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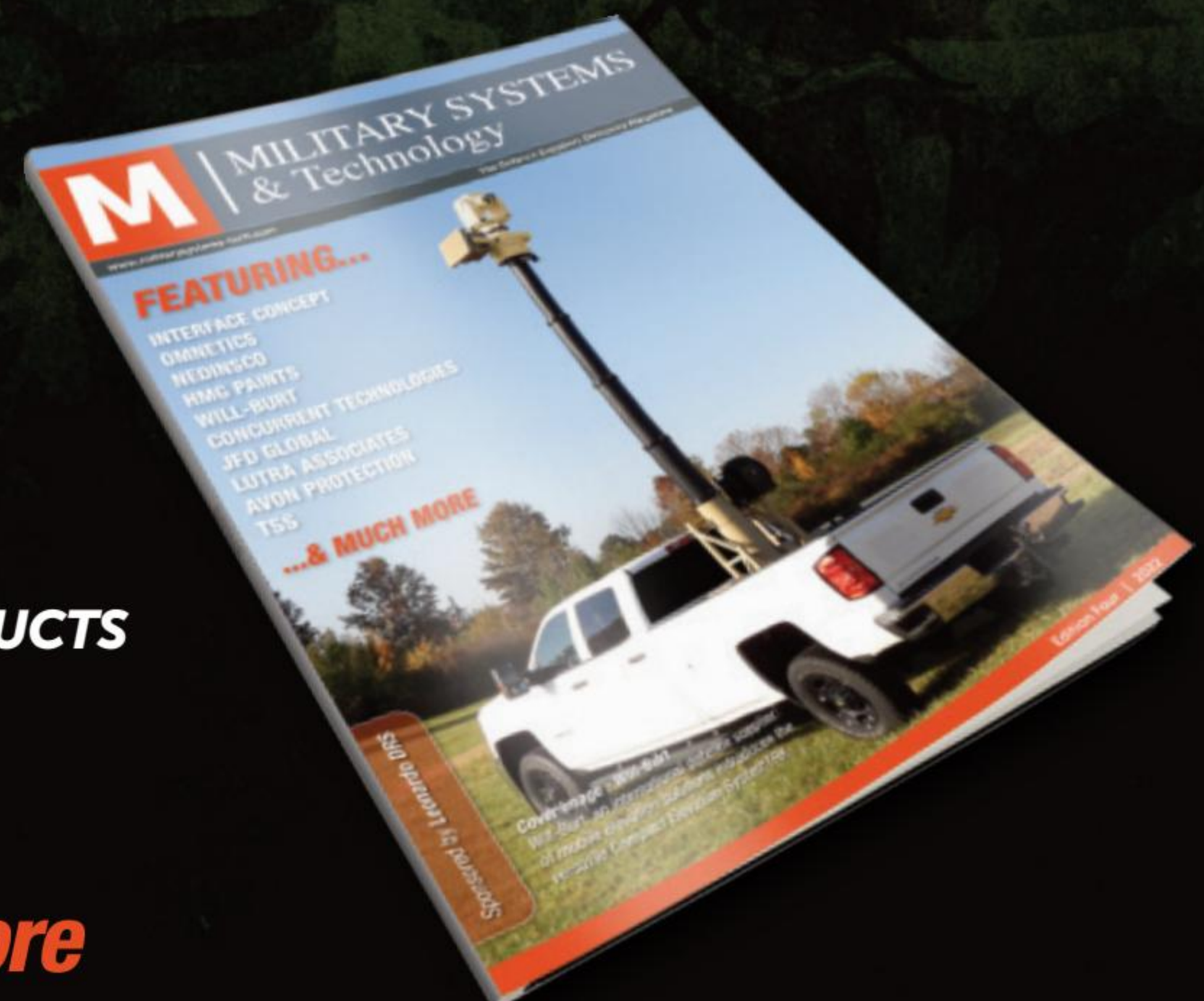
Cover image - Will-Burt
Will-Burt, an international defence supplier of mobile elevation solutions introduces the versatile Compact Elevation SystemTRK

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We welcome you to the fourth edition of The Military Systems & Technology Magazine 2022.

As an established web portal for the International Defence & Aerospace Industry, we strive to provide a comprehensive and detailed listing of Military Equipment Suppliers, Products and Services. This magazine is designed to keep you up-to-date with latest news and events within the Defence Industry's Governing Bodies, Organisations and Companies.

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For more information, technical guidance or the latest subscription packages available for Military Systems, please contact us where one of our team will be more than happy to advise you.

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Here at Trifibre,

We are committed to ensuring the absolute best quality service and products whilst delivering in a timely manor. Here are just a few of our business aims and ethics to show that not only are we an ambitious company, but we do everything to keep our carbon footprint low.



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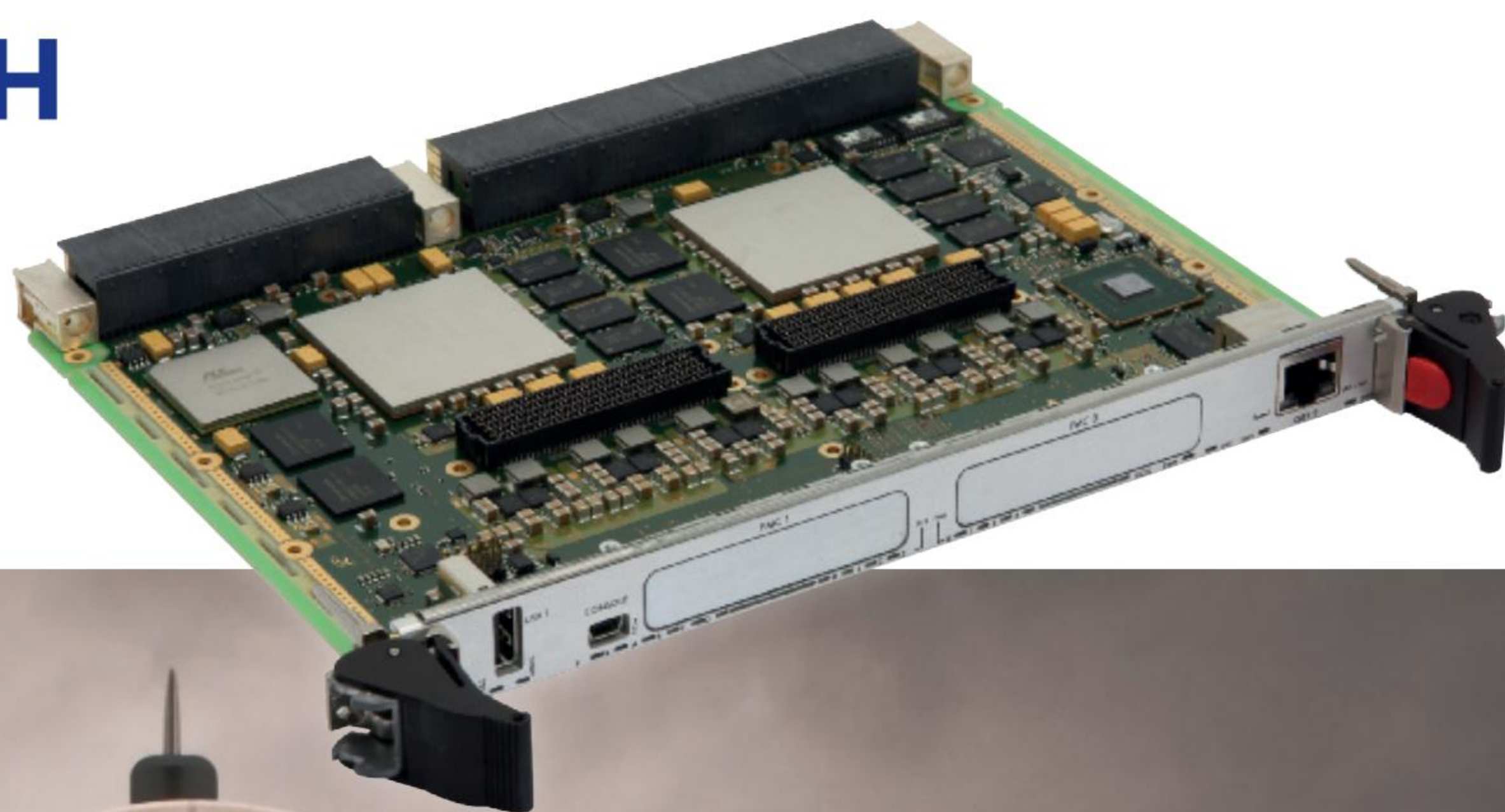
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New 3U VPX Intel® Xeon® W Single Board computer --- IC-INT-VPX3k

Interface Concept, a leading developer and manufacturer of high-performance embedded COTS boards and systems is introducing the IC-INT-VPX3k, a 3U VPX single board computer based on the 11th Gen Intel Core Xeon® W series (codename: Tiger Lake-H) processor.

The IC-INT-VPX3k provides the computing power and the media interfaces of a high-performance workstation on a 3U VPX form factor, while keeping power at a low level. It is aimed at large bandwidth and high-demanding applications located at the edge of networks which may have to meet thermal and environmental constraints and have real-time functionality and operational safety mechanisms.

This 3U board-level product leverages the latest Intel 10nm Intel® Xeon® W series processor enhancements to provide high-computing performance and a complete set of high speed interfaces to system integrators with power, fast IO needs and latest generation video interfaces. The IC-INTVPX3k takes advantage of the Xeon® W eight cores running at 2,1GHz, 64G DDR4 at 3200MT/s and a large number of PCIe gen3 and Gen4 lanes ideal to connect peripherals with tremendous bandwidth.

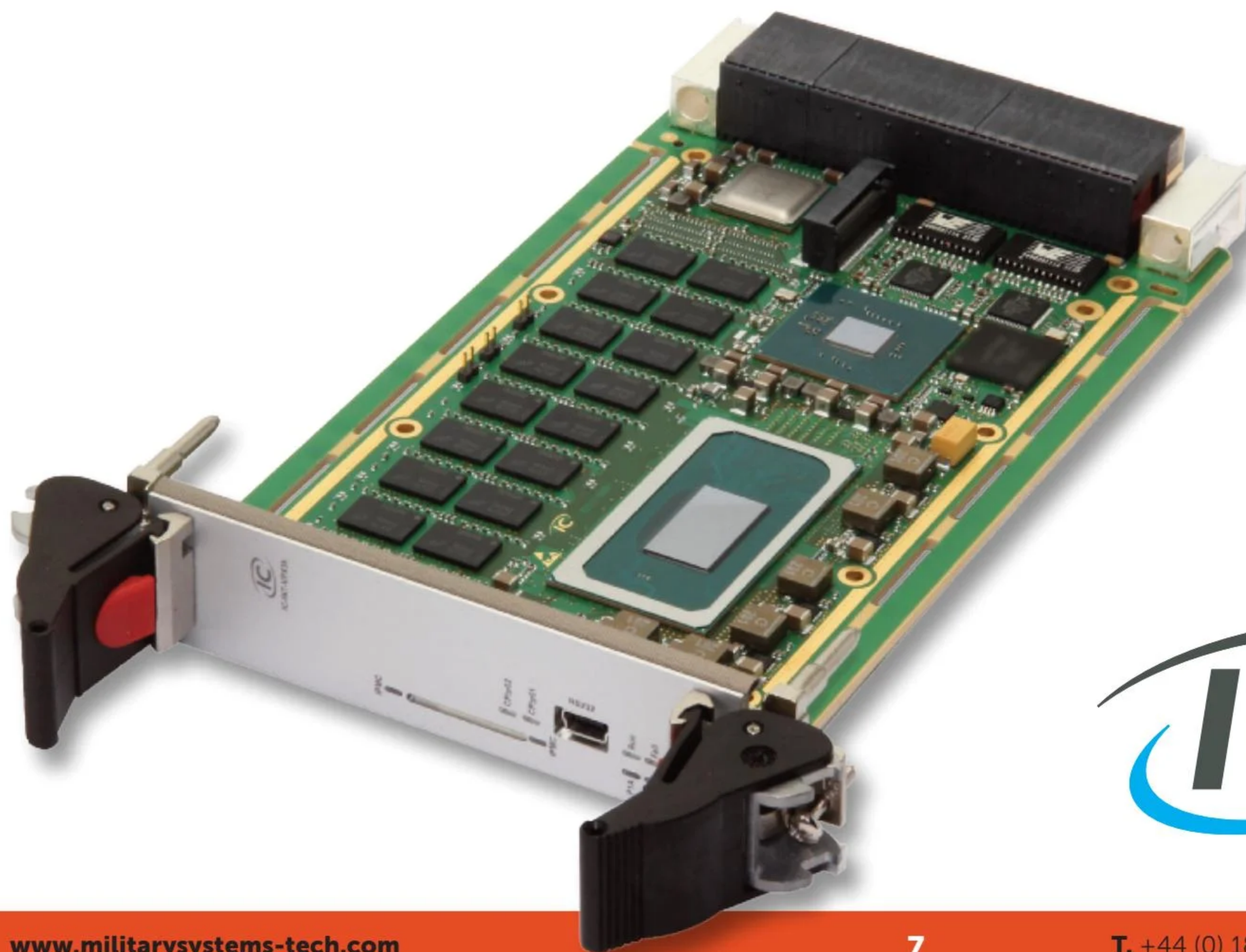
In addition, it supports the well-proven Intel® Advanced Vector Extensions 512 (AVX-512) instruction and the security protect modules of the Slim Bootloader.

“The IC-INT-VPX3k is the ideal solution for integrators who are looking for a new generation of SBC combining performance, high speed interfaces, managed power and featuring the latest Intel developments in video. This board will be well-suited for customers designing mission computers and surveillance systems” said Franck Lefèvre, Interface Concept’s Sales director.

Interface Concept provides Board Support Packages for Linux® (IC SDK, others...) and VxWorks®. Other RTOS can be supported on request. Compliant with OpenVPX™ standard, the IC-INT-VPX3k is available in air-cooled and conduction cooled versions (compliant with VITA 47 classes). Interface Concept is now taking orders for the IC-INT-VPX3k which will ship in Q1-2022.

Main features

- Intel Xeon® W (Tiger Lake-H)
- DDR4 with ECC up to 64GB
- 1 Gen4 PCIe x4 (Data Plane)
- 1 Gen4 PCIe x16 (Expansion Plane)



Contact: Ms Brigitte Jouselin
Email: bjouselin@interfaceconcept.com

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SCHROTH®**Mine Blast & Utility Seat Systems**

The **SCHROTH Mine Blast Protected Seat Systems** are tubular lightweight systems with a unique resettable Energy Absorbing (EA) system designed into the seat.

The EA design and technology comes from the years of experience **SCHROTH** has with energy management in seatbelt systems. The design of the seat gives the occupant not only excellent protection in a mine blast event, but also offers excellent protection in the event of an accident or impact. The All Belts to Seat (ABTS) design allows the vehicle manufacturer to optimize the installation of the seat within the hull. An integrated footrest can also be incorporated into the seating system for additional lower-leg protection. The unique **SCHROTH EA** technology is tunable to match the size and weight of the vehicle as well as the level of protection required and the available space within the vehicle interior. The EA is also designed to reset itself and offer high levels of protection for the secondary (slam down) event.



The Mine Blast protected seating system is available in two versions:

- **SU-62 compact forward- or rear-facing seat**
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The **SCHROTH** seating comes standard with an ECE certified lightweight 4-point harness restraint. Restraint systems with ECE complaint 5-point seatbelts are also available.

SCHROTH offers the ideal system for military personnel & troop transport configurations.



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BLOCS label printer from Lincad makes easy work of transporting batteries around the world



Lincad, a leading supplier of batteries and charging systems for military and other sectors, has designed an innovative Battery Logistics and Operational Compliance System (BLOCS) to simplify the process of recording states of charge of batteries in preparation for air transportation.

BLOCS is a label printing system and connects directly to Lincad's in-service battery conditioners and chargers, the Armada, Caravel Mk2 and Four Channel Caravel Mk2. It allows batteries intended for use with military equipment to be flown safely around the world in adherence to IATA regulations, with full traceability.

In 2016, IATA regulations changed to ensure that lithium-ion batteries could only be transported via cargo aircraft and only if they were at a state of charge of 30% or less. These regulatory changes

were implemented following several high-profile cases where lithium-ion batteries were identified to be the cause of fires on aircraft. At less than 30% state of charge, lithium-ion batteries generally have insufficient energy to go into thermal runaway, a process which exacerbates the combustion process. The regulatory changes initially proved problematic for manufacturers and shippers of lithium-ion batteries and Lincad was the first company to integrate a transport mode into its conditioners and chargers to allow the 30% state of charge limit to be achieved through the simple push of a button.

The BLOCS label printer is a further enhancement and automatically prints a status label for each battery being run through the transport mode on one of Lincad's conditioners or chargers. When a battery reaches the 30% state of charge limit on a charge or discharge cycle, a status label is automatically printed, each label indicating the exact state of charge and providing other identifiable data for that particular battery. Through this approach, batteries can be demonstrated to be safe to fly and traceability provided, allowing those in the supply chain, the end user and third parties to have confidence that compliance has been achieved.

BLOCS can be integrated with up to 32 conditioners or chargers at the same time. This reduces overall system costs, speeds up processing times and streamlines logistics. Using Lincad's six channel Armada conditioner, as many as 192 batteries can be processed simultaneously. The system comes as a factory add-on option and its automated, plug-and-play approach requires no external input from the end user following set up. Different conditioner and charger types can be attached simultaneously to offer maximum flexibility and convenience.

