VOLUME 33/ISSUE 1

JANUARY/FEBRUARY 2025
US$25

ASIAN MILITARY REVIEW

ASIA PACIFIC'S LARGEST CIRCULATED DEFENCE MAGAZINE

FOCUS ON AUSTRALIA
VEHICLE PROTECTION SYSTEMS
REVIVING INDIA'S AIR FORCE
REGIONAL EW COOPERATION REPORT
VIETNAM'S BALANCING ACT

www.asianmilitaryreview.com

ENABLING ELECTROMAGNETIC SUPERIORITY & SUPREMACY

WITH LIGHTWEIGHT TACTICAL SOLUTIONS

SPECTRUM MONITORING

DF & GEOLOCATION

FORENSIC SIGNALS ANALYSIS

- EMSO / EMO
- Airborne target acquisition
- Border security monitoring
- SIGINT / COMINT
- EMCON
- UAV, UGV, USV integrations

CRFS

EXTRAORDINARY
RF TECHNOLOGY

CRFS.COM

Contents

JANUARY/FEBRUARY 2025
VOLUME 33 / ISSUE 1

ASIAN MILITARY REVIEW

Australia has now received all 72 Lockheed Martin F-35A fighters it had on order. This fighter of the Royal Australian Air Force is seen taking off from Darwin during Exercise Pitch Black 2024. (Gordon Arthur)

Editorial

NORTH KOREAN SOLDIERS CREATE DILEMMAS – AND NOT JUST FOR UKRAINE

The capture of at least two North Korean soldiers by Ukrainian forces in the seized Kursk border region exposes the lie that nobody believed anyway – that North Korean President Kim Jong-un did not really send up to 12,000 soldiers to assist his dictator friend Vladimir Putin.

But captured North Koreans offer a dilemma for President Kim – and the soldiers concerned have an extremely hazardous future ahead. If they become part of a prisoner exchange, these men are likely to head straight into North Korea's penal colonies at best, or will not be allowed to live in the hours after their arrival. A return to their families and communities would be out of the question because of what they have seen outside North Korea.

There is a thought that these souls under guard should be shown some of Kyiv's well-stocked goods and food shops. Perhaps this might turn them into assets (of whatever quality). It is rumoured that one of the two is already reluctant to return to North Korea.

There will also be little explanation of what happened to their comrades, who are likely to be mown down through a lack of tactics and combined-arms support. Not that losing hundreds or thousands of his own men will keep North Korea's supreme leader from losing a moment's sleep at night.

What must worry Ukrainian President Volodymyr Zelenskyy is if Putin and Kim agree on sending another tranche of thousands of troops to fight for Russia. Again, the Russians would happily use them as "cannon fodder" instead of their own troops, using up Ukrainian ammunition and helping to reveal their firing points.

So what of incoming U.S. President Donald Trump's promise to stop the fighting on his first day in office? Well, that promise has already devolved through his appointment of retired U.S. Army general Keith Kellogg to the task of "man on the spot" in charge, a position that can take the blame and someone who can be replaced and replaced again if there is no desired outcome.

And what of Trump's relationship with "Little Rocket Man"? Kim's new friend is Putin, the man who is actually giving him technology for his rocket development programme. And with China still having influence on both Russia and North Korea in the background, this is a growing and ugly "bear trap" for the incoming U.S. president.

Andrew Drwiega,
Editor-in-Chief

Editor-in-Chief: Andrew Drwiega
Tel: +44 1494 765245, E-mail: andrew@mediatransasia.com
Publishing Office: Chairman: J.S. Uberoi
Media Transasia Limited,1603, 16/F, Island Place Tower, 510 King's Road, Hong Kong
Operations Office: President: Egasith Chotpakditrakul
Chief Financial Officer: Gaurav Kumar **General Manager:** Jakhongir Djalmetov
International Marketing Manager: Roman Durksen **Digital Manager:** David Siriphonphutakun
Art Director: Rachata Sharma
Media Transasia Ltd. 75/8, 14th Floor, Ocean Tower II, Soi Sukhumvit 19,
Sukhumvit Road, Bangkok 10110, Thailand. Tel: 66 (0)-2661 6829, Fax: 66 (0) 661 6838

Audited Media Association of Australia cab
Circulation Audit Board

Controlled circulation: 23,114 (average per issue)
for the period 1st January 2023 to 31st December 2023.
Subscription Information
ASIAN MILITARY REVIEW can be obtained by subscription.
Subscription rate for one year (6 issues) is U.S.$ 100.00 Readers
should contact the following address:
Subscription Department, Media Transasia Limited.
75/8, 14th Floor, Ocean Tower II, Soi Sukhumvit 19,
Sukhumvit Rd., Bangkok 10110, Thailand
Tel: 66 (0)-2204 2370, Fax: 66 (0)-2204 2387
Email: accounts@mediatransasia.com

