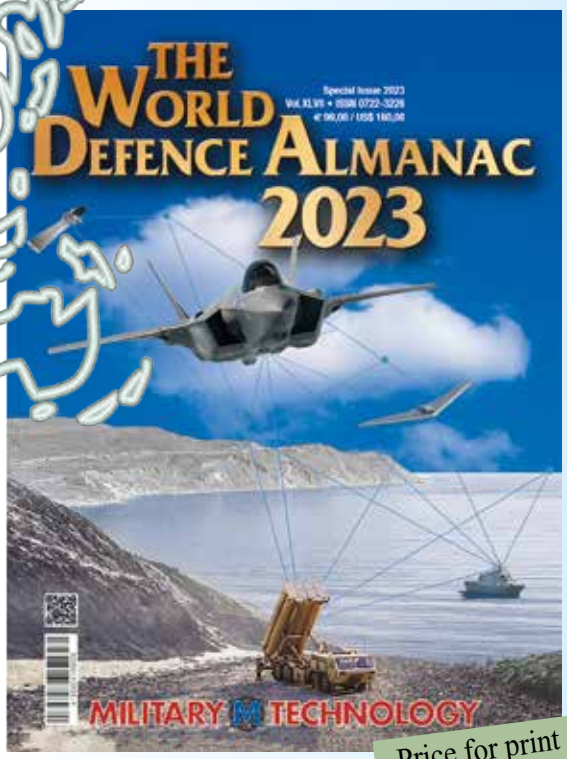

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