Lincad's conditioners and chargers can operate with a broad range of lithium-ion battery types. Through the characterisation of battery charge and discharge profiles and the development of battery interface adaptors, batteries from various OEMs can come under the umbrella of a single type of conditioner or charger. With the integration of a BLOCS label printer, a whole fleet of different batteries can be prepared for air transport, offering a step change in battery logistics management.

According to Peter Copplestone, Operations Director at Lincad, ***"Our innovative BLOCS label printer is the ideal solution for busy logistics teams operating in military and other sectors to ensure that all their batteries are not only discharged to IATA-required levels, but are***

accurately and clearly labelled too. Customers can use BLOCS for charge status labelling of their Lincad products, but also for batteries from other OEMs."

For long-term storage of lithium-ion batteries, a state of charge of 50% is generally recommended. In addition to a transport mode, Lincad's latest conditioners and chargers feature a storage mode to allow batteries to have their state of charge adjusted to this 50% level to prolong shelf life. The BLOCS label printer system can be used in the same way to provide evidence that batteries have been prepared for long-term storage.

Lincad has worked predominantly in the military sector since it was founded over 35 years ago. Key customers include the UK Ministry of Defence and defence prime contractors, along with other armed forces around the world, including those from NATO and the Five Eyes alliance. Lincad works closely with its customers to supply a wide range of bespoke batteries and charging systems, including its popular LIPS (lithium-ion power system) range of batteries and associated chargers. These are ruggedised products, capable of withstanding hostile environments and demanding applications. Lincad's products provide a sought-after, military grade performance that can be adapted across a range of sectors.



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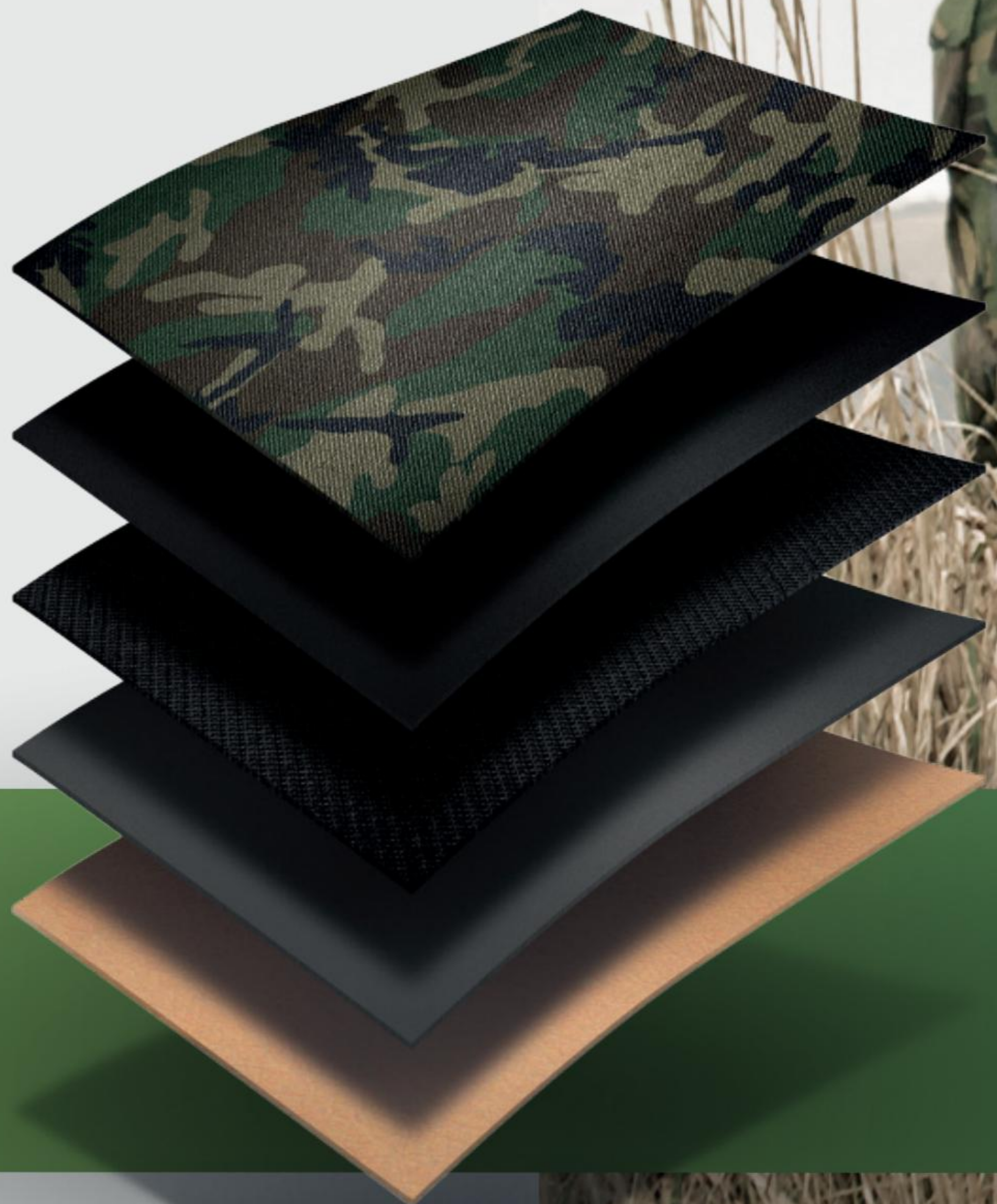
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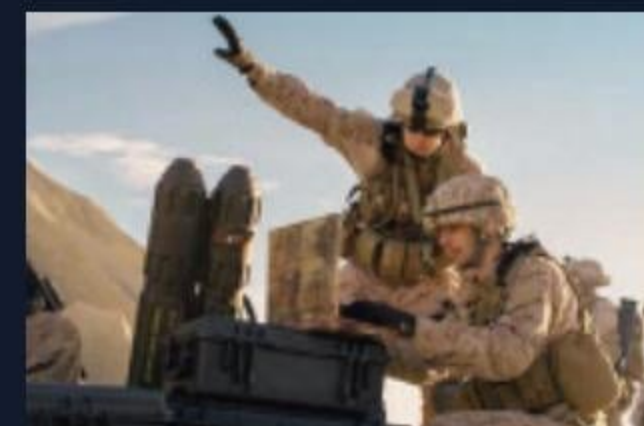
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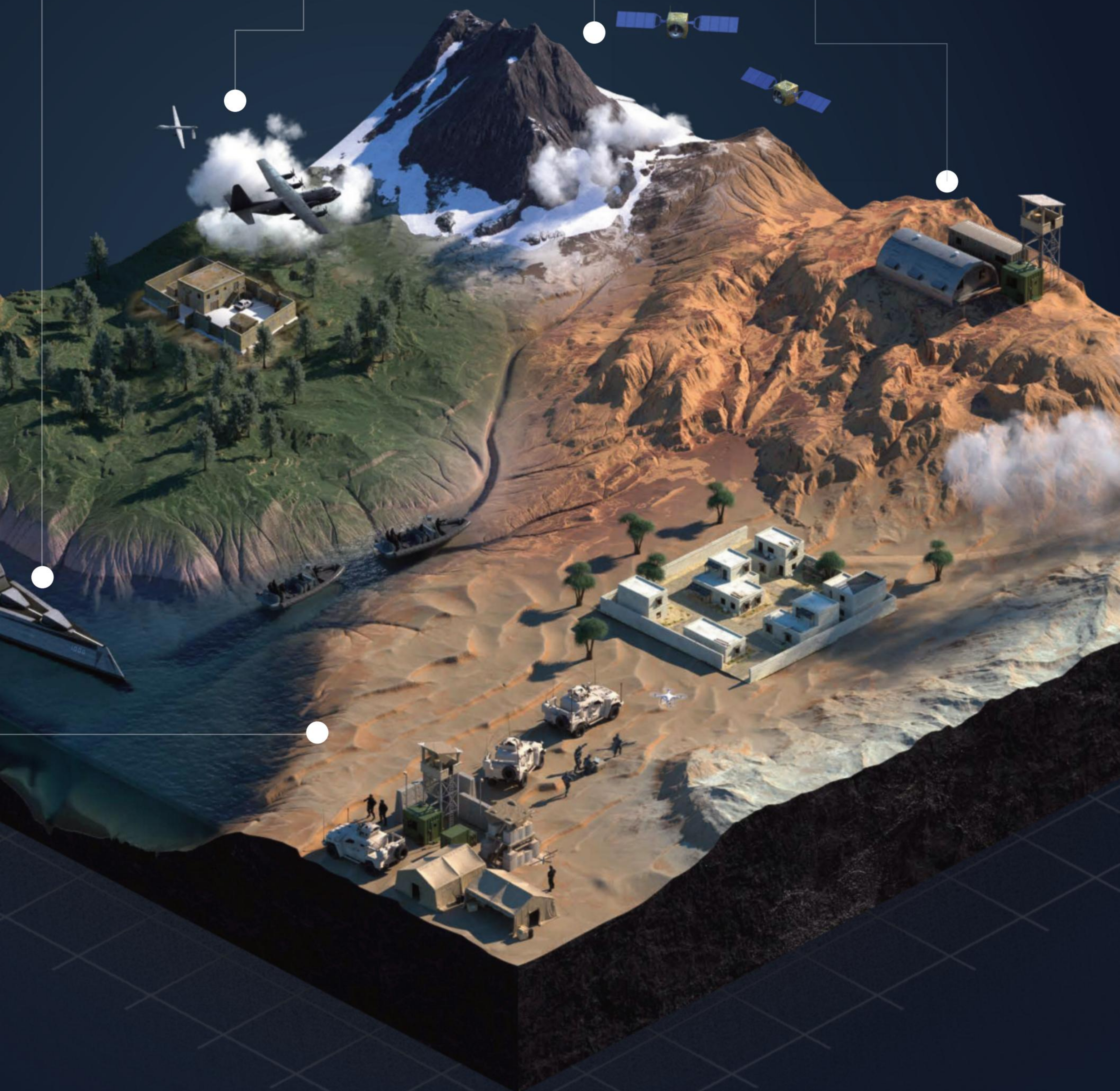
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NEW MILITARY AND AEROSPACE SYSTEMS DRIVE CHANGES IN CONNECTOR AND CABLE DESIGN

Advanced electronics in high-reliability systems are improving military and aerospace equipment to meet the significant challenges that lie ahead.

As new technologies expand and spread around the world, however, so has the potential threat from possible foes who have coopted modern consumer technologies, such as global positioning and information systems (GPIS), unmanned aerial vehicles (UAVs), and space systems, to serve their own purposes. Our technological battlefield now begins with military space equipment, surveillance, and position control. As such, our defense industry is developing improvements, expanding capabilities, and creating next-generation technical systems to provide immediate protection and prepare for potential threats. To that end, a new digital battlefield program has evolved.

We are seeing a wide range of technical methods emerge to meet these challenges, beginning with cutting-edge sensors for data image collection and distribution. There is a great need for

mission and situation awareness monitoring with real-time data collection, faster signal processing, and central command guidance transmissions. The amount of time allotted for action and reaction, and for data control and usage, has diminished to a critical stage, causing electronic equipment and methods to be pushed beyond their barriers. In response, new cables and connectors are being designed and implemented to meet the application-specific needs of new military and aerospace systems.

Military satellite systems with wide-viewing capabilities will rapidly become a leading focus of technology expansion for surveillance and reconnaissance control. Multispectral surveillance cameras can provide images, while additional sensors monitor items such as weather, ocean levels, and other satellite and missile activities. Satellites also provide data for the new geospatial intelligence system (GEOINT), which features image analysis software that drives higher-speed digital signal data comparisons. Ruggedized, lightweight, high-density connectors with .050" and .025" pitch spacing are used to direct that data into the transmission modules that send it back to Earth.

UAVs designed for use at very low elevations, and typically controlled by earth-bound ships or ground troops, have added major advantages to our mission quality. UAVs provide a different value in surveillance, and offer close control for monitoring wide-area moving target indicators (MTIs), ground targets, and airborne early warning (AEW) radar surveillance in support of theater missile to ground defense. The thorough package of electronics in today's UAVs includes: directional control, GPIS referencing systems, high-resolution cameras, and ammunition launch and controls.

A key to the success and performance of these highly mobile,



Latching Nano-D from Omnetics

High-speed, lightweight electronics are making soldiers safer and military operations more successful.

fast-moving UAVs is extreme signal speed and integrity. Ruggedized, miniature connectors with small diameters and high-speed differential signal processing capabilities are essential for making cable connections between the data storage modules these systems rely on. They also enable some transmission-to-ground communications, but image and data modules are often quickly replaced at base stations on the ground. These applications have driven the use of ruggedized micro and nano sized latching connectors, and high-speed digital signal formats are used to handle speeds above 5Gb/s.

Phased array radar is rapidly eclipsing the old moving dish radar technology. These advanced systems use multiple transmission lobes (i.e., antennas) and send coordinated signals with slightly adjusted phase shifts to focus the radar beam directly at one point and define targets with serious resolution. Circuit speeds and logic systems continue to function more rapidly, allowing even the fastest missiles to be tracked electronically. The military industry is benefitting greatly from these systems due both to their increased capabilities and their ease of portability, which makes them even more versatile.

One of the keys to phased array radar is the use of multiple sets of high pin- and socket-count connectors capable of handling rapid signal processing to and from radar modules, which helps adjust the phase angle of the antennas to follow rapidly moving targets. The high-speed signal capacity of these connectors also provides improved intelligence, surveillance, and reconnaissance (ISR), as well as targeting, weapons delivery, and threat warning systems. Additionally, the use of digital-signal interconnections has become critical in reducing the vulnerability of radar to electronic countermeasures (ECMs). Electronically scanned arrays, along with sophisticated software, manage variations in environmental conditions and identify jamming attempts.

Mass storage and portable Ethernet systems are some of the most rapidly evolving instruments in the mil/aero industry. Many requirements for handling data and processing signals must comply with Avionics Application Standard Software Interface (ARINC 653). This interface specification is aimed at ensuring that the aeronautics and space industries operate within a real-time operating system (RTOS) standard. The ability to host multiple applications of different software levels on the same hardware also provides universal performance while retaining a small physical size and low weight. The current focus is on routing both more and higher-speed signals into the main bank of equipment that stores the mass bulk of data being received. The new boards designed to enable this are highly condensed, lightweight, and rugged to suit the needs of equipment including the portable military electronic systems that are taken into battlefields. High pin-count edge-card connectors and mating cables are routed from detection and surveillance units back to the main system and provide the signal integrity and digital signal speeds that can prove critical during adverse battle conditions.

Portable Electronic Devices (PEDs) often specify micro-sized



Micro and Nano Circular Connectors for SWaP



circular connectors for highly portable modules that require the combination of power and differential signal processing within a single connector and cable. This often requires customized cable designs and careful attention to wire hook-up protocols to insure high signal integrity and offers up to 10Gb/s. Power levels depend upon the power pin and the size of the power wire specified. The number of signal pins can be designed to accommodate multiple digital signals, and metal shells are often used to provide 100% shielding from the cable to the connector.

Military robotics are used in remote battle situations to analyze, predict, report, and deliver a wide array of information. For example, the military employs both front line and perimeter IED detection for carrying pack loads and remote ground ammunition-firing systems. The Talon, by Qinetiq, is easily transported to battlefronts and can operate in adverse weather and terrain. This robot travels rapidly carrying customized electronic equipment that allows behind-the-front control and delivers rapidly even in very rugged conditions. It also has the capability of firing weaponry from its own chassis. Cable and connectors utilized in these types of equipment must be extremely rugged and waterproof, and efficiently distribute

power and remote directional control simultaneously with image capture and transmission.

Many of the ground robotic connectors for military and aerospace applications require the combination of low weight and extreme reliability when exposed to shock and vibration. Special pin and socket systems using spring beryllium copper or twisted steel are used to retain constant contact during these events. In addition, each pin/socket set must be plated with nickel and then gold to help retain contact reliability over long exposures. Test specifications are defined to qualify and insure reliable performance. Many applications will require metal back shells and braided metal shielding over the cable to prevent both damage and EMI (electromagnetic interference shielding). As signal speeds increase and as more electronic packages are crammed into tighter spaces, this is becoming more and more critical.

Soldier-worn electronic systems are being deployed extensively. This is the era of the high-technology digital battlefield. Constant communication with each ground trooper and biomonitoring are critical to protect the personnel. Higher speed signals, again, become life- supporting as well as efficient for critical data sharing from satellites, unmanned vehicles, and ground central. Munition directions from the ground team will be processed at the soldier with his onboard computer that is linked with a military GPS satellite above.

The connectors and cables must meet three key criteria to maintain these functions in a wearable format. They must be reliable, weigh as little as possible, and provide ideal signal integrity at all times. Each new cable and connector design is reviewed for how and where it fits on the soldier's equipment pack and uniform. It is then fabricated and tested for the electrical and mechanical specifications the soldier will



Omnetics' COTS Complete Family

experience in the field. Finally, the new cable and connectors are installed into his system. That is not always the last step, however. The military must be the critical element in the “useable” features of each new cable and connector. Redesigns are an acceptable way to refine and improve the cable and connectors, much as it is for the rest of his equipment pack.

Adapting today’s connectors to new military and aerospace requirements has become a serious process that goes beyond the older “quote-a-spec” method of the past. As seen in the wide range of applications above, one connector design, size, and shape does not fit all. More often, the designer must review the combined details of electronics, mechanical use, and survival to adapt connectors to fit and perform in these advanced technologies. Requirements vary from mobile instruments, ground troop electronics, and even military space systems.