MKU
EMPOWERING HEROES

FROM CONCEPT TO COMBAT
TRUSTED AND PROVEN

EMPOWERED
3 MILLION
HEROES

ARMOURED
3000 +
PLATFORMS

TRUSTED BY
230+ FORCES
100+ COUNTRIES

DOWNLOAD
THE CATALOGUE

NETRO
OPTRONICS

NIGHT VISION | THERMAL IMAGING |
LASER | DAY-OPTICS

KAVRO
PROTECTION

HELMETS | BODY ARMOUR |
ARMOUR INSERTS | BALLISTIC SHIELDS

AIRCRAFT | LAND VEHICLES |
NAVAL VESSELS

www.mku.com

GAINING A DECISIVE EDGE
HAMAD AL MARAR IS MD AND CEO OF EDGE GROUP

Q: EDGE is making quite a splash in the international defence market. As CEO, can you highlight the strengths and areas of expertise of your company?

A: At EDGE, our focus is on rapidly developing a globally competitive portfolio of highly disruptive solutions for export. With an emphasis on autonomous systems, smart weapons and electronic warfare, we have expanded our portfolio of advanced systems and solutions from 30 in 2019 to over 200 in 2024. This growth has been driven by aggressive product development, calculated investments and strategic partnerships. These efforts have resulted in a global footprint spanning 91 countries, an order backlog of US$12.8 billion through secured contracts, and the establishment of 41 advanced facilities and manufacturing capabilities.

Our core strength lies in our ability to respond rapidly to the international defence market. With an ecosystem of over 35 entities specialising in air, land, sea, electronic warfare, cyber, space and homeland security domains, we are leveraging productive synergies within our core competencies to deliver cutting-edge solutions and systems.

Additionally, we have established 23 joint ventures and partnerships across key domains, ensuring that we meet the niche requirements of local and international markets. These partnerships and joint ventures are strategically positioned to tackle evolving challenges and operational requirements.

We are moving beyond selling individual products to offering complete solutions. This positions EDGE as a systems provider, capable of integrating capabilities across all domains. We are responding to international demand to modernise military forces. Whether it's supplying state-of-the-art naval vessels, advanced military vehicles or modular counter-drone systems, EDGE is at the forefront of delivering tailored, high-performance solutions for operational excellence.

Q: How important is the international market, relative to your existing UAE customer base?

A: The international market is critical to our success. Our performance as a business is measured on the global stage, and we place a strong emphasis on developing disruptive solutions and systems for export. As a relatively young player in the global defence industry, EDGE has made remarkable strides, growing our international order book from US$18.5 million in 2019 to US$2.1 billion in 2024.

Our international strategy is supported by key partnerships and joint ventures. A prime example is PULSE, our Abu Dhabi-based joint venture with Indra Sistemas, which was established to develop and manufacture next-generation radar systems. With a pipeline of orders for approximately 300 advanced radar solutions, PULSE is positioned as a major player in this field. Additionally, PULSE is set to secure prime rights for future contracts awarded to Indra that are independent of NATO and the European Union.

Having the UAE Armed Forces as a prime customer also strengthens our position internationally. Their capabilities-based strategy and demanding operational environments push us to develop highly advanced and reliable solutions, ensuring our systems stand out in competitive global markets. This has allowed us to showcase the UAE as a hub for innovation and advanced manufacturing in defence technology.

Q: What markets are you currently focused on, both in terms of regions and types of products?

A: Our focus is on addressing the evolving requirements of global markets with cutting-edge solutions. For example, counter-unmanned aerial systems (C-UAS) capabilities have become a critical need for customers worldwide. To address this, we developed the highly modular and rapidly deployable SKYSHIELD C-UAS system. It integrates 3D radars, electro-optic cameras, direction finders and soft-kill effectors into a unified command-and-control system. SKYSHIELD provides real-time situational awareness and autonomously detects and neutralises UAS threats through jamming and spoofing solutions. This proven system has already secured contracts with the UAE Ministry of Defence and an international customer.

Regionally, we are focused on South America, where we provide smart weapons and homeland security solutions, including nonlethal systems and cyber capabilities, actively engaging with governments and authorities through partnerships such as with the Brazilian Navy via our LATAM office. In Africa we continue to fulfil contracts and address growing interest in advanced naval vessels, alongside other defence and security solutions tailored to the region's unique requirements. Meanwhile, in Southeast Asia, our CARACAL brand has made significant strides in India through our partnership with ICOMM and in Malaysia through Keytech.

Our ability to work closely with customers and offer tailored solutions positions us as a trusted partner in these regions.

Q: What new developments or products do you have in the works?