This process of configuring connectors to application-specific functions often begins with a review of the equipment to which the connectors will be applied. Standard and COTs connectors can be considered and analyzed to find a close fit to the new application. During early stages of design, COTs connectors can be used in prototype circuits, which can save time and cost of development. There are significant advantages when the COTs, or even small changes to the COTs connectors, will suffice. Connectors with previous military-quality materials and processes can shorten the design cycle time and give early expectations of lifespan and performance. When changes in shape or size are required, a solid model of the new design can be quickly completed by the connector supplier and sent to the system design team. This can begin an online work session that also helps to get the design right early in the process. After design completion, connector fabrication can be transferred directly to smart tooling machines.

Planning for the cable as signal speeds increase can be very critical. Higher speed differential signal processing pushes the limits of standard cables in our industry. Signal length, attenuation, and skew of differential signals must all be planned, prescribed, and attended to in the cable design. In the past, we planned for the resistance and potential crosstalk of signals within a cable. Now, we must prepare for high-speed different electron propagation delays between signal lines that can cause skew, and plan for inductive reactance, as well as learn new ways to prepare and test the cable before it is attached to the connector. Some methods are evolving by use of TDR (time delay reflection) instruments or by sending complete signals down the new cable and reviewing eye diagrams that exhibit noise, jitter, and skew of the signal as it actually runs through the cable.

Final electrical and mechanical testing can assure good performance of the completely assembled connector to the cable harness. Field-proof testing and certification will require building enough of the products to run the group through combinations of mechanical, environmental, and signal integrity performance. Shipping new cable and connectors for military equipment has become a detailed and important step. The supplier must remain critically aware of the many new expectations of the connector systems of today and tomorrow.

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Oxley and Astute Launch New UK Distribution Partnership



Oxley Group and Astute Electronics are delighted to announce a new UK distribution partnership.



Under this agreement, commencing from November 2022, Astute will represent Oxley across the electronic components range including EMI filters, interconnect solutions and LED panel lamps. This new UK agreement builds on a long relationship between Oxley Group and Astute in Germany.

Electronics specialist Astute has 30 years' experience in supplying components to the aerospace and defence markets. This partnership will capitalise on this experience to enhance the service to Oxley's UK customers through improved product expertise and design support as well as the swift fulfilment of deliveries. The Astute team, headquartered in Stevenage with sites across the globe, has a dedicated design support service with experienced product managers and application engineers as well as the backing of the wider Oxley team.

Oxley CEO Darren Cavan commented, 'Astute, with their values of

Agility, Passion & Innovation have a great synergy with Oxley, we are very confident that this partnership will ensure customers in the UK receive the best possible support and we are looking forward to developing a prosperous relationship moving forward.'

Stewart Burns, Passive and Discrete BDM, Astute added, 'Astute is delighted to partner with Oxley, the product range fits perfectly with the Astute portfolio, Oxley, like Astute is heavily invested in ensuring long-term supply for the lifetime of all customer projects. Excellent customer relationships and a full design and test facility ensures that the Astute & Oxley partnership can facilitate initial design, evaluation of a new or existing requirement or the delivery of off the shelf EMI Filter, LED Lamp or Interconnect solutions.

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Having unobstructed sight is the key to keeping an army team safe and making combat more efficient. Nedinsco developed a series of customizable, real time, 360° awareness systems that are tailored to the exact needs of any armored vehicle. The new FALCONA and AQUILA systems increase crew and combat safety by detecting outside threats and by making it easier to maneuver in complex situations.

No matter the distance, your crew has an unobstructed view in even the most challenging circumstances, thanks to modular optical sensors operating in different spectral ranges, such as low-light CMOS (daylight), Short Wave Infra Red (SWIR) and Long Wave Infra Red (LWIR). Their names, inspired by birds of prey, match their value proposition: a sharp, hawk eye view in any tense situation.

By mounting multiple rugged cameras on the vehicle with overlapping fields of view and using advanced imaging and software, our advanced systems are able to create a 360° image

that gives your staff the agile scope that they need. Our solutions allow your crew to have a real time and seamless 360° overview and to switch between bird view, rear, left, right and front views.

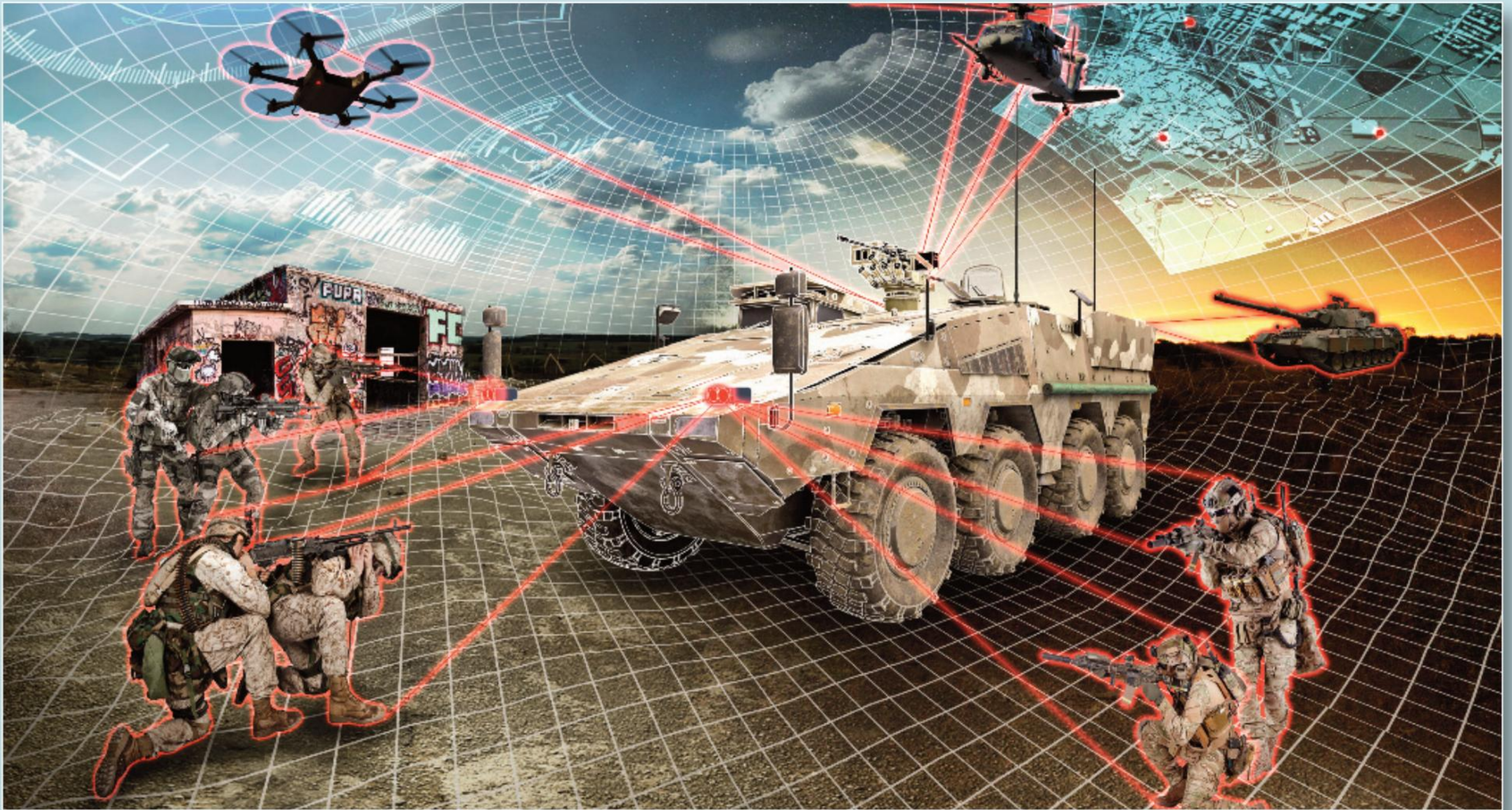
FALCONA: making driving an armored vehicle easier

The Close Range Awareness System (CRAS) FALCONA visualizes the immediate vicinity of the vehicle. The images that the four cameras produce are connected primarily via the Battle Management System. This enables the driver to look around the vehicle in 360° and thus maneuver around the terrain in a safe manner, without crashing into obstacles.

AQUILA: allowing fast identification of distant threats

Unlike the FALCONA, the AQUILA, being a Local Situational Awareness System (LSAS), focuses on short to medium distances. At least six cameras are used, which are mounted at different positions on the vehicle, usually corners. The primary purpose of this system is to visualize the environment around the vehicle and help the crew detect potential hazards from a distance. This leaves more time for the team to prepare and take appropriate action.





State of the art video processing

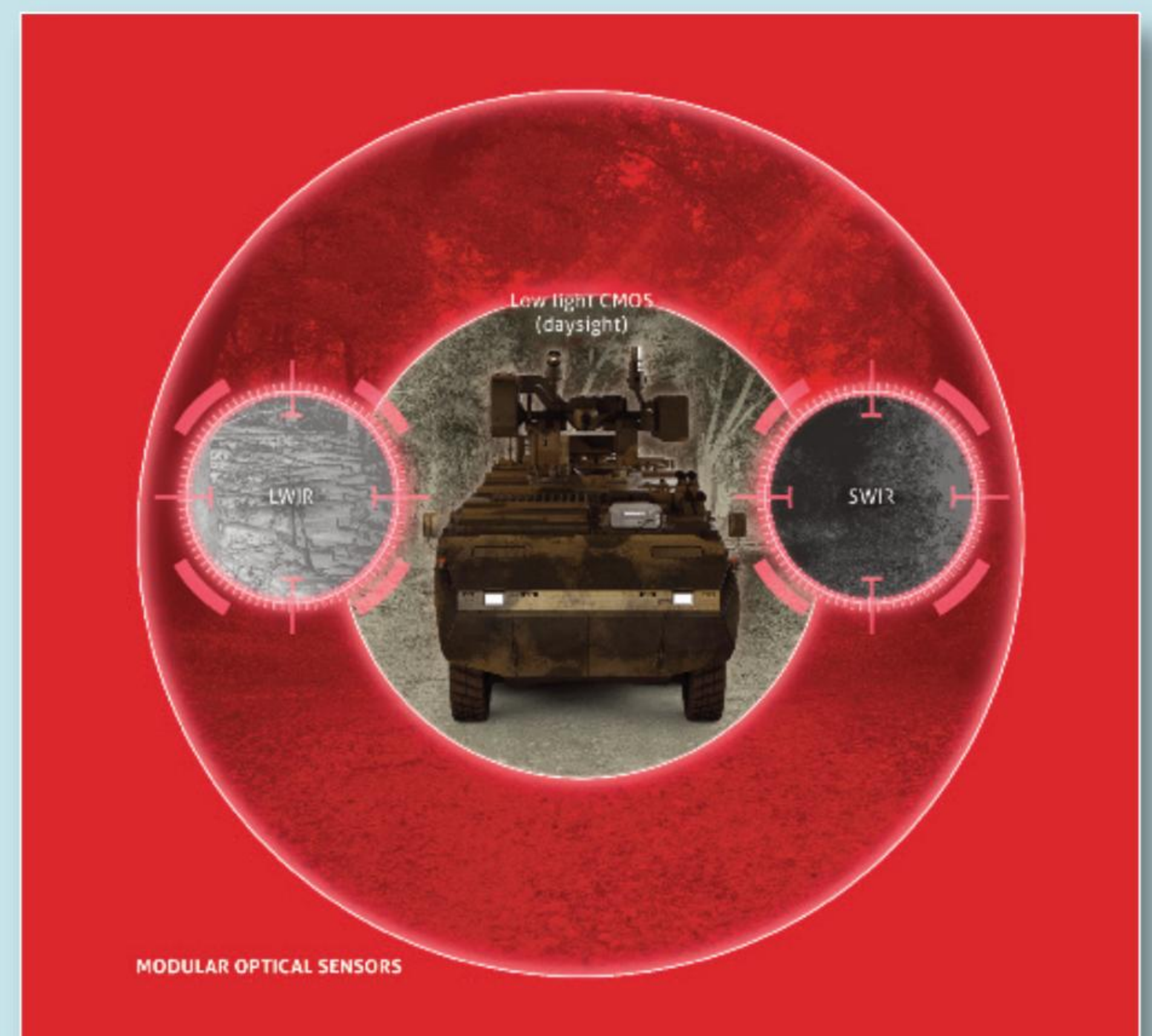
Seamlessly connecting the input from different cameras to shape a 360° environment forms the backbone of both systems. Besides, the delay (or latency) caused by the processing of the raw images was brought to a minimum, making it a truly stunning piece of engineering. A personal, real-time video stream on every display in the vehicle facilitates fluent communication and affords efficiency within the team. It enables the team to react more quickly to dangerous situations.

The extraordinary quality of the sensors and lenses used, the powerful state of the art Graphic Processing Unit (GPU) and the sensational video editing software together form a rare combination of functionalities. Nedinsco's FALCONA and AQUILA are therefore unique in the market.

The future is near: AI integration for enhanced detection

The development of our 360° systems continues, even after the introduction of the FALCONA and the AQUILA. A promising functionality that is being worked on behind the scenes is the addition of AI technology with which the images made by the cameras can be analyzed and interpreted in real time.

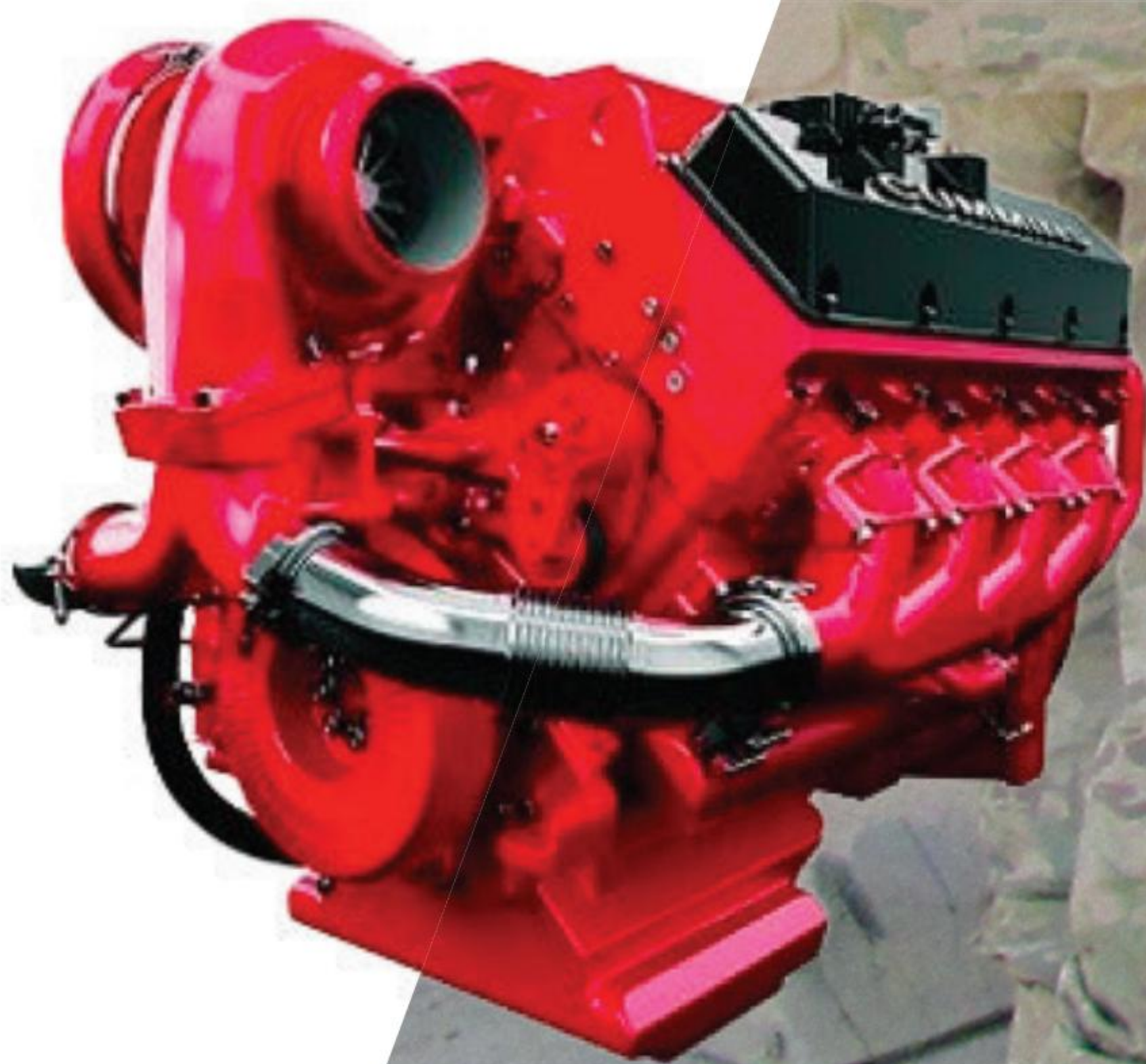
With a powerful GPU on board, it is possible to use machine learning to train an algorithm that can identify and track objects from great distances and can give advice on what to do next. This makes it possible to make faster decisions in combat and to be better prepared for possible dangers from outside. This way, Nedinsco will continue to make a difference in the future, in order to make the work of those who protect us safer.