A: We are continually investing in the development of our autonomous portfolio, particularly in the air domain. At the core of any aircraft is its engine or propulsion system, and we are positioning the UAE as an original equipment manufacturer of advanced aeronautical engines and autonomous aircraft. Our recently established Abu Dhabi-based FLARIS joint venture is a testament to this, with exciting developments in aircraft engine capabilities set to be announced in the near future.

Additionally, EDGE is undergoing a transformation to become a system provider instead of a product provider. This shift reflects our ability to deliver integrated, end-to-end solutions across air, land and sea domains, significantly enhancing our export potential. This major achievement consolidates our position as a global leader in offering comprehensive defence capabilities. A


UNLIMITED
INGENUITY.
LIMITLESS
POTENTIAL.
At EDGE, we innovate. Integrate. Fabricate. And work together across domains and beyond borders to create a more secure future, bounded only by what could be. So when some say "can't", we don't just say "can", but "will". In a world of limitless potential, our ingenuity helps pioneer the way to a safer tomorrow.
We are EDGE. Unlimited.
VISIT US AT IDEX 2025 | HALL 5
Explore EDGE Unlimited at edgegroup.ae
EDGE

Australia has already retired one *Anzac*-class frigate, and the navy is desperately trying to plug looming capability gaps with eleven new general-purpose frigates.

Gordon Arthur

AUSTRALIAN DEFENCE PROGRAMMES

Australia has a capable military, but there are still significant equipment gaps that it needs to fill.

By Gordon Arthur

As a middle power with just 27 million inhabitants, Australia has quite an impressively equipped military. Its 2024/25 defence budget allocated a record A$55.7 billion (US$36.8 billion), up 6.3% from the preceding year, and this included A$16.7 billion for new acquisitions.

Before examining what future requirements the Australian Defence Force (ADF) has, it is useful to review some achievements in the past year. For example, the Royal Australian Air Force (RAAF) received its final nine Lockheed Martin F-35A fighters, these possessing the Technology Refresh 3 upgrade that will be retrofitted to the rest of the F-35A fleet as well. The nonet's arrival brought to completion the air force's full complement of 72 F-35As, these operating alongside Boeing EA-18G Growlers and F/A-18F Super Hornets in what is a very modern combat fleet. Another 2024 highlight for the RAAF was receipt of the first of four Northrop Grumman MQ-4C Triton unmanned aerial vehicles (UAV).

The USA is busily meeting Australian Army demand for new equipment too, with the first 46 out of 75 M1A2 SEPv3 Abrams tanks having reached Australian shores. Seven additional Sikorsky UH-60M Black Hawk helicopters arrived last year; the army has ten in service, with more arriving this year to fill the large gap left by the inexplicable demise of the MRH90 Taipan. The army is greatly boosting amphibious sealift too, with Austal contracted to build 18 of Birdon's 50m-long Landing Craft Medium vessels under Project Land 8710 Phase 1A. Then, Damen's LST 100 design was selected last November for the Landing Craft Heavy requirement under Phase 2.

As for the Royal Australian Navy (RAN), its vessels fired three types of missile for the first time last year – the Tomahawk cruise missile, SM-6 and Naval Strike Missile (NSM). Elsewhere, BAE Systems commenced construction of the first *Hunter*-class frigate last year, and the first Anduril Ghost Shark autonomous underwater vehicle (AUV) prototype was delivered. Importantly, Canberra shortlisted two designs for its general-purpose frigate project – more on that shortly.

Overall, ADF acquisitions reached a record A$16.6 billion in FY2023-24, of which the government claimed 54% of expenditure went to domestic industry. Additionally, the ADF spent A$16.4 billion sustaining existing equipment, of

which Australian industry accounted for 79%.

Naval procurements

Chewing up massive chunks of the defence budget, the acquisition of hugely expensive nuclear-powered attack submarines broodily looms over the RAN. Because it will take years for the first submarines to arrive, a capability gap exists as six existing *Collins*-class submarines soldier on. The government's approach is to prolong the life of the *Collins* class rather than to purchase interim conventional submarines. AUVs could help take up some of the slack, with the RAN investing in Anduril's Ghost Shark. However, there is room for other AUVs to be acquired to fulfil specific roles such as mine countermeasures.

Progress is being made on procuring eleven off-the-shelf, general-purpose frigates of at least *Anzac*-class size to "provide maritime and land strike, air defence and escort capabilities … in order to secure maritime trade routes and our northern approaches". The first three of these Project Sea 3000 warships will be constructed overseas, and the remainder in Western Australia. In May 2024 the navy had requested information from the following five players: the thyssenkrupp Marine Systems (TKMS) MEKO A-200, Mitsubishi Heavy Industries *Mogami* class, Hyundai Heavy Industries/Hanwha Ocean FFX Batch II/III and Navantia Alfa 3000.