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HMG Defence brochure launch

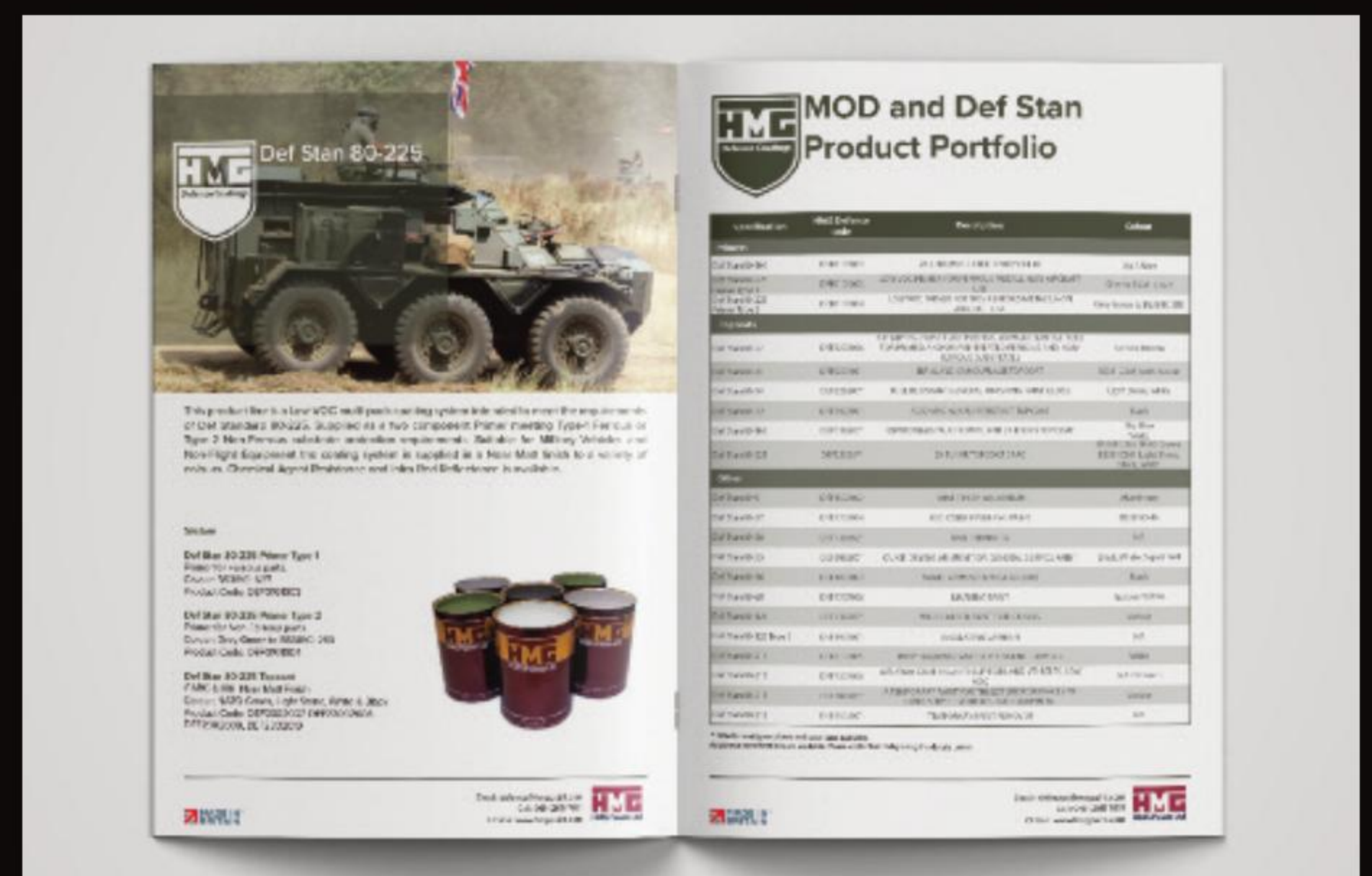
HMG Paints, the UK's leading independent paint manufacturer, has launched its new Defence Coating brochure.

The brochure which launched at DVD 2022 held at UTAC Millbrook, offers a complete guide to HMG's range of over 100 paints and coatings for use on military vehicles and equipment, including Def Stan 80-225.

However, the major feature of the guide is that it features a full list of paint related NSN's and breaks them down so they are easy to understand. The new brochure and the HMG Technical Support service is all aimed to take the hassle out of identifying and sourcing the correct products for Defence projects.

Easy to identify paint requirements with NSN Numbers

"We've designed the guide to help take the hassle out of identifying which paint OEM's, refinishers and other users need, be that via Def Stan references or NSN numbers." Commented Josh Taylor, HMG Paints Defence Technical Support. "During DVD 2022 exhibition we had numerous people visit the stand who were struggling to find the right product and order codes and we were able to provide them a guide and help them quickly identify the correct product."



For those who missed out on a copy of the guide at DVD 2022 you can email **defence@hmgpaint.com** to request a copy. Alternatively you can contact the HMG team directly to ask a question about HMG's paint range and technical support services.

"The DVD2022 show gave personnel within the defence industry the chance to discuss paint and coatings technical requirements directly with us and after the COVID pandemic it was fantastic to be back at in person events" added Josh. "At HMG We want to be a true partner within the industry and that includes offering product advice, technical support and fast delivery of products. Over the last few years we've built some very strong relationships across the industry and we're very proud to be supporting companies on some exciting projects."

Defence Coatings Delivered Fast

With global supply chains being heavily impacted as a result of the pandemic, Brexit and the ongoing conflict in Ukraine, paint users have faced challenges in receiving products which are often shipped from abroad. As a British based manufacturer HMG can provide fast delivery across its entire range, something which has become increasingly important to its customer base over the last few years. The company has a number of key products readily available at its Manchester HQ and with its agile manufacturing setup those products that aren't stocked can be manufactured and shipped within 10 days.

HMG Paints, is a proud independent SME paint manufacture and a Make UK Defence member. All of HMG's Defence coatings, including its Def Stan 80-225 system, are Made in Britain accredited. The HMG Defence range offers products which are free from Chrome VI, meet low VOC requirements, and are IRR and CARC resistant and includes military standards. HMG's Defence Technical Support team will be in attendance at the Make UK Defence Summit in Birmingham and also have a stand at the DSEI Exhibition in 2023.

Alongside Defence Standard products, HMG produce a wide range of approved high-quality coatings for practically every purpose for the defence industry. HMG's product range is suitable for equipment such as containers, trailers, vehicles, helmets, bridges and armour. HMG are renowned for their innovative approach to coatings including corrosion resistant primers, functional topcoats plus CARC and IRR materials approved to UK defence standards.

You can find out more about HMG's range of Def Stan products and bespoke coatings development service at **www.hmgpaint.com/products/landing/Defence**. If you'd like to book a meeting slot or require information on the HMG Paints products you can email **defence@hmgpaint.com** and a member of the team will assist you.

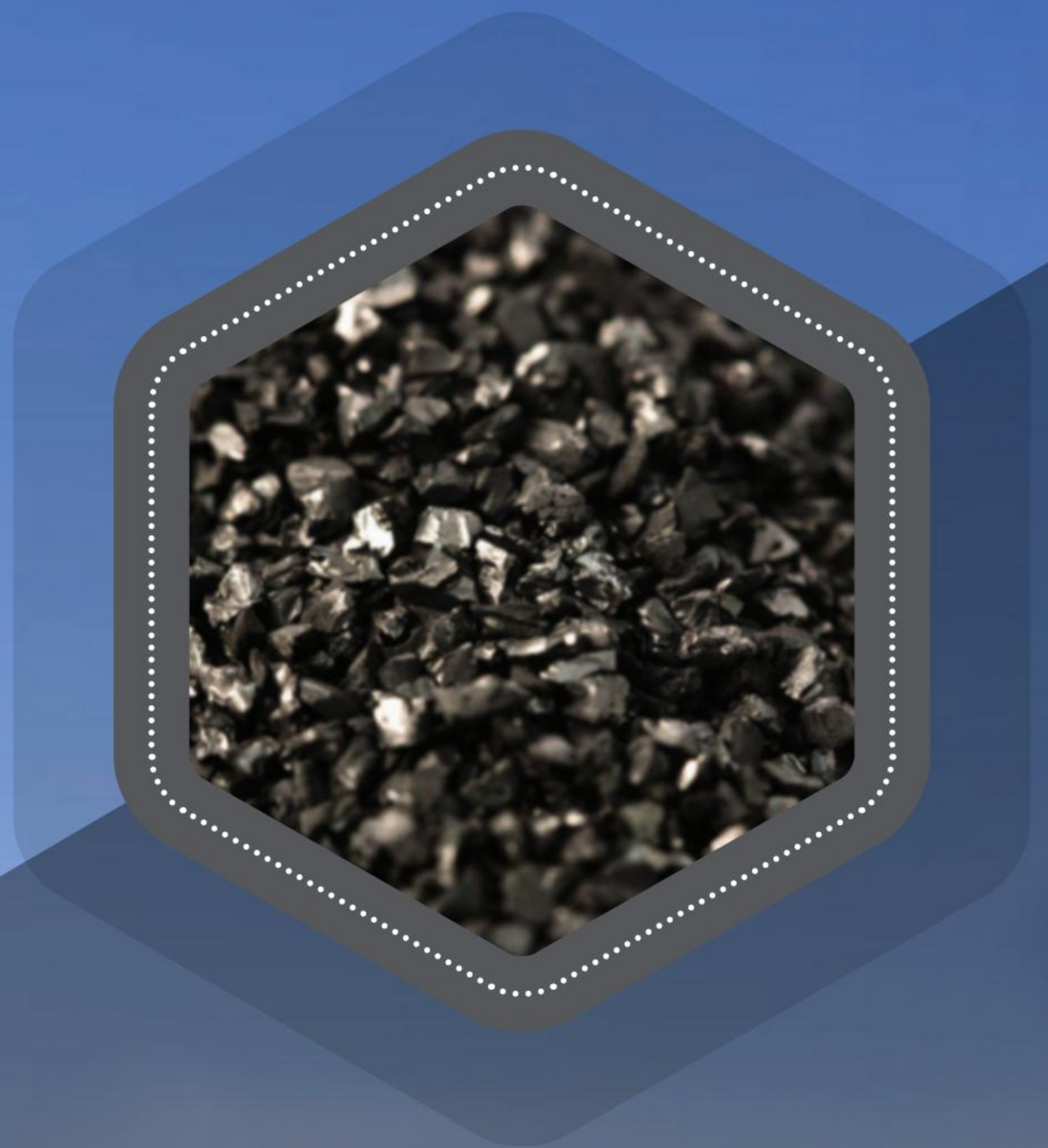
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Will-Burt Introduces three new Mobile Elevation Platforms

Will-Burt's mobile elevation systems are specifically designed for the complex missions facing today's defense organizations. Our elevation products, platforms, and systems are designed to Maintain the Advantage in Strategic Competition. All Will-Burt telescopic masts and positioners are MIL-STD 810 certified and capable of overcoming the environmental challenges that exist today and new ones that will arise tomorrow.

The ability of Will-Burt to deliver superior elevation solutions is attributed to its worldwide leadership in the industry for over 75 years. Teams of experienced engineers, design new products to fit today's requirements. We also offer custom designed solutions to meet program specifications. Our vertically integrated manufacturing systems are backed by an ISO 9001:2015 quality management system. Finally, all of this is backed by a worldwide sales, marketing, and service support structure focused on delivering the correct customer solution on time, every time.



COMPACT ELEVATION SYSTEM^{TRK}

Will-Burt's truck based Compact Elevation System with integrated CAN-bus controls and cable management is a rugged and precise mobile elevation platform that provides rapid deployment of a wide variety of sensors from a compact position in a standard 2.4m pickup truck bed. The compact design provides up to .7 m³ for the sensor payload with the tailgate in the closed position. Available with an electro-mechanical or pneumatic elevation system at 4- or 6-meter heights with a payload capacity of 241 kg, payload stability is assured with section keys and keyways that minimize rotational movement.



COMPACT ELEVATION SYSTEM^{TLR}

Will-Burt's medium trailer based Compact Elevation System with integrated CAN-bus controls and cable management is a rugged and precise mobile elevation platform that provides rapid deployment of sensors in as little as 30 seconds. The compact design allows significant room for the sensor payload and auxiliary equipment. Available with an electro-mechanical or pneumatic elevation system at 4-to-8.5-meter heights with a payload capacity of 241 kg, payload stability is assured with section keys and keyways that minimize rotational movement. This trailer-based system is customizable and can accommodate a variety of power systems as specified by the customer.



RAPID DEPLOYMENT ELEVATION SYSTEM

Will-Burt's Rapid Deployment Elevation System (RDES) with fully integrated CAN-bus controls is designed for expeditious deployment when significant heights are required for sensors and antennas. The RDES includes a mast tilt system that delivers a compact transport envelope. The system is available in heights of 24m or 36m. The powerful telescopic mast can elevate a 544kg payload - no need for crane assistance. An automatic lock system maintains a consistent height for extended periods of deployment – even with the loss of power. Payload stability and pointing accuracy is assured with section keys and keyways that minimize rotational movement. Full deployment of the 24m system can be achieved in 8 minutes.



www.willburt.com

PR A11/6sd-RCR

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Covert RF surveillance

The commandos were dug in and well-camouflaged as they observed the enemy talking on the radio before them. They had been watching the track for some time and now finally had confirmation that the area was being used by the enemy.



But what was the enemy's intent? And where were they heading? Following them would be too risky, but if the enemy were using radios, there was intelligence to be gained.

The covert nature of the mission meant moving COMINT trucks into the area was out of the question. Fortunately, the troops had a trick up their sleeve. The commandos had brought three RFeye Stormcases with them. The self-contained Signals Intelligence (SIGINT) system was set up and activated in a matter of minutes. At a flick of a switch, they could now gather the all-important COMINT needed. But this wasn't all the Stormcases were there for.

Frequencies

The RFeye Stormcase is versatile kit. Covering frequencies of 9 kHz to 18/40 GHz it not only collects COMINT on radios transmitting on HF and V/UHF wavebands, but also collects SIGINT on a range of emitters including radars and satellite communications. With low noise figures, few signals escape the system's attention, even when using low power to obfuscate their existence. Furthermore, while one RFeye Stormcase comfortably collects SIGINT across these frequencies, the use of 3 or more allows emitters to be accurately located using live or post-processed TDOA geolocation. And that's exactly what our commandos in the story did. By placing three RFeye Stormcases in various locations around the area of interest, not only could they collect COMINT, but also valuable geolocation intelligence on where these transmissions were coming from.



Ease of Use

We sat down with Malcolm Sellars – product management lead to find out more.

“The idea of the Stormcase was to make it as portable as possible for a quick deployment,” said Malcolm. It can be comfortably carried in a rucksack by one person, and or discreetly transported and used in a vehicle. Malcolm says that time spent consulting with customers on what they need in a deployable signals intelligence gathering system was gold dust. Customers told him that they needed an easily deployable, self-contained design. “You don’t have to worry about power supply cables or weather proofing,” said Malcolm (CRFS Product Management Team).

The Stormcase was designed from the outset to be used by the untrained operator. In other words, squaddie-friendly, or grunt-proof. Malcolm commented, “The RFeye Stormcase was specially designed to have simple configuration, even with gloved hands. The operators just needs to flick a switch and the equipment starts its mission. This ensures minimum deployment time and low observability so that it can be quickly and easily concealed.”

The RFeye Stormcase can be left hidden and unattended recording signals of interest: “A soldier could dismount from their vehicle, take the RFeye Stormcase out, leave it there and come back in a couple of hours or the next day and retrieve it.” This approach lets the soldier/operative stay out of harm’s way



and frees them to perform other duties while the RFeye Stormcase is recording.

As well as recording signals, the system can be connected to an external backhaul radio through its integral ethernet port. Signals can then be live streamed back to analysts at the headquarters for example. The ethernet port also lets the RFeye Stormcase be controlled remotely.

The system can be configured well in advance, according to the SIGINT it is to collect. A specific ‘script’ can be uploaded to the RFeye Stormcase’s software letting the user define the mission’s parameters. For instance, the system can be programmed to hunt specific signals on specific frequencies while ignoring others. Alternatively, it can be optimised to record signals with specific waveform or modulation patterns. This ensures that the RFeye Stormcase’s memory does not fill up too quickly with extraneous signals.

Equally, this quickens analysis as experts can get to work straightaway on signals of interest whether these have been recorded or are being transmitted in real time. Malcolm points out “You can specify the bands to sweep over. This does not have to be a continuous sweep, instead you can just specify your start and stop frequencies. You can configure the Stormcase to do exactly what you want.”

Our scenario at the beginning of this article may have been fiction, but it is based on 100% reality. The RFeye Stormcase is TRL9 and has been used across NATO countries to support SIGINT, COMINT and Spectrum Monitoring. Stormcase contains the world-leading RFeye Node 100-8/18/40GHz, with best-in-class RF performance. Hot-swap battery packs, and an integrated GNSS antenna, with the option to connect an external anti-jam GNSS antenna.