These were further shortlisted last November, with the German and Japanese designs making the cut. In fact, the selection comprises three platforms since TKMS is proffering both a standard 3,700-tonne A-200, plus a customised 4,700-tonne A-210 configuration boasting equipment more common to the RAN. One of the MEKO's advantages is that current Anzac-class frigates were based on the older MEKO 200.

The RAN will soon pay off its entire class of *Huon* minehunters, with no current plans to replace them with new hulls.

Gordon Arthur

It must be remembered that Japan is a novice at exporting advanced naval vessels but, nonetheless, Tokyo is enthusiastically backing what it considers a strategic deal for its 4,800-tonne 06FFM frigates. Japan's Ministry of Defence said, "Based on this policy, this joint development and production project will contribute to significantly improving interoperability and compatibility with Australia, strengthen the foundation for shipbuilding and maintenance in the Indo-Pacific region, and improve the future capabilities of Japan's ships." Japan's navy will adopt the first of these same improved warships in FY2028; they are larger and more heavily armed than the 3,900-tonne *Mogami*-class frigates currently under construction.

Selection of the winning design should occur this year to allow first cutting of steel in 2026, and delivery later this decade. However, this whole US$6.4 billion project is beset by valid criticisms. The programme is being rushed through because of historical governmental indecision and lack of foresight. With the Chinese military threat looming and the *Anzac* class already starting to retire, this constitutes a kneejerk reaction to obtain new frigates as soon as possible. Worryingly, the RAN now has the fewest surface combatants – just ten – at any time since World War II.

Furthermore, why is the RAN seeking a platform bearing minimal compatibility with other vessels already in service? Other vessels sport Saab's 9LV combat management system and CEA Technologies radars, for example, but these are not mandated on the general-purpose frigates. Despite the logistical and training burden, officials claim it is a nonissue. Minister for Defence Industry and Capability Delivery Pat Conroy insisted, "We've operated multiple combat management systems in the past. When I talk to the chief of navy, his focus is on getting more hulls in the water – more hulls with very exciting capability." Conroy added, "It's all about speed to capability – we need to urgently recapitalise the navy."

The navy's mine countermeasure (MCM) capabilities were supposed to be boosted by the well-named Project Sea 1905 (1905 in Roman numerals is MCMV!). A Phase 1 request for information was released in January 2020, seeking shore-based and ship-based toolboxes of "scalable and versatile" autonomous systems to detect, localise and destroy sea mines. Saab Australia and Exail had been shortlisted before Defence suddenly

The StrikeMaster, a Bushmaster chassis sporting two Naval Strike Missiles, is a contender for Australia's coastal missile requirement.

Gordon Arthur

The ATLAS 8x8 unmanned ground vehicle from BAE Systems will be trialled during Exercise Talisman Sabre this year.

cancelled the effort in April 2024. Ultimately, there was not enough money in the kitty.

Tranche 2 would have followed up with replacements for *Huon*-class minehunters and *Leeuwin*-class hydrographic survey ships in the mid-2020s. The ADF told *Asian Military Review*: "Defence requirements for maritime mine countermeasures effects have changed, in line with the National Defence Strategy and associated Integrated Investment Program." However, neither document directly addresses the MCM realm.

Despite Sea 1905's cancellation, Antony Penn, Exail's Chief Commercial Officer, told *AMR* that his company has not given up. "Exail remains committed to opportunities to contribute to Australia's defence needs, particularly in the areas of undersea and seabed warfare. We've developed strong partnerships with Australian defence industry leaders with specialist capabilities, ensuring we're ready to provide solutions that align with Australia's strategic objectives."

Meanwhile, Saab Australia as systems integrator had partnered with Leidos (software), Sonartech Atlas (unmanned surface vessels and AUVs) and SeaBytes (mission management system) for Sea 1905. Its solution included the Double Eagle for mine detection, identification and neutralisation, plus the Multi-Shot Mine Neutralisation System. Andy Keough, Saab Australia's Managing Director, told *AMR*, "The RAN has an enduring requirement for an MCM capability – our expertise means we remain ready for future opportunities in the Australian market, offering both advanced MCM products and critical systems integration."

With Sea 1905 canned, a Defence spokesperson said, "The deployable mine countermeasure capability utilises crewed and uncrewed surface vessels paired with remote and autonomous underwater vehicles." Regardless, whether acknowledged or not, the RAN has mine warfare capability gaps as its minehunters are pensioned off without any direct replacement. Just two *Huon*-class minehunters and one hydrographic vessel remain.

Jennifer Parker, an Expert Associate at the National Security College, Australian National University, warned, "The justification for cancelling the mine warfare ship programme was that autonomous systems would replace the capability. However, without a ship to deploy from, these systems cannot cover the full spectrum of operations needed to protect Australia's shipping routes from naval mines – something it should expect in the event of a conflict in the region."