RFeye Stormcase is available now either direct from CRFS or one of our local partners. For more information visit <https://www.crfs.com/stormcase/>

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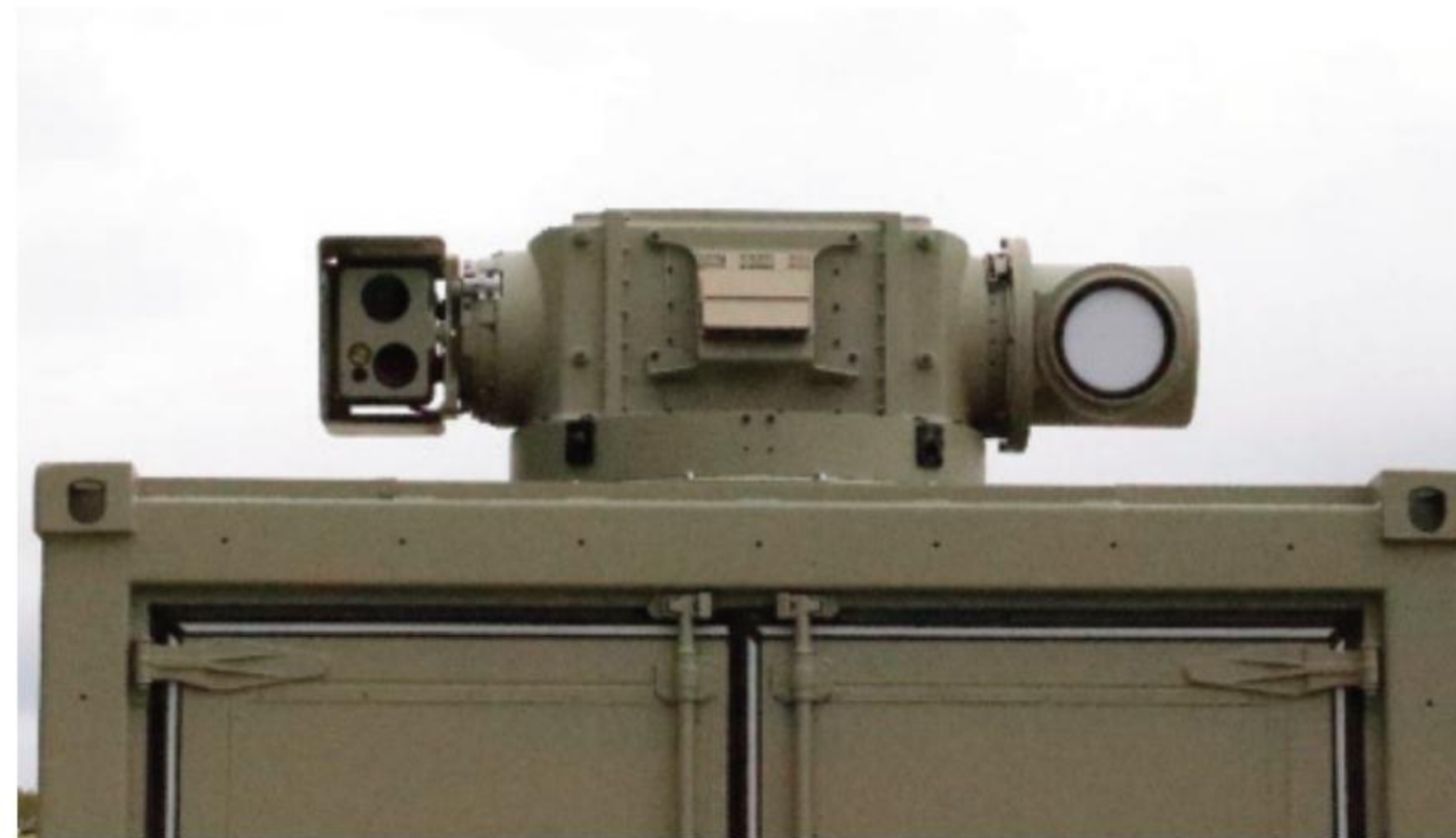
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Suicide drone swarms present an asymmetric threat



Titanis 35 kW Directed Energy beam director on containerised system

TITANIS DRONE DEFEAT

Countering the threat caused by drones is now a global issue and an increasing concern for military, government and homeland security forces across every continent. It is expected that unmanned aerial systems (UAS) will be increasingly used for malicious purposes, given their ability to carry cameras, weapons, toxic chemicals and explosives, and they are already being for acts of terrorism, espionage and smuggling.

EOS has developed the Titanis Counter UAS (CUAS) system to address the growing threat from malicious and threatening UAS.

Based on the EOS R-Series RWS, Titanis is a fully integrated, scalable CUAS suite that combines the specific detection, command and control (C2), and layered hard and soft kill defeat capabilities necessary to acquire, track and defeat swarming UAS threats.

The Titanis system allows operators to match kill solutions to large numbers and varying combinations of small and large drones to ensure that the threat can be mitigated regardless of their direction, numbers and capabilities while managing environmental, geographic, airspace and personnel safety considerations.

A typical all-up Titanis configuration incorporates direct-fire engagement systems, passive and active soft kill electronic warfare (EW) systems, an integrated sensor suite – including Pulse-Doppler, software-defined radar, day/thermal camera, laser rangefinder and radio frequency (RF) detection systems – and an optional Directed Energy (DE) kill system. These systems sit together with, and are integrated through, a proprietary, EOS-developed C2 and fire control system.

High-volume fire point defence solutions range from the 7.62 mm Dillon Aero M134-

series minigun to larger-calibre 30 mm guns (e.g. the Northrop Grumman M230LF 30 mm cannon with EOS R400S Mk2 RWS, or the Mk44 II Bushmaster chain gun with the heavier-weight EOS R800 RWS) firing airburst munitions (including 30 mm x 113 mm proximity fused airbursts and 30 mm x 173 mm airburst rounds) to deliver CUAS effects out to 3000 m.

One of the key differences between CUAS and other missions is the high angular speed that UAS can achieve at relatively short range. EOS RWS have been modified with a fourth-axis, independently slewing sensor unit that can move independently in azimuth to track fast-moving targets. A 1 Hz laser provides laser ranging and tracking throughout the engagement.

Passive and active soft kill EW systems designed to operate across all-threat frequency bands are, as with the radar solutions, integrated according to customer preference. Typical solutions include offerings from Blighter in the UK, Echodyne in the US and RADA in Israel.

Titanis' DE system has been deployed with a 35 kW high energy laser (HEL), although the HEL in its current format is capable of scaling to around 55 kW. The HEL system has been demonstrated as a small containerised system; however, while the DE beam director is slightly different to a weapons station, it has 60% commonality with the R400S RWS and is therefore effective from deployable platforms.

Developed and manufactured in-house by EOS, the DE system – which includes the beam director and the co-mounted optical target identification and tracking system – is designed to address Group I, II and III UAS swarm threats, with high rates of target engagement, out to ranges of 4000 m.



Kinetic CUAS using airburst munition



RWS fitted with Dillon Aero M134-Series minigun

The ability to maintain and manage the quality of the beam, the software that ensures precision engagement and drives the process, and all the mechanical designs and architectures are all EOS designs and intellectual property.

Arguably, the largest current growth rate in lightweight lethality systems is in the unmanned systems space, both for integration on unmanned platforms with remote operation and for the engagement and defeat of unmanned systems. For CUAS applications, Titanis – with its direct engagement/point defence, and passive and active EW and DE capabilities – constitutes a significant force multiplier.



FIND OUT MORE: [EOS-AUS.COM/DEFENCE](https://eos-aus.com/defence)

Acceleration, Vibration, Radiation... It's A Jungle Up There.

Quartz crystal oscillators are the frequency source of choice for a variety of functions in virtually all military and aerospace systems.

However some of their superior qualities, such as high frequency stability and low noise, can quickly degrade when they are exposed to the extreme operating environments associated with these applications.

Shock and Vibration Effects

For oscillators used on mobile platforms, vibration and shock effects can be significant. While crystal oscillators can be designed to withstand extreme levels, these effects can be the limiting factor that determines the achievable performance in any given system.

Random vibration, for example, will show up on the output spectrum of the oscillator as an increase in the noise floor. The amount of degradation is determined by (1) the level of vibration and (2) the acceleration sensitivity of the oscillator. The effect can range from barely noticeable to catastrophic. The severe vibration experienced on a missile system or other airborne platform can cause phase noise to degrade by as much as 50dB to 60dB.

Temperature Extremes

The temperature conditions often present in military and aerospace environments are another critical factor that impacts signal source performance.

The frequency vs. temperature characteristic of the oscillator will be determined primarily by the quartz crystal itself. Most MHz range crystals are cut to conform to a temperature curve in the "AT" family of cuts. The temperature coefficient of these crystals is relatively flat compared to other passive components. Even over the wide range of -55°C to +125°C, the frequency error can be as small as ± 20 ppm.

For many applications better stability may be needed – and temperature compensation can be added in order to reduce temperature error to < 1 ppm.

Radiation Environments

When a device will be deployed in space, some level of radiation tolerance is required.

For satellites deployed in Low Earth Orbit (LEO), radiation tolerance of up to 50 krad(Si) TID (total ionizing dose) is required. TID is a cumulative deteriorating effect over time at some rate.

Deep space and other missions will require a tolerance of 200 krad(Si) TID or greater. Single Event Effects that can occur randomly – due to impact with a heavily charged particle – must also be taken into consideration.

Oscillator design for radiation tolerance also demands close attention to all the components that are used in the device. While most passive components are inherently radiation tolerant to a high level, some commercial semiconductors are sensitive to TID levels of only a few thousand krad(Si).

Radiation hardened devices are manufactured with special processes and are extensively screened and tested on a lot-by-lot basis, with an attendant increase in cost. The trend for commercial LEO satellite systems, for example, is to carefully evaluate and test lower cost COTS (Commercial-Off-The-Shelf) components to find designs with acceptable performance. This approach requires a certain level of risk acceptance that may not be appropriate for military and related applications.

Please visit www.greenrayindustries.com for additional resources and information about frequency control solutions for military and aerospace systems and applications.



Ultra-High Reliability Reference Sources for Mission Critical Apps.

For over 60 years, Greenray quartz crystal oscillators have served as high reliability reference sources for industrial and military applications that require low g-Sensitivity and excellent phase noise in order to optimize system performance while operating under the most demanding environmental conditions.

State-of-the-art vibration compensation enables our oscillators to deliver excellent phase noise performance and the short and long-term stability necessary in high shock and vibration environments.

Leveraging our extensive design and manufacturing experience, Greenray space-qualified TCXOs have been designed specifically for LEO (low earth orbit) satellite applications and/or deep space exploration. They offer guaranteed, long-term performance under radiation exposure from 30 krad(Si) to 200 krad(Si) TID.

Our T1254, T1354, T1276 and T1282 Series TCXOs are ideal for high orbit transponders, LEO nano/micro satellites, RF telemetry systems, multiband converters and upconverters.

The Y1631 Series clock oscillator is available from 60 to 130 MHz and combines low phase noise *and* ultra-low g-Sensitivity performance (to $5 \times 10^{-11}/g$). It features a 0.68" sq. SMT package, +5 Vdc supply and +10 dBm sinewave output. It is ideal for a variety of aerospace-specific and other applications.

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CP CASES NEWS



TYPES OF CASES AVAILABLE FOR THE DEFENCE AND SECURITY INDUSTRY

Defence and security industries require military cases that can combat rough handling, extreme climates, environmental hazards and unpredictable conditions. Lifesaving equipment requires the right casing which is why CP Cases offers a variety of different cases with IP ratings from IP54 to IP65.

Weapons cases

Transporting military weapons requires rugged cases that can protect expensive equipment from extreme climates and rough handling. Our military weapons cases are tailored to different applications depending on security size, weapon type and more.

The key to an effective weapon case is durability which is why CP Cases military cases are resistant to impact, extreme temperatures and water or dust. Nitrogen-blown polyethylene foam inserts eliminate the possibility of chemical contamination or corrosion, meaning weapons are kept safe and in pristine condition.

Amazon cases

Amazon cases are designed for military markets made for transit and storage of defence and security equipment. For maximum capacity storage and inter-stackable, amazon cases are the ultimate transportation for military equipment.

Made for air transport, amazon military flight cases are moulded from rugged polyethylene that can withstand rough treatment and extreme climates. UV stabilised, easily cleaned and corrosion resistant, these cases are ideal for transit and storage.

Helmet cases

Helmets are vital pieces of defence equipment that can save lives. This is why it's important that they are properly stored so as to protect them during transportation.

Our helmet cases are specifically designed for helicopter pilot helmets which cost a great deal of money and so require the most premium cases. Made using AluWeld, these high-tensile aluminium cases offer maximum protection against environmental hazards.

Inside the case, we use engineered foam to cushion the helmet and the exterior has been swaged to increase stiffness by 25%. These lightweight cases are practical in design and effective in protecting military helmets.

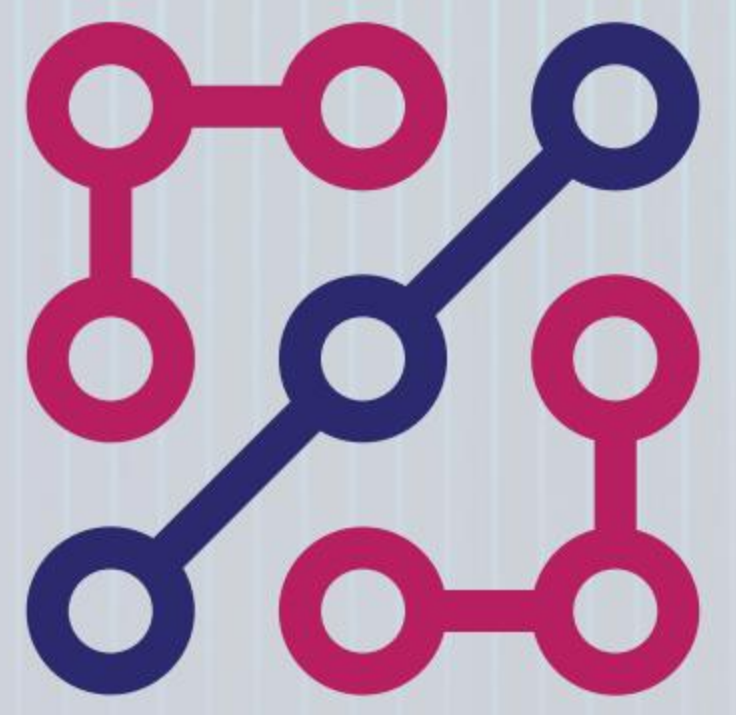
Medical cases

Lifesaving medical supplies need to be transported safely, especially in military situations. CP Cases medical equipment cases provide tough water-resistant transportation for vital medical supplies. With a variety of customisation options, medical cases can be supplied with drawers to help organise and secure medical equipment.

Hygiene is paramount when transporting medical equipment which is why our cases are made from polyethylene which has zero fungal growth and is tested to MIL-STD-810F.

Extreme military environments require rugged cases to transport and store the highest grade of defence equipment. Having the right storage solutions will ensure that equipment lasts longer and performs at its best. At CP Cases, we have a variety of different custom cases for all defence and security uses.

CONCURRENT TECHNOLOGIES



Concurrent Technologies announces a Rugged 3U VPX™ Position, Navigation and Timing (PNT) Board



Solutions Brief

Scan here to receive your digital copy of our latest Solutions Brief.

Assured Position, Navigation & Timing solution for Defence Applications.

Concurrent Technologies announce a rugged 3U VPX™ Position, Navigation and Timing (PNT) Plug In Card. Designed in alignment with the SOSA™ Technical Standard, PR A11/61d-RCR provides resilient PNT data for sensor-based solutions that are used in Electronic Warfare and Intelligence, Surveillance and Reconnaissance applications. As a key differentiator, PR A11/61d-RCR is ITAR free and is designed and built in the UK utilising technology licensed from Racelogic, another UK company specialising in positioning data.

In normal operation, PR A11/61d-RCR sources highly accurate PNT data from a built in GNSS receiver and uses this to discipline a Chip Scale Atomic Clock (CSAC). This, in turn, feeds radial clock signals to the signal processing plug in cards that make up a VPX based sensor subsystem. In periods of GNSS denial or jamming, accurate PNT data

continues to be provided by utilising signals from a built in Inertial Measurement Unit and sophisticated Kalman filtering techniques. The timing slot on most commercially available backplanes supports one or two 10GBASE-KR pipes and PR A11/61d-RCR is controlled using one or other of these pipes. Bussed clock signals are also supported for backwards compatibility with older VPX systems.

Dr Miles Adcock, CEO at Concurrent Technologies, commented:

“The development of this new PNT plug in card shows that Concurrent Technologies is now investing in products that provide additional differentiated capability alongside our state-of-the-art single board computers. This product will have universal appeal but was driven by the needs of several lead customers who are looking to Concurrent Technologies to bolster the scope of UK sovereign capability for assured PNT.”

For more information contact Nigel Forrester on:

+44 (0)1206 752626

or: **nforrester@cct.co.uk**

or Brent Salgat on: **+1 (781) 933 5900**

or: **bsalgat@gocct.com**

Solutions Brief

Deploying Assured Position, Navigation & Timing (A-PNT)

CONCURRENT
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Military Professional Division of Aqualung Group propose **innovative and adapted solutions** for the military and professional market. For more than 75 years, Aqualung Group is pioneering innovations in the underwater industry. Its **Military Professional Division is the industry leading specialist** for best-in-class solutions dedicated to military and professional missions in any water environment. We **recognize** the integral operational requirements of different military and professional End Users and **support** them with premium field proven systems. Our equipment **enables** the End Users to focus on their primary purpose.

Our regulator manufacturing plant, Apeks Maine Equipment, is based in Blackburn, UK. It was founded in 1973 and acquired by Aqualung Group in 1997. There we design and manufacture **world-class regulators and emergency breathing systems** used by maritime military operators worldwide, including UK MoD, and public safety diving units.

We are dedicated to offering much more than just the necessary equipment. For us, it is a true devotion to bring **best-in-class field proven systems and services** that reinforce essential personal safety and enhanced performance for all Military and Professional End Users globally.

We **perform product research and development** as well as test and evaluation scenarios. The analysis machines we have can measure and test equipment performances as well as simulate any underwater breathing conditions. Dive depth, breathing rate, force and water temperature can all be adjusted for higher quality testing. Conscious of the serious environmental challenges military End Users face our nonmagnetic analyzing processes and equipment are at the **highest level**. We are also equipped with a state-of-the art positive pressure cleanroom.