After cancelling selection of Schiebel's S-100 Camcopter as the navy's future shipborne UAV, and divesting the existing S-100 fleet, the RAN is now relying on Project DEF129 – a merger of army and navy UAV programmes – for an eventual solution. The Army Aviation Command said it is "working through the early stages of requirements for those systems, and understanding what the acquisition pathway will look like". The army already operates Insitu's RQ-21A Integrator.

Land procurements

The army is inducting copious amounts of new equipment: M1A2 SEPv3 tanks, Abrams-based combat engineering vehicles, HIMARS, Boxer 8x8 reconnaissance vehicles, AS21 Redback infantry fighting vehicles, AS9 Huntsman 155mm self-propelled howitzers, NASAMS air defence systems, AH-64E Apache attack helicopters and UH-60M Black Hawks.

Yet to be decided, though, is the renamed Project Land 8113 Phase 2 requirement for land-based maritime strike, especially to protect Australia's northern archipelagic area. Canberra has declared a two-horse race to equip the Adelaide-based 10th Brigade with anti-ship missiles. Thales Australia and Kongsberg created the StrikeMaster, a Bushmaster vehicle carrying two NSMs, while Lockheed Martin is proposing HIMARS armed with Precision Strike Missiles (PrSM).

John Fry, Managing Director of Kongsberg Defence Australia, told *AMR* that "we genuinely believe the Naval Strike Missile Coastal Defence System, with a launcher like StrikeMaster, could be a great candidate for that requirement". He added, "It's essentially the same configuration what the US Marine Corps are actually building now under their Navy Marine Expeditionary Ship Interdiction System (NMESIS) programme." Fry highlighted that StrikeMasters can be built in Australia quickly: vehicles come from Thales Australia, combined with weapon sleds already used on RAN warships, fire control centres manufactured for NASAMS, and 185+km-range NSMs that begin production at a new Kongsberg factory in Newcastle in 2027.

As for Lockheed Martin's solution, PrSMs are launched from the same M142 HIMARS that the army is acquiring. The first HIMARS batch is due in Australia ahead of schedule in Q1 2025, and the government has already announced it will acquire the PrSM, of which it is a paid-up co-developer. Australia is exploring domestic PrSM production, and Wayne Harrison, International Business Development Principal at Lockheed Martin, said PrSM Increment 2 meets Australia's maritime strike requirement. This missile variant has a 400+km range and a smart seeker to hit moving targets on land or sea.

Describing it as "a compelling option",

The RAAF has now received its full complement of 72 F-35A fighters, but what will come next to replace its F/A-18F Super Hornets?

Defense & Security 2025

MINISTRY OF DEFENSE
THAILAND

Tri-Service Asian Defense & Security Exhibition,
Conference and Networking Event

10–13 November 2025

IMPACT , Muang Thong Thani, **THAILAND**

Power of Partnership

www.asiandefense.com

The RAAF relies on the Hawker 127 as its lead-in fighter trainer, but a replacement for the fleet is needed in the next five or so years.

Harrison commented, "We believe PrSM Increment 2 will be able to interdict the sea lanes at ranges of 400+km, especially if you put this thing in a C-130 and you're able to move it around the archipelagos where most likely the ADF will be engaged. The enemy doesn't really know where these launchers are, because there are numerous C-130-capable airfields. You've got two PrSMs in there that can interdict a ship, and we believe that will meet the land-based, maritime strike mission set."

A glaring ADF capability gap is counter-UAV (C-UAS) systems to protect infrastructure, bases, dismounted personnel and vehicles. Project Land 156 will address the threat posed by group 1 and 2 UAVs weighing up to 55kg. An approach to market occurred last November, which sought a systems integration partner to manage C-UAS acquisitions. However, with a request for tender due in January, a minimum viable capability is still not expected until late 2030. Australia has a vibrant industry producing C-UAS systems, including Acacia, Boresight, Codarra, Department 13, DroneShield, EOS and Silentium, all of whom should be interested in Land 156. DroneShield has delivered around 1,000 devices to Ukraine, whilst EOS can offer its Slinger remote-controlled weapon station.

Australia has initially purchased Switchblade 300 loitering munitions, but is also exploring local solutions like Innovaero's One-Way Loitering (OWL). The Ukraine conflict has illustrated how such weapons are indispensable in modern warfare, so more Australian acquisitions should be expected.

Unmanned ground vehicles (UGV) may take off too, figuratively speaking. The Australian Army is currently at the experimental stage and, once requirements fructify, purchases could follow. The army's new experimental unit (1st Armoured Regiment) is presently trialling locally developed GaardTech Jaegar-C and DefendTex Banshee sacrificial UGVs, the surveillance-oriented Ground Uncrewed System (GUS) from Outlook Industries, the Cyborg Dynamics Engineering Warfighter (based on a tracked BIA5 platform) and M113AS4-based Optionally Crewed Combat Vehicles. The army also has Hunter WOLF 6x6 UGVs.