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The Use of Special Operations Tactical Diving Vehicles

An Historical Review and Its Contemporary Relevance



Large hybrid TDVs can act as stand-off attack, fire support and surveillance platforms

Carrier Seal, a hybrid TDV able to transport 8 personnel and travel at high speed on the surface, semi-submerged and submerged

On November 1st 1918, during the last days of World War I (WWI), two men from the Italian Navy rode a primitive semi-submerged slow running torpedo into the heavily defended Austro-Hungarian naval base at Pola.

The men did not use breathing apparatus and thus had to keep their heads above the surface. As a consequence, they were observed and captured; but not before they had attached delayed initiation munitions (limpet mines) to the hull of two key targets. Approximately two hours after being taken prisoner, muffled explosions were heard aboard the battleship *Viribus Unitis*, which subsequently sank fifteen minutes later, together with the freighter *Wien*.

Despite its profound implications, the significance of two men sinking a Battleship was lost on the larger maritime powers of the time, such as the United Kingdom (UK) Royal Navy (RN) and United States Navy (USN), who were understandably focused on large surface capital ships as the central form of maritime capability. However, despite being an ally of Great Britain in WWI, Italy suspected it might one day have to confront the numerically superior British fleet, thus work began on developing a means of addressing this strategic imbalance. And so, throughout the 1930's a small group of highly motivated visionaries within the Italian Navy, evolved the concept of operations first employed at Pola and pioneered a new form of maritime warfare that was to have a significant impact in the next world war that was soon to follow.

By the outbreak of World War II (WWII), in complete secrecy, the Italian Navy had developed the Tactics, Techniques and Procedures (TTPs) along with the associated specialist equipment required to effectively prosecute a new form of maritime warfare. This military innovation employed the free-swimming diver as a covert underwater saboteur who was able to travel considerable distances using a submersible vehicle. Although surface swimmers had been used since ancient times to assault or to disrupt an enemy, this was a form of underwater warfare the world had not yet seen. Delivery of effect was executed using modified

submarines carrying Dry Deck Shelters (DDS) to transport two-man vehicles or Chariots. Once at the objective area, the submarine would bottom out in shallow water and 'frogmen' from the top-secret unit Decima Mas (10th Light Flotilla), would lock out of the submarine using long endurance, closed circuit oxygen rebreathers. The DDS would then be flooded, opened and the Chariots pulled out onto the submarine casing. These were then ridden sub-surface to their objective by two Operators. Once at the objective area, a suitable target would be identified and they would descend under the target vessel. A front section of the Chariot containing 150kg of high explosive was then released and suspended beneath the ship's hull before being prepared for later detonation. Each Chariot carried two such weapons for use against primary targets and small limpet mines for use against secondary targets.

Starting in 1940, these TTPs were first put into effect during a series of successful attacks against Allied merchant shipping located in the British controlled Gibraltar anchorage. Later in December 1941, three Decima Mas Chariots penetrated Alexandra Harbour in Egypt and managed to put the British battleships HMS *Valiant* and HMS *Queen Elizabeth* out of action for the remainder of the war. Prime Minister Winston Churchill described this attack as "the most strategic strike in the Mediterranean theatre". Deeply frustrated at the UK's lack of innovation in this field, he instructed Combined Operations, the organisation responsible for Commando raids, to do everything possible to replicate the Italian capability.

Having come to understand how these attacks were being prosecuted, Combined Operations and the RN embarked upon their own programmes to develop the TTPs and equipment necessary to undertake this new type of warfare. Once operational, the British quickly became very effective at it and later in the war, in an ironic twist of fate, following the Italian capitulation to the Allies, the British undertook joint 'Chariot' operations with the Italian Decima Mas against Axis forces in the Mediterranean.

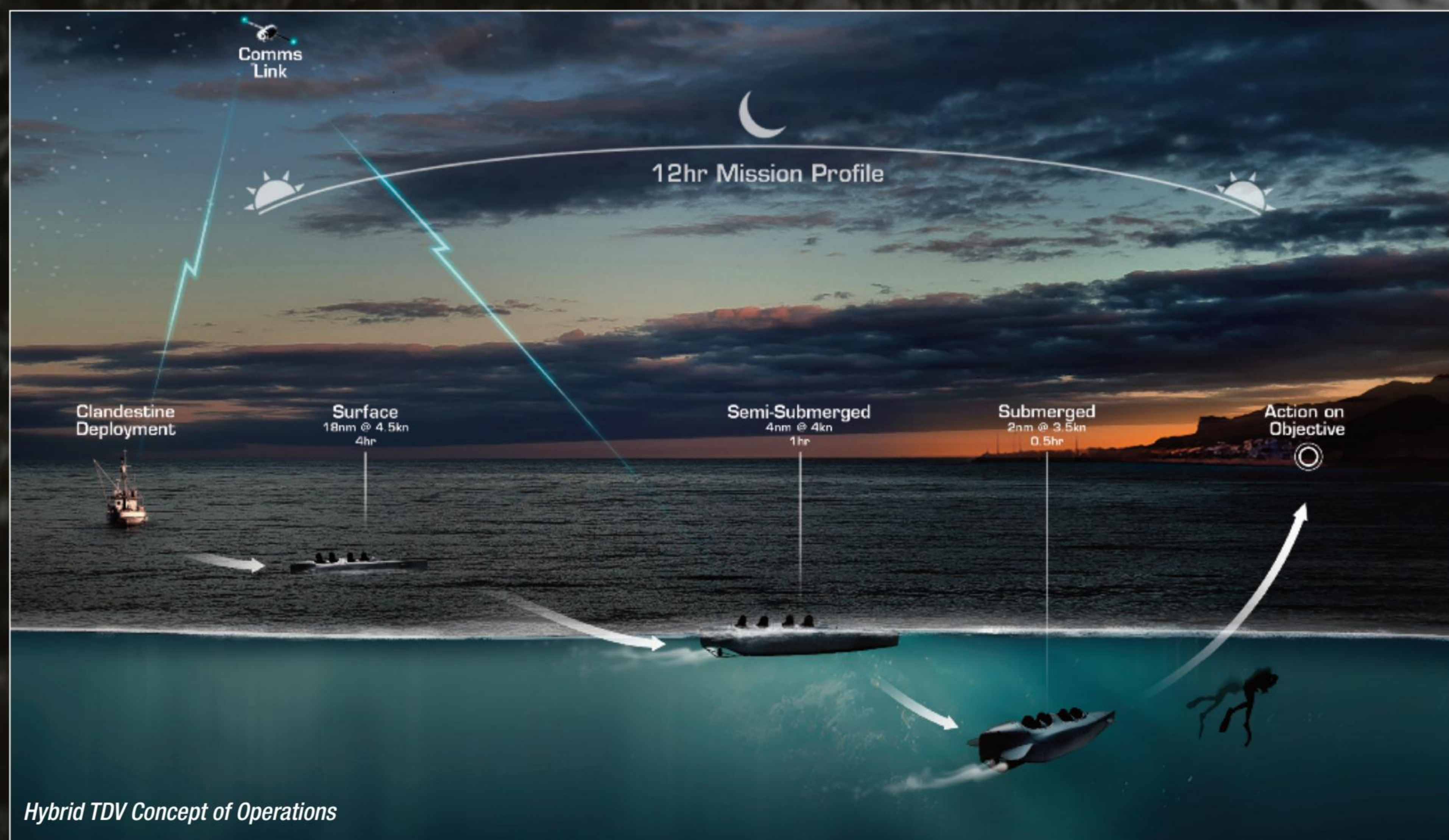
In today's Special Operations Forces (SOF) parlance, this capability is often referred to as Underwater Maritime Manoeuvre (UWM) and to a greater or lesser degree, is now a capability held by numerous nations worldwide. However, the origins of this can be directly traced back to that Italian attack at Pola at the end of WWI and the Decima Mas of WWII.

The list of specialist equipment and systems necessary for the prosecution of offensive maritime SOF operations is long and continually growing. However, the key means of projecting UWM capability is the Tactical Diving Vehicle (TDV). In WWII, this took the form of the Chariot, often referred to as the 'Human Torpedo', the motorised submersible canoe, colloquially named the 'Sleeping Beauty' or the RN miniature submarine 'X Craft'. Contemporary equivalents are the USN Mk 8 Swimmer Delivery Vehicle (SDV), the Shadow Seal hybrid TDV and the USN Dry Combat Submersible (DCS). There is however a hybrid vehicle with capabilities that differ notably from purely submersible TDVs. An example is the Carrier Seal that can travel hundreds of miles at high speed on the surface, run for extended distances semi-submerged and transit fully submerged carrying large payloads and weapon systems at speeds and for distances only dreamed of by WWII Charioteers.

Is then the penetration of an enemy harbour and the disabling or sinking of a key naval platform a realistic proposition today? If

facing a non-peer adversary then the possibility is potentially very high. However, when facing a peer or near peer adversary, mission success probability reduces significantly. Not only is such a threat understood and likely to be anticipated, sophisticated passive and active diver surveillance systems are now able to detect and identify the various signatures that emanate from the human, underwater breathing apparatus and the TDV, automatically triggering defensive measures. However, not all harbours and anchorages are defended to such a degree. This potentially leaves targets of opportunity and the ongoing conflict in Ukraine demonstrates the vulnerability of naval vessels berthed or anchored in hostile waters away from the security of their home port.

Whilst attacks on poorly defended low-key targets may not have strategic effect, at a tactical level, such attacks cause disruption, confusion, navigational restrictions in confined waters and the re-allocation of enemy resource away from the front-line. In addition,



Carrier Seal in low profile semi-submerged mode discretely deploying a SOF team across the shoreline

success against such targets is a moral boost for attacking forces and the wider associated population, the positive psychological impact of which should never be underestimated during war.

If there is a low probability of a successful UWM strike against a peer or near peer strategic asset, what then is the reason for nations investing in such a capability? In reality, the classic 'ship attack' is only one of many operational scenarios. Maritime SOF mission profiles are broad and are continually evolving in response to the needs of modern warfare and national security interests. For example, such missions include Intelligence, Surveillance, Target Acquisition and Reconnaissance (ISTAR) operations, Maritime Counter Terrorism (MCT), counter narcotics, the infiltration, protection and exfiltration of Secret Intelligence Service (SIS) operatives, the covert deployment of SOF personnel across the littoral and into the hinterland, pre-amphibious landing beach reconnaissance and seabed warfare operations in navigation 'choke-points'.

With geopolitical tensions driving a maritime pivot by NATO and her allies, what then is the future 'direction of travel' for this highly specialised form of warfare? It is widely acknowledged within the western maritime SOF community, that the focus on land activity over the last twenty years has resulted in a number of littoral capability deficiencies. Modernisation priorities therefore include but are not limited to:

1. **Improved lethality & stand-off attack capability**
2. **Increased UWM capability with greater range, speed and operational employment flexibility**
3. **Signature reduction**
4. **Sub-surface communications**
5. **Electro optical sensor systems able to detect, recognise, identify, range and track objects of interest**
6. **Improved sub-surface navigation**
7. **Improved diver thermal protection**
8. **Extended duration tactical life support systems with increased depth capability and duration**
9. **The integration of un-manned surface and sub-surface systems into the SOF maritime battle space**
10. **Improved situational awareness above and below the water-line.**



The Shadow Seal Four Man hybrid TDV

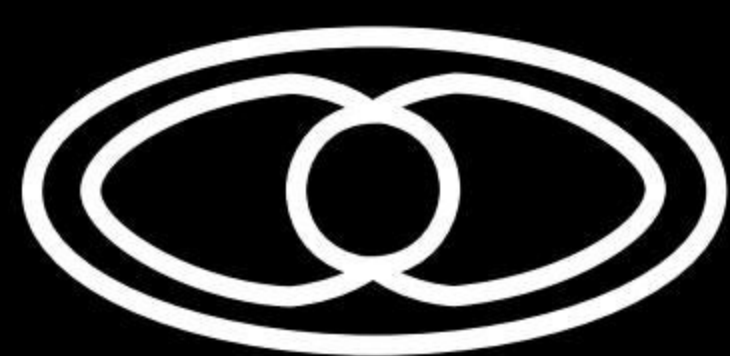
Addressing these capability gaps requires significant investment and industry innovation in order to support the concept of the hyper enabled SOF Operator. At a unit level, whilst these technological challengers are being addressed, there is a transitional effort by many western maritime SOF organisations, to return to their roots through the re-establishment of a 'waterborne' culture. As a consequence, technology deficiencies are now being bridged and a stronger special operations maritime capability is being re-established.

The key to successfully achieving this operational re-focus, are TDV platforms that have the flexibility to project UWM capability in an effective and efficient manner, are employable across a broad range of mission profiles and operational scenarios, whilst enabling maritime SOF, where required, to undertake operations without the need for dependence upon large naval support platforms such as submarines and DDS systems.

Paul Haynes is the Head of Special Operations Capability for JFD and a former UK Special Forces diving Instructor, Supervisor and Swimmer Delivery Vehicle Operator. Since leaving the military, Paul has worked for JFD, the world's largest manufacturer of defence diving equipment and as a consequence, remains at the forefront of special operations life support and submersible vehicle development, design, test and training.



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IS DEFENCE MARKETING THE SECOND OLDEST PROFESSION?



The Genesis of this article came whilst planning a response to a “request to tender” to represent and assist a defence company with its marketing.

As one of its four main strands of work Lutra helps companies get into the defence market (difficult but the easy bit!) and win business (more difficult still by several orders of magnitude). It can be in their own country or if non-British, the UK's. To beginners it is stunning how difficult the whole process really is.

The inspiration for the title came from a senior office who posed the question “Is Defence Expert The Second Oldest Job Description In The World?” and went on to qualify it by further saying that “the second profession only outnumbered the first in the number of amateurs trying to be one”. Lutra has been in and around defence in one role or another for in excess of 50 years. The longer one is in the defence market the more obvious is the similarity of his question is to defence marketing.

Probably the first and biggest question to answer for any company or decision maker is do you really want to do this? You or your company may have created the most beautiful baby (read system or item of technology) ever. At least you think so. Have you asked others whether it is? Not your mother or aunt but some hardnosed neighbour with several children of their own.

If they say your baby is ugly, what will you do? Think about creating another, schooling this one to be cleverer than anyone else or spend money to dress it up as something different? Whatever you do it will take time, money and resources that might be useful elsewhere. Even if people fall in love with the baby and help it grow and develop it will be a long time before the baby becomes useful and earns money.

Thus, the first questions are:

- *Is the technology as good as you think it is?*
- *Is it as useful as it could be?*
- *Can others see more or different potential in it?*
- *Does it even have a use or application in their vision, if not can that vision be changed?*
- *Can I afford to let it grow up and the willingness to commit to it?*

Half measures won't count, its playing or cupboard love. Getting most of the way down the road to their first job and giving up on education or training is not an option for your children either. Backing off once you start on the road and have done enough to convince the users that its worth looking at is not an option. You will never be believed again.

Given these difficult questions it's important to understand a few basics about defence procurement. Perhaps the most important is it is multi staged, processed and faceted. This leads to the first in a series of hard realizations. It is a time-consuming process. The more you work out the reasons for this

the second becomes apparent, it's resource hungry and thirdly you start to see how bureaucratic it is with processes and procedures to go through and standards to meet. However perhaps the most important issue is getting public money into the budget.

If you are working in a democracy the main issue is it's, public money. People have to be sure before they commit to a project. Even then when its blindingly obvious the financiers may well, and usually do, change their mind at some critical juncture in the process. Couple that with financiers taking a short term, this budget year, approach thinking saving a penny now, even if it costs a pound next year, a good move and it's a difficult market.

The lessons so far. Make certain:

- *Your baby is beautiful and everyone agrees*
- *Everyone can see baby's potential*
- *You understand it will take time to become employed unless you have a prodigy (about 3 a year in the world!)*
- *There are lots of forms and processes to go through to get the first job*
- *There are even more forms to go through to get the first pay cheque.*

All this leads to hard work, difficult decisions and a lot of time. It seems, and is, full of brick walls and blind alleys and bureaucracy. The best advice is to get help earlier rather than later. A piece of advice Lutra repeatedly offers is that a gram of preparation, discussion and forethought early is worth a kilogram of heartache later. It might seem expensive to get the advice of some hard-hearted consultants who ask the right, and always difficult, questions early in the process and then help you set up the processes, systems and campaigns needed. Uncomfortable sessions with shareholders, redundant workers or insolvency experts in due course are more expensive and much worse. You will certainly do all the latter three if you skimp the early parts of the process. A gram of

If they are any good those consultants will be independent and experienced at helping you adopt the long-term approach. The good ones try to see beyond your, or even the horizon. Long after they have left you might thank their children.

Having decided you really want to do it and you are prepared for the long term then your child must rise to the top of the class and then pass the interview and land the top job, i.e., you must win the inevitable competitive tender. Remember it's all about public money and accounting for it and demonstrating that it has been wisely spent and accounted for. Defence tendering has many stages and getting to the winning line in the school sports day involves qualifying and then heats and semi finals and so on. The race



is a 3000m steeplechase not a 100m sprint. It is long with lots of obstacles. This all takes a campaign or rather campaigns. It is about winning two races at once. Convincing the judges and timekeepers that the offspring (no longer a child) and its parents (you and your team), who support it, are the best in the race and the business. A good consultant can help you do this. Think of them as the coach, independent, committed and knowledgeable, who knows what needs doing and who to approach.

Find a consultant who understands your subject, sector and MoD. Can they talk to 200 people overseas if that is what is required? Can they explain why the cloud of pollen is likely to set some biological detectors off but not others? Believe it or not these two images are related. Can the consultant grasp new technology and its application? Do they "live" the issues, do they have the experience? These are all attributes Lutra lives by.