A future option is the Autonomous Tactical Light Armour System (ATLAS) 8x8 UGV, with BAE Systems Australia unveiling it last year armed with a 25mm cannon. A company representative told *AMR* that it will participate in ADF exercises this year.

Undecided is Land 8710 Phase 1B, a replacement of LARC-V amphibious logistics vehicles. Unfortunately, as money is hoovered up by submarines, new infantry equipment is being put on hold. Land 159 Tranche 2 (later rolled into Land 300) – supposed to deliver close-combat assault rifles, grenades and a family of light, medium and heavy machine guns – is deferred indefinitely. Tranche 3's lightweight automatic grenade launchers, less-than-lethal munitions and command-detonated munitions are correspondingly delayed.

Air procurements

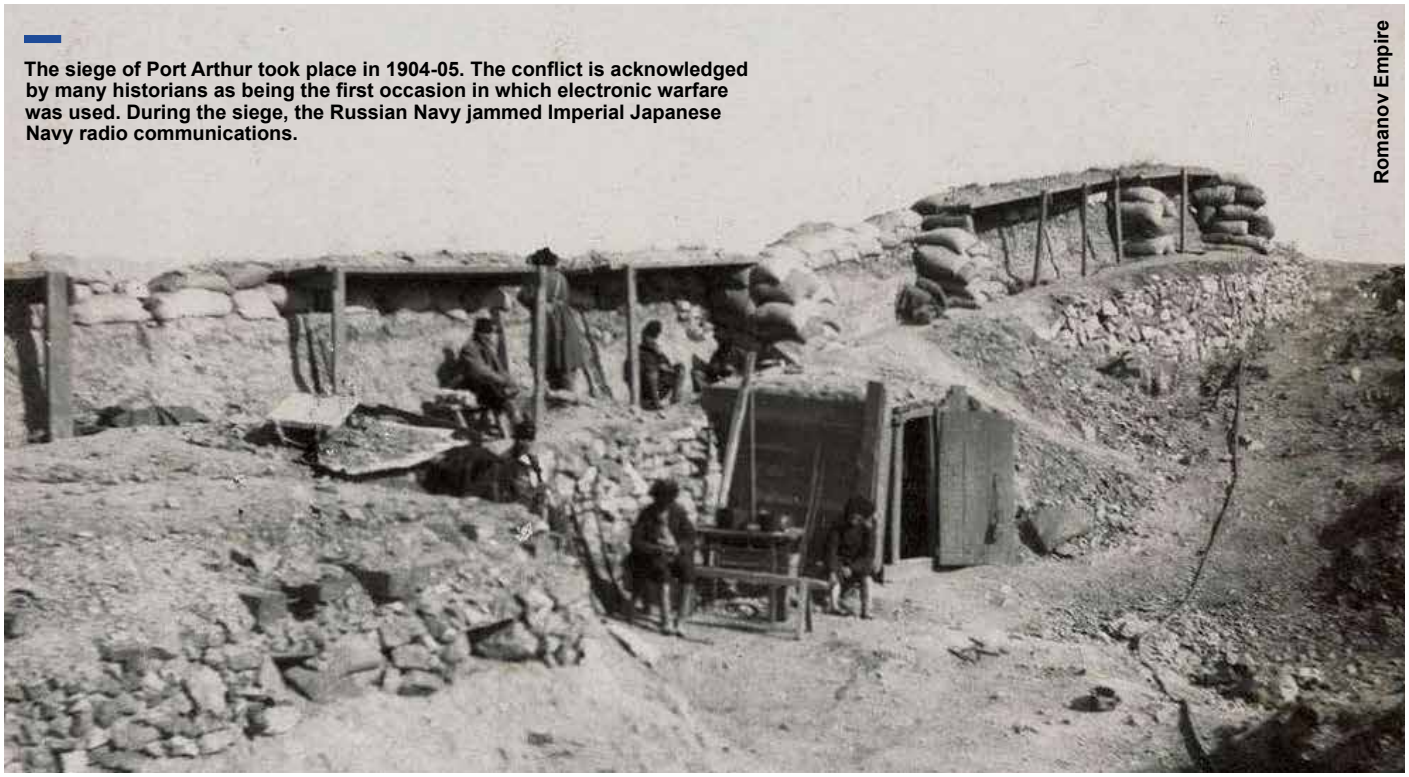
The RAAF has a modern aircraft fleet. Twenty replacement C-130J Super Hercules are on the way, but four MC-55A Peregrine electronic warfare aircraft are facing delays. Other incoming platforms are the MQ-28A Ghost Bat unmanned loyal wingman (with eight prototypes built and three second-generation prototypes coming), although there is no obvious desire to field something like the MQ-9B Reaper. Defence said future UAV investments would "work together and complement crewed systems". This leaves the door ajar for manned-unmanned teaming such as incoming Apache helicopters cooperating with armed UAVs like the Gray Eagle, for example.