That leads to campaigning. There are several threads to this. The company needs promoting, secondly the technology has to be promoted, thirdly any existing product needs publicising, fourthly the standards (lots in defence, more time and resources) have to be achieved, certified and put in the public domain, fifthly the user must be engaged and allowed to see the technology, existing development/product and the company so they have confidence in the package. Sixthly there has to be a concept of use. Because defence marketing is a long game this has to be continuous for several years. Partly this is the role of the consultants but equally it's you and your team, with their guidance, engaging with the government specialists and end users.

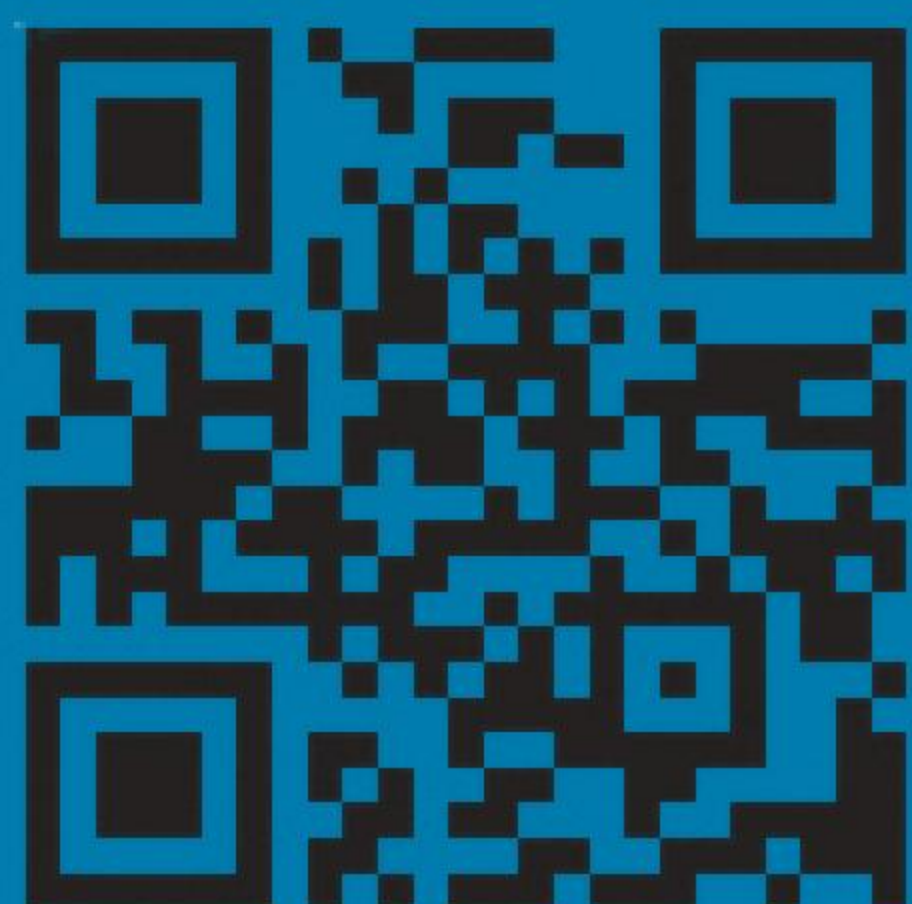
This involves a campaign of a package of visits to and from the end user and the procurement officials. There are no customers in defence it's like a jelly with bits of fruit in it. Each one needs searching for and chewing to work out what its flavour is and then digesting. Although the jelly represents what is to be eaten the flavour comes from the fruit bits. Your baby will understand!



The campaign to raise awareness involves publicity, press releases, advertorial, adverts, events. Selecting the right ones is important. Again get help from the consultants. The right exhibitions are especially important because they maximise contact with multiple and different end users in one hit. You can also engage with senior officials and officers. Items and issues can be discussed. Then when the issue is raised with them, they have a feel for the offering. Meetings at exhibitions importantly lead to more visits. At exhibitions you can investigate other opportunities for the technology or product. You can also see what the competition is doing. Consultants can advise on where to go and what to do. Social media whilst important probably has less impact than for civil marketing and products. Given the turmoil in that sector they are probably less effective than they might have been and are also more transitory than books and journals.

This is really only the start of this topic. Campaigning is another chapter. Having the will to last the long term and the vision to see the end point is critical. Consultants are important in making those decisions and guiding proceedings. For the long term you must have good independent advice, Lutra is a good godfather, to steer your child's progress. Good consultants will give you independent rather than sycophantic advice. It may be difficult to accept but its always worth the money and listening to. It helps bring the baby to maturity.

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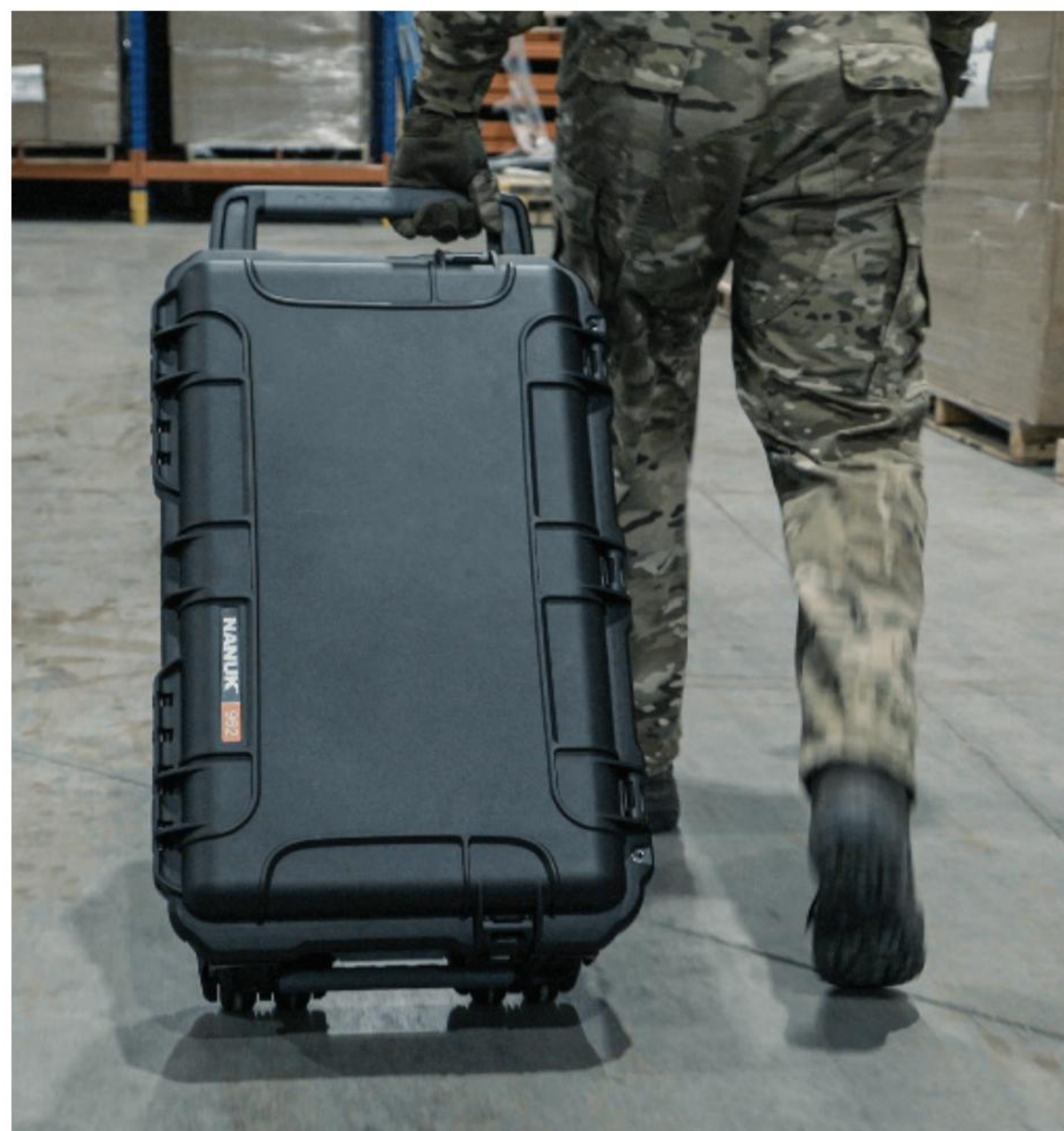
NANUK introduces two new protective case sizes: **962 and 980**

Robust and Compact: **NANUK 962**



Robust and compact, the **NANUK 962** protects and transports heavy loads with minimal effort. It's built to effortlessly glide over the most punishing terrain with two (2) sets of heavy-duty double wheels featuring stainless steel bearings. It comes standard with a retractable handle which makes it the perfect premium waterproof protective case to go anywhere.

Like all **NANUK** waterproof protective cases, the 962 is made of crushproof NK-7 resin certified to withstand extreme impact and continuous vibration – in other words, it's indestructible. It's also equipped with two (2) oversized team-carry handles as well as five (5) of our legendary Power Claw latches and will never open accidentally. Molded with deeper ribs and taller feet, it's highly stackable.





The **962** comes with our lifetime warranty, your assurance that we build cases to protect your most valuable gear for life. Additionally, a polycarbonate ID Window can be attached quickly and easily to the front or side of the case. Other options include TSA Approved Latches as a retrofit kit, TSA Approved locks, Panel Installation Kit, Cubed Foam, Padded Dividers, and Lid Organizer.

Interior dimensions

L711mm x W419mm x H236mm
L28.0" x W16.5" x H9.3"

Exterior dimensions

L790mm x W495mm x H282mm
L31.1" x W19.5" x H11.1"

Available colors:

● Black ● Orange



**New case size available
in February 2023:**

NANUK 980

Interior dimensions

L685mm x W338mm x H158mm
L27.0" x W13.3" x H6.2"

Exterior dimensions

L760mm x W410mm x H185mm
L29.9" x W16.1" x H7.3"

Available colors:

● Black ● Olive ● Orange

for more info.

DON'T STAND STILL;

Always Evolve, and Exceed Requirements as They Emerge.



Survival Systems Limited (SSL) the Dartmouth (Halifax) Nova Scotia based company are specialists in the provision of simulation survival training systems centred around survival on and in platforms especially those where water is involved. Famous for their Modular Egress Training Simulators (METS®) for helicopters and light aircraft they also provide firefighting training systems and METS® for amphibious and land rollover vehicles that work close to water.

Their success revolves around specialist knowledge, applying and constantly seeking to expand it, flexibility and meeting customers' requirements. The knowledge base comes from experience, their indigenous Research and Development, much of it shared internationally, paying attention to other R&D and following market development of the platforms they are replicating. Application of the knowledge base is vital. The knowledge covers many aspects including financial scheduling. The move to the METS® concept was driven by the realization that reducing the capital cost of procurement is important but the need to reduce the cost and increase the productivity of training is as important. The greatest savings in expenditure are achieved by simplifying training methodology and by reducing infrastructure costs by reducing the systems that must be stored.

Survival training systems for helicopters that fly over water, military or civil, are called Helicopter Underwater Escape Trainers (HUETs). If you visit a company providing training with HUETs provided by SSL's competitors, it is not uncommon to find several HUETs, each representing a different type or class of helicopter. By reducing the number of HUETs you make the provision of the facility and its design more affordable and efficient. In the commercial world that translates to commercial advantage for the training providers. In defence it reduces costs.

This was the spur for the switch to modular designs for METS®. With just one base platform and different panels and fittings several configurations can be achieved with one METS® frame. Thus on one platform, Merlin for example, can be used for training in the morning. With a few panels and fittings changed, Chinook could be the afternoon's training. No need to

buy, and provide space for a second HUET. Modularity is not everything if a bespoke system is needed the design and manufacturing skills enable its delivery.

This then leads to training fidelity. R&D showed that representing what actually happened when an aircraft struck water was key to survival. Seats collapse, things move around. The result is that an emergency exit that was easily accessible and easy to open is less so. The muscle memory must be trained to get to the likely position of the exit catches and latches after the crash rather than before it. Thus, the seats and harnesses must behave in the same way and be in the same position in training as they are in reality. Seats need to collapse in the same way as actuating seats in the real aircraft, restraints need to represent, be tightened, and be release identically; and most importantly exits are required to be orientated to the trainee/escapee as they are post-crash. Studying these issues leads to a whole range of design and use criteria which must be right first time.

Aircraft design, usage and roles change. Equipment fits evolve and change. This is much to the advantage of a modular, panel based, design such as Survival Systems Limited's METS®. There are several reasons for this. Not all fleets change at the same time. Often only some of a fleet changes. Thus, the same user may well have different parts of the fleets configured differently depending on the equipment available. Being able to switch configuration by changing just a few components rather than having another HUET is an advantage for the user, the trainer, and the financier.

Another key aspect to emerge from R&D was for the HUET to be part of an integrated system. Primarily this consists of the HUET and the lifting system. Putting people into a box which you lower into the water and then submerge and turn upside down-the unfortunate consequences of helicopters crashing into water-is inherently dangerous. Not as dangerous as the real thing but more than sitting at a desk reading papers. The trainees should not fear the system failing.





If people panic or get trapped there is a need to get them above the water surface as quickly as possible. This involves lifting a large mass of equipment and people through water and getting them to a position where they can breathe. The target for this, the result of lots of R&D, is 7 seconds.

A lift failing or even malfunctioning is not an option. For this reason the lifting systems have to be “personnel-rated”. This involves system redundancy and duplicated capabilities. This is not cheap. Look carefully at some training facilities and the lifting system is where the supplier has cut corners. The buyer, through ignorance or lack of diligence, has not applied the rules and taken the cheaper price. All SSL lifting systems from the most to the least complex or simple application meet the personnel-rated requirements. All SSL’s METS® are designed to allow water to drain from them as quickly as possible and its lift systems, but not all others, achieve retrieval to a safe air gap for trainees within the 7 seconds.

Following on from the concept of training as a system that must provide fidelity in training there are other things to be considered. When a helicopter crashes it will usually be: in poor visibility, stormy with gusting winds and raining, and there will be large waves. If you have really drawn the short straw, it will be foggy and snowing too. Training in a benign environment teaches wrong lessons-back to muscle memory. SSL has designed and provided consultancy to many clients for Survival Training Simulation Theaters (STST™) training facilities that incorporate the ability to simulate large swells, high winds, darkness, lightning, rain, and fog, audio tracks, visual lighting representative of strobe, emergency, etc., and CCTV for observation, instructional feedback, and consistency based training delivery and results. Back then to safety. If someone gets into trouble in the water it is imperative to return to daylight and calm instantly. SSL’s STST™ designs do just that.

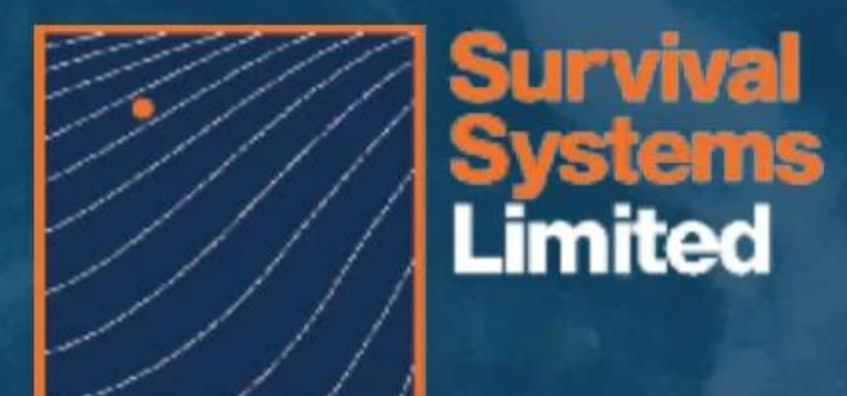
Moving on from this one comes to where the crash might take place. Unfortunately, many helicopter mishaps will take place on the helicopter deck of a platform, ship or rig, at sea. Dangerous as crashing into water is, crashing into hard metal is worse as there is the added risk of fire. Two groups of people need training; those in the helicopter and those on the

platform. SSL’s Fire Training Simulation Systems including: Modular Fire Training Facility (MFTF™), Helicopter Fire Simulator (HFS™) and Helideck, enable just that.

Keeping pace with the market, even out pacing it is important. Business development is just as heavy on R&D as new systems. Thus, when a spate of vehicles overturning into rivers and canals led to several deaths on operations, it quickly becomes apparent that there is a need for simulators for these platforms. The same is true of fast work boats, Rigid Hull Inflatable Boats (RHIBs), and new design amphibious vehicles. SSL has delivered simulators systems for all these diverse platforms.

You do not achieve this plethora of base models, variants, and new designs without being close to your customers. Listening to their views and advice, incorporating their ideas, responding to their operational concerns, and delivering to their schedule and financial capabilities are all important to meet the demands of training personnel to survive an emergency situation. Equally, following up on their needs for support and maintenance, retraining, updated certification and equipment modification are as crucial in providing assurance to those responsible for safety in this difficult and demanding subject as brilliant design. SSL is acknowledged worldwide as a trusted partner in survival training.

Celebrating 40 years of delivering results on time, within budget, and to customers’ complete satisfaction requires perpetual motion with sensitivity to the subject matter. Constant disciplined development and never standing still have been key to success in this discipline for 40 years.



ROBUST JAMMING & SPOOFING DETECTION ON ALL PLATFORMS

Following on from our report on GNSS integrity in the last issue, we would like to introduce you to our GIDAS product family today. As is well known, the first step for safe GNSS applications is to be aware of present threats.

The core of our GNSS Interference Detection & Analysis System GIDAS is formed by multiple jamming and spoofing detection techniques developed in more than 20 years of research. The smart combination of different monitoring approaches makes for a robust statement of the current local integrity of the GNSS positioning and timing services.