With its Super Hornets due for replacement in the mid-2030s, the RAAF must also look ahead to new fighter platforms beyond the F-35A. Options include the American Next-Generation Air Dominance programme, the European-Japanese Global Combat Air Program or the French-German-Spanish Future Combat Air System.

The RAAF plans to retire its Hawk 127 jet trainers by 2032. To achieve this, a Project Air 6002 Phase 1 contract for new lead-in fighter trainers would need to be signed by 2027. The RAAF needs 30-40 aircraft, and four contenders promoted their wares at Avalon Airshow 2023: BAE Systems' Hawk AJT, Boeing's T-7A Red Hawk, Korea Aerospace Industries' FA-50 and Leonardo's M-346.

Ground-based air defence beyond the range of NASAMS is non-existent. The ADF is working on the underpinning architecture via the Lockheed Martin Australia-led Project Air 6500 Joint Air Battle Management System, but Project Air 6502 Phase 1's ambit of a deployable, medium-range, ground-based, air defence system remains quiet. Contenders include American systems like Patriot and THAAD, or European systems from the likes of MBDA.

Another victim of belt-tightening was Joint Project 9102, designed to give Australia its first ever sovereign satellite communications (SATCOM) network. Lockheed Martin Australia was selected in April 2023, but then the government suddenly cancelled the multi-billion-dollar programme last November. The system was to feature geostationary communications satellites, multiple ground stations, integrated SATCOM management system and two SATCOM operations centres. Rather than relying on access to foreign systems like the US Wideband Global SATCOM constellation, Australia will still need its own multi-orbit satellite network in the future. A



The siege of Port Arthur took place in 1904-05. The conflict is acknowledged by many historians as being the first occasion in which electronic warfare was used. During the siege, the Russian Navy jammed Imperial Japanese Navy radio communications.

Romanov Empire

SHARE AND SHARE ALIKE

Security concerns involving the People's Republic of China, and worries over the strategic direction of the Trump administration, may serve to deepen electronic warfare collaboration in Asia-Pacific.

By Thomas Withington

"In the Asia-Pacific region, there is no collective security organisation like that in Europe," wrote Lieutenant General (Retired) Jun Nagashima, a senior research advisor at the Nakasone Peace Institute. Nagashima was writing in a Chatham House publication entitled Security and the Frontier: UK-Japan Perspectives on Cyberspace, Outer Space, the Arctic and Electronic Warfare published in 2021. Chatham House is an international affairs think-tank based in London. The Nakasone Peace Institute performs similar research work, and is based in Tokyo.

He argued that, "Because of history, politics and regional characteristics, it is not realistic to establish a new NATO-type military organisation to cope with emerging risks and threats." Nagashima has a point. The North Atlantic Treaty Organisation (NATO) defensive grouping is a collection of 32 democracies in Europe and North America. All these nations pledge to come to the aid of each other if they are attacked under Article 5 of the Atlantic Treaty. The treaty is effectively NATO's constitution.

The US and China

While governments in the Asia-Pacific region cover a wider spectrum of political hues, they all arguably share the same security challenge in the form of a strategically assertive China. China's government has made no secret of its desire for territorial aggrandisement. It has claims on islands in the South China and East China seas. Taiwan, which China sees as an inalienable part of the mainland, remains a running sore for the regime as it considers the invasion and occupation of the country.

To further complicate matters, as of 20 January, the USA will have a new president. Reading Donald Trump's foreign policy intentions can be akin to gazing at tea leaves. On the one hand, Trump invited Chinese leader Xi Jinping to his inauguration. An article published in *Foreign Affairs* on 17 December 2024, written by Deputy Editor James Palmer, speculated that he probably would not. Palmer wrote that Xi "knows that his attendance would be read as supplication, and he has no interest in playing along".

In late November 2024, Trump threatened to impose 10% tariffs on Chinese imports to the USA straight off the bat. The president-elect said the move was retaliation against what he implied was a lackadaisical approach by

the Chinese authorities to crack down on fentanyl smuggling. The US National Center for Drug Abuse said 3.8% of America's adult population is addicted to opioids like fentanyl. This figure equates to more than ten million people. On the campaign trail, Trump threatened China with 60% tariffs, these being a key device to support his "America First" approach to economics. This policy stresses reducing the country's trade deficit with China, while shoring up jobs and production at home. According to analytical firm statista.com, the USA maintained a trade deficit with China amounting to $279.4 billion in 2023.