So you can protect your stationary infrastructure (e.g. airport) from GNSS interference, we have developed GIDAS STATIONARY.

GIDAS Stationary consists of a monitoring center and monitoring sensors. Depending on the number of sensors (at least 3), you can even localize the source of interference.

GIDAS MONITORING CENTER local or nationwide

The monitoring center is the core entity of any permanent installation of GIDAS. It hosts a central database, the web-based user interface, and alarming interfaces.

Having multiple GIDAS installations distributed nationwide requires one central dashboard to monitor, configure and maintain the system. The generation of nationwide interference reports has never been easier.

GIDAS MONITORING SENSOR stationary

The monitoring sensors form the eyes and ears for the GIDAS system. A stationary monitoring sensor is composed of a dual-module GNSS antenna and a receiving unit with a small form factor.

We can also bring our knowledge to your platforms with GIDAS EMBEDDED

GIDAS EMBEDDED algorithms

The heart and core of GIDAS. Our knowledge regarding GNSS interference detection poured into source code, forming a C++ library to be directly integrated into your solutions.

GIDAS EMBEDDED micro controller

By supporting selected microcontrollers, GIDAS algorithms can run side-by-side with your applications on existing hardware platforms.



The system is not only available fixed and stationary, but also mobile for mounting on a rooftop of a vehicle, as well as portable in a waterproof IP-rated case.

GIDAS MOBILE

Some GNSS-based applications require mobile units mounted on the rooftop of vehicles to monitor GNSS interference on the move.

GIDAS PORTABLE

Our GIDAS portable is a fully autonomous, portable, real-time system to monitor the GNSS services wherever needed. It is packed within a waterproof IP-rated, portable case and comes with a rugged and IP-rated operator tablet. Depending on your needs the dual-module GNSS antenna comes with a magnet mount for tripod-less application or with a standard mount for tripods.



If any interference is detected, you get alerted either via the user interface, email or any custom interface. The system is operated via a web-based user interface, accessible by the included tablet. The user interface can be accessed from any webenabled device with a data connection, even from distance. GIDAS portable is powered by a 230V power supply and can also be powered by a portable battery, optionally supported by a solar power source.



OUR GNSS INTERFERENCE DETECTION & ANALYSIS SYSTEM (**GIDAS**) LETS YOU MONITOR THE GNSS QUALITY WHEREVER NEEDED.

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Avon Protection expands CBRN protection



A new line of CBRN protective garments are enhancing Avon Protection's work to keep operators safe from chemical threats in high-risk environments. Manufactured from the company's proven rubber technology, the EXOSKIN range is designed to protect personnel without compromising the wearer's tactical agility in the field.

EXOSKIN Gloves and Boots

The ambidextrous EXOSKIN-G1 Tactile CBRN Gloves allow for the handling and operation of electronic touch screen devices. With a rubberised outer layer textured to maintain grip in wet conditions, and an intelligent, seamless inner knitted liner that has a conductive tip on both the thumb and forefinger, the layers optimise the wearer's dexterity and allow them to complete their mission safely.

The EXOSKIN-B1 High Traction CBRN Boots provide improved durability and agility in the field with quick-release straps to secure the garment over standard footwear. A highly textured sole improves the wearer's manoeuvrability in all underfoot conditions. In addition, it is 100% leak-tested.

"In developing the EXOSKIN range of CBRN protective garments, our focus was to optimise end-user versatility in the most demanding environments, while continuing our relentless pursuit to keep operators safe from these chemical and biological threats", Steve Elwell, Vice President of Avon Protection UK and International, said. "We applied our deep CBRN and rubber expertise to fill this gap in the market with a quick don/doff boot and glove that offer chemical warfare agent and TIC (toxic industrial chemical) protection, and that are impermeable to biological agents."

Towards protective garments

The EXOSKIN range presents a new capability for Avon Protection, which is best known for its market-leading Air Purifying Respirators (APRs). The company has delivered 3.5 million M50/FM50 CBRN personal respirator systems to military users worldwide, as well as escape devices and self-contained breathing apparatus (SCBAs).

So - what has prompted this shift into protective garments from a company that has built its position in the market as a leading provider of respiratory protective gear?

"This is not so much a shift as an expansion into a wider market offering, which is in line with where we see demand heading in the near future" Elwell said. "In expanding its offerings beyond respirators into protective garments, Avon Protection aims to provide the full scope of integrated protective wear that can be scaled to suit changing threat environments and readiness levels."

Increased agility

Similarly, the company is supporting efforts to help reduce military operators' reliance on APRs and to offer respiratory protective equipment for the wide range of users requiring CBRN protection and the range of threats that exist.

"There is certainly a case for a new dress category state, as these currently offer limited flexibility at lower threat levels," Elwell said. "The changing threat environment highlights the requirement for an additional state of readiness allowing combatants to be agile, while still ready to protect themselves against a broad range of threats – whether this is a release of a weaponised chemical or from a damaged industrial site."



APRs are expensive and require training, maintenance and spare filter provision, which makes them unsuitable for carriage by users at all times. In recognition, Avon Protection has invested in developing the smallest and most compact escape device on the market – the CH15 Compact CBRN Escape Hood – which offers the same high level of CBRN protection that an APR would provide at a lower size and weight, as well as a reduced training and maintenance burden.

Such thinking is reflective the company's forward-looking approach to the CBRN sector and gives some insight into how the company is positioning itself for what it sees as a dramatic shift in the way military forces view the CBRN threat.

Non-military theatres

When the milestone 1997 Chemical Weapons Convention banned the use of chemical weapons by the international community, CBRN protection became largely limited to a small sub-set of specialist military operators. Typically, only those personnel whose job it is to respond to chemical or biological attacks would ever need to deploy their respirators while on active service.

However, since then a number of governments and nation state-backed groups have shown themselves willing and able to deploy chemical weapons in non-military theatres, putting the lives of civilians, first responders and military personnel at risk.

"These factors are driving militaries to reconsider how they equip their personnel for operations that can no longer exclude the possibility of chemical and biological threats," Elwell said. "We are continuously applying our deep understanding of the CBRN threat and working with research teams to produce innovative solutions ready to take to market as needs evolve and requirements emerge."

"We have already received orders for the EXOSKIN range from existing users of our respirator products, confirming our belief that users who know and trust the Avon Protection brand want to expand their use of our products to keep their operators safe in the field."

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EXOSKIN™-B1
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■ Proven Rubber Technology

■ Optimised Design

■ Quick Donning and Doffing

■ Ambidextrous Fitment

■ Ruggedised Quick Release Straps (Boots)

■ 27 Adjustability Settings (Boots)

■ Optimised Tactical Grip (Boots)

■ Touchscreen Compatible (Gloves)



AVON
PROTECTION

NEWS ANNOUNCEMENT:

The OPEC CBRNe team have moved!

You can now find them at:

**Unit 8B, The Genesis Centre Garrett Field,
Birchwood, Warrington WA3 7BH**

The new office telephone number is +44 019
2582 2000.

This news comes off the back of the recent appointment of Geoff Rowland as General Manager, and continuing company growth as we enhance our suite of CBRN protective garments for both military personnel and the first responder market.

Next time you are in the area please drop by.



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PRODUCT UPDATE:

COMPLETE BRAKE UPGRADES LC300 AND MB-G



Civilian Armoured Vehicles generally require an upgraded brake system to be able to cope with the added weight the armour brings to the vehicle. Over the years, TSS International BV has provided hundreds of these brake systems for platforms such as the Toyota Land Cruiser 200 V8, the Mercedes-Benz G-Class, Nissan Patrol Y62, Chevrolet Suburban, Mercedes-Benz S-Class and many others.

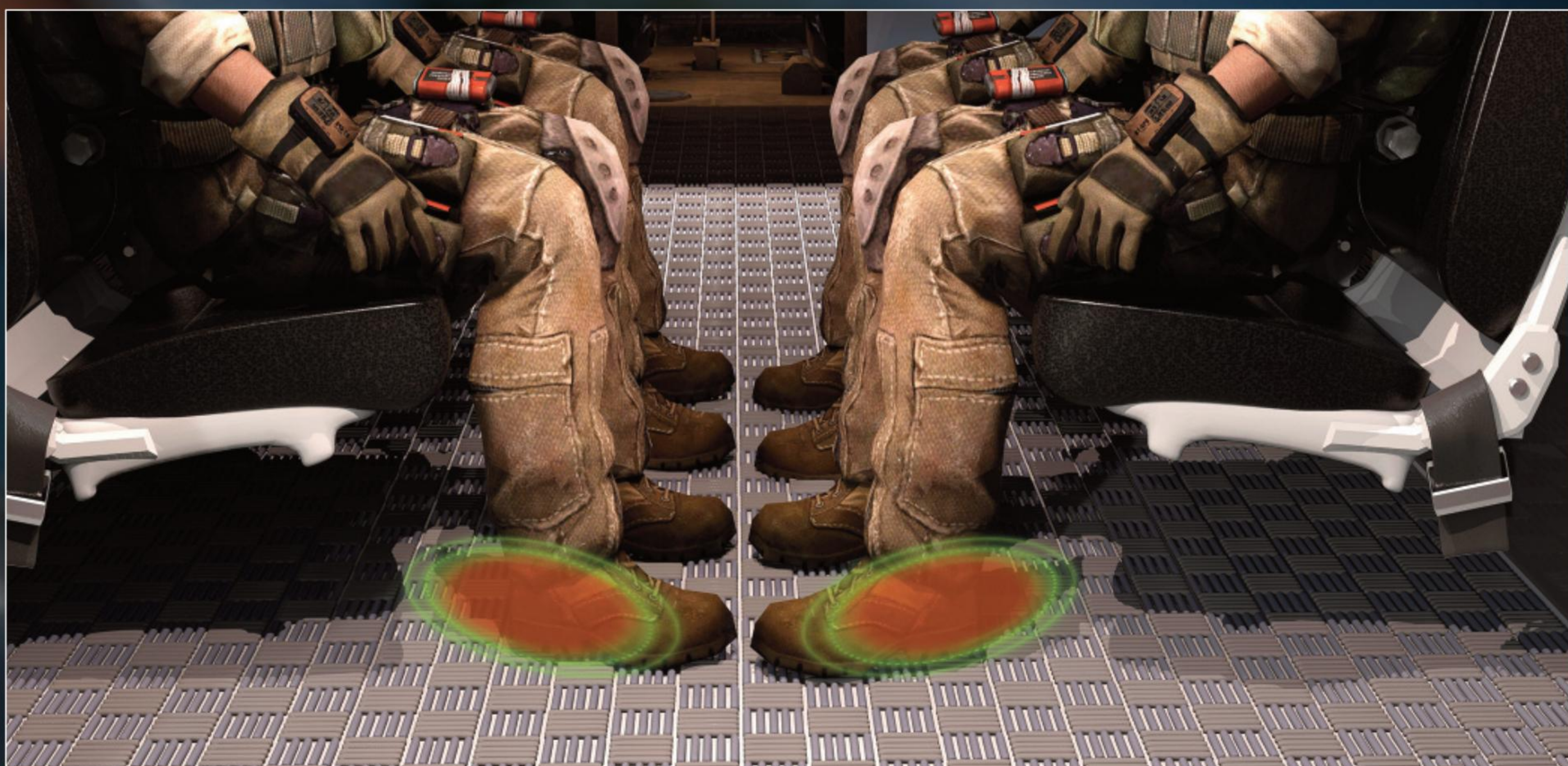
A recent development in the automotive industry is that the parking brake no longer makes use of a drum-in-hat solution, where two separate brake shoes clamp into a drum integrated in each rear-axle brake disc. Instead, many OEMs now choose to integrate the parking brake in the rear brake callipers and activate the callipers' pistons to use the

operational brake pads to clamp onto the friction area of the brake disc. This has some advantages for the OEM, mainly in regard to cost. For the armouring industry however, this poses a challenge, in that this type of brake calliper does not easily allow the required increase in size of the brake discs in order to create more stopping power for the added weight.

Until now. Through close collaboration with MOV'IT GmbH, TSS International BV has two complete-vehicle brake upgrades for armoured versions of the new Toyota Land Cruiser 300 and the latest model Mercedes-Benz G-Class.

Both upgrades consist of front axle brake discs, callipers, brake lines & brackets, as well as a rear axle upgrade with





brake discs, brake lines and a unique set of callipers with integrated fully functioning Electronic Parking Brake. The rear axle callipers have been optimised, to be able to incorporate a 384x36mm brake disc for maximum braking performance.

Combine these brake upgrades with 18" TSS Heavy Duty Wheels with Rodgard BPX Runflat inserts and you have a synergetic solution for armoured vehicles of GVWs up to 7200kgs (based on 50/50 weight distribution).

Also available for armoured conversions of the Mercedes-Benz G-Class and Toyota Land Cruiser 300:

- *TSS ProtecTank®: Self sealing and flame retardant fuel tank protection system for weight savings*

- *JRZ Suspension shock absorbers, delivered complete with springs*

- Available in adjustable and non-adjustable versions

- Optional: Proactive system for live, high-speed, automatic adjustments during driving

- *SKYDEX shock mitigation system, for weight saving and added occupant-protection*

- *B&G Intercoms with integrated sirens, for closed-window communication with the vehicle's surroundings. Also controls B&G LED-lights in the grill and bumpers.*

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“

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- Kevin Cudby
Intermodal Director



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Military foam packaging demands a much greater attention to detail than commercial packaging solutions. A large amount of military cargo requires careful packaging and handling due to the sensitive materials. The equipment must be protected from physical impacts, climate changes and any biochemical hazards too. Military equipment is often transported around the world, which is why the defence foam packaging needs to be of the highest quality to ensure safe transportation.

Kewell Converters take into account the likelihood of physical impact and others factors in the transportation of sensitive goods. That's why our military foam packaging is produced to the highest possible standard and we take all of these things into consideration. Our expert team has a great deal of experience in producing military foam packaging for all kinds of purposes.

OUR MANUFACTURING PROCESS

We understand the needs for high-quality military foam packaging and manufacture products for this purpose. Kewell Converters Ltd. manufactures foams that meet or exceed the following military requirements:

- *Foam for general purpose packaging.*
- *High density foam for general purpose packaging.*
- *Foam for explosive compatible packaging*

Fill out our online form for a quote on your defence, aviation or industrial packaging requirements. You can also order free samples from us.

MILITARY FOAM APPLICATIONS

We supply high performance protection for applications such as helmet inserts or aircraft ejector seats. In addition to which we supply packaging, case inserts and bespoke foam parts for applications such as ordinance packing & protection, weapons carriage and bespoke designed flight cases and inserts machined to fine tolerance when accuracy is critical. Our engineered military foam is perfect for these applications as it has a number of properties that make it the ideal material. This includes the low mass, energy absorption, durability, strength under compression and tension that engineered foam packaging offers.

Static dissipative and conductive foams also find many applications in the military sector.



MILITARY GRADE FOAMS FOR PROTECTION, PERFORMANCE AND DURABILITY

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- *Explosives compatible*
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- *High tear strength*
- *High tensile strength*
- *High resistance to compression set*

At a glance

STANDARD	DESCRIPTION	MOD GRADE	PRODUCT
DStan 81-116/3 Type GP	"Expanded polyethylene sheet - general purpose"	Grade A Grade B Grade C	Plastazote LD24 Plastazote LD33 Plastazote LD45
DStan 81-116/3 Type QX	"Expanded polyethylene sheet - explosives compatible"	Grade A Grade B Grade C	Plastazote LD24 Plastazote LD33 Plastazote LD45
DStan 81-124/2 Type QX	"Expanded polyethylene sheet and mouldings, explosives compatible"		Plastazote LD33
DStan 93-101	"Expanded polyethylene sheet, high density, for general purpose"		Plastazote PK80
DStan 81-125/3	"Electrostatic conductive foam sheet"		Plastazote LD50CN
DStan 93-117	"Static dissipative low density. Polyethylene foam"		Plastazote LD40SD
DStan 81-119/3	"Cross-linked expanded ethylene-vinyl acetate sheets and mouldings"		Evazote EV50 Evazote VA25



For 'mission critical' packaging

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- *Missile cradles*
- *Weapons case inserts*
- *Rifle case inserts*
- *Ruggedised case inserts*
- *Electronics device protection*
- *Flight case fitments*

For high performance protection

- *Personnel protection*
- *Body armour*
- *Helmet inserts*
- *Aircraft ejection seats*
- *Tool control inserts*
- *Sleeping mats*
- *Buoyancy devices*
- *Punctureproof' marine fenders*

For the very best defence foam packaging then speak to us about the right foam application for your military foam packaging or aviation requirement. Our defence foam packaging is made out of the highest quality closed cell foam materials. Major international aviation and defence OEM's trust Kewell to deliver and you can too. So, when failure is just not an option Kewell Converters are here to help!



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Mastsystems tactical composite mast systems, accessories and services are trusted by the Finnish Defence Forces and used in over 50-countries worldwide. In this article our Sales Director Mr. Jarmo Pelli discusses Mastsystem's consultive sales approach, and how long-term partnerships are achieved and maintained.



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OEM SPARE PARTS



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MAST ACCESSORIES



VEHICLE MOUNTING
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CONSULTING
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“ Our approach is to always find the most optimal solution that meets the requirements . Tactical mast system configurations can go from very light, man portable systems all the way up to heavy-duty vehicle mounted mast system solutions, and then integrated as part of the communication system. Our long experience in this field enables us to understand and take into account all variables, which means that the customer receives a system that does not only come with optimal performance, but is also cost-effective and can easily be maintained with our support.

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Mr. Jarmo Pelli
Sales Director

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We welcome any enquires and are always happy to discuss individual requirements.

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