A changing threat-scape

Trump has been similarly mercurial regarding defence and security alliances in Asia-Pacific. Since World War II, the USA has effectively been the security guarantor in the region, and this makes perfect strategic sense. The US economy depends on the smooth flow of global maritime trade. Disruption to sea lines of communication caused by conflict in the region could be catastrophic domestically for the USA. Nonetheless, Trump arguably sees security relationships in the region as more transactional. Last October, he asserted during an interview at the Economic Club of Chicago that South Korea should pay $10 billion annually to have American troops on its soil.

The campaign trail saw Trump strike a similarly hawkish tone, arguing that Taiwan should pay for US protection. The 1979 Taiwan Relations Act pledges that the US government will "maintain the capacity of the United States to resist any resort to force or other forms of coercion that would jeopardise the security, or social or economic system, of the people on Taiwan". Trump's comments appear to put this commitment in doubt.

The Asia-Pacific's "threat-scape" and the unpredictability of Trump could act as important drivers for deepening regional security cooperation, especially regarding electronic warfare (EW). Traditionally, EW can be a tricky area for bilateral and multilateral cooperation. Ironically, EW is acknowledged to have first been used by the Russian Navy to jam Imperial Japanese Navy (IJN) radio communications during the Russo-Japanese War of 1904-05. Russian naval jamming hampered IJN naval gunfire control during the siege of Port Arthur on the northern coast of modern-day China.

Countries can be cautious over the extent to which they share EW expertise, technology and data. Details regarding the characteristics of hostile radars, radios and communications networks are often closely guarded secrets. The sophisticated jamming waveforms used to attack these targets are likewise highly classified. Technologies applicable to the EW fight are often zealously guarded by the nations who develop them. Even close allies like the Five Eyes nations of Australia, Canada, New Zealand, the United Kingdom and USA sometimes limit their EW cooperation.

Nonetheless, regional initiatives are showing that some levels of electronic warfare cooperation are not only possible, but essential. China is making significant investments in the People's Liberation Army's (PLA) electromagnetic capabilities. The US Department of Defense's (DoD) *Military and Security Developments Involving the People's Republic of China 2024 Annual Report to Congress* underscores this reality.

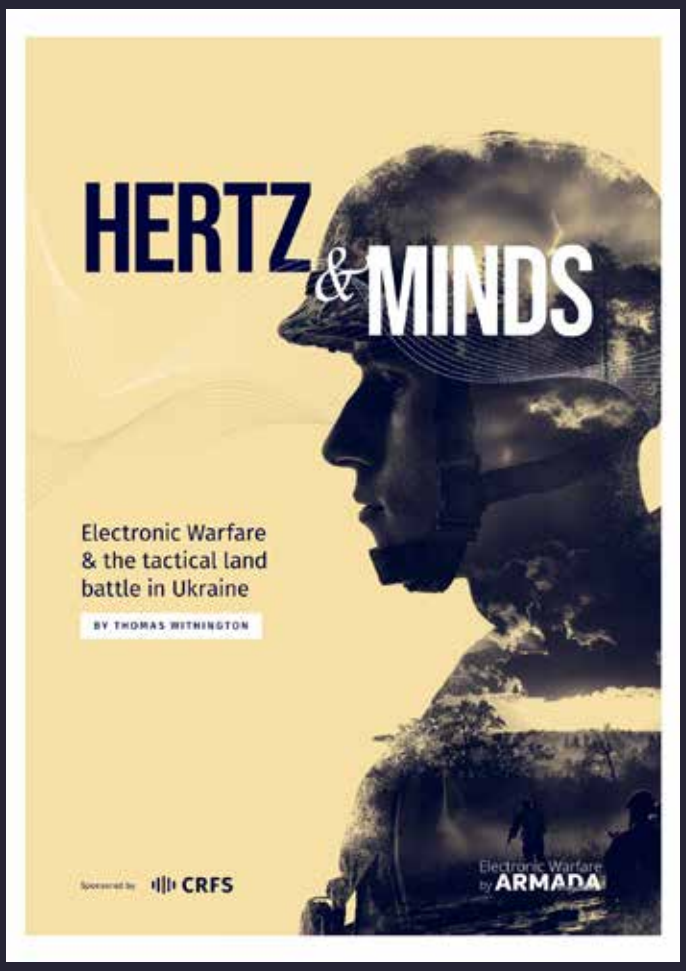
The aforementioned report noted that China is continuing its investments in advanced ground-based air defence and fire control/ground-controlled interception radars to protect its airspace. To put matters into perspective, the report stated that China's integrated air defence system (IADS) has early-warning radars that provide coverage of up to 300 nautical miles (555km) beyond its coastline. The networking of China's IADS is deepening. Radio links between command-and-control centres, combat aircraft and ground-based air defence units are multiplying to improve redundancy: the more radio links that are present, the more targets an aggressor is forced to try and jam. Cabled fibre-optic links, which are very difficult to locate and attack since they do not emit radio frequency (RF) energy, further complicate this task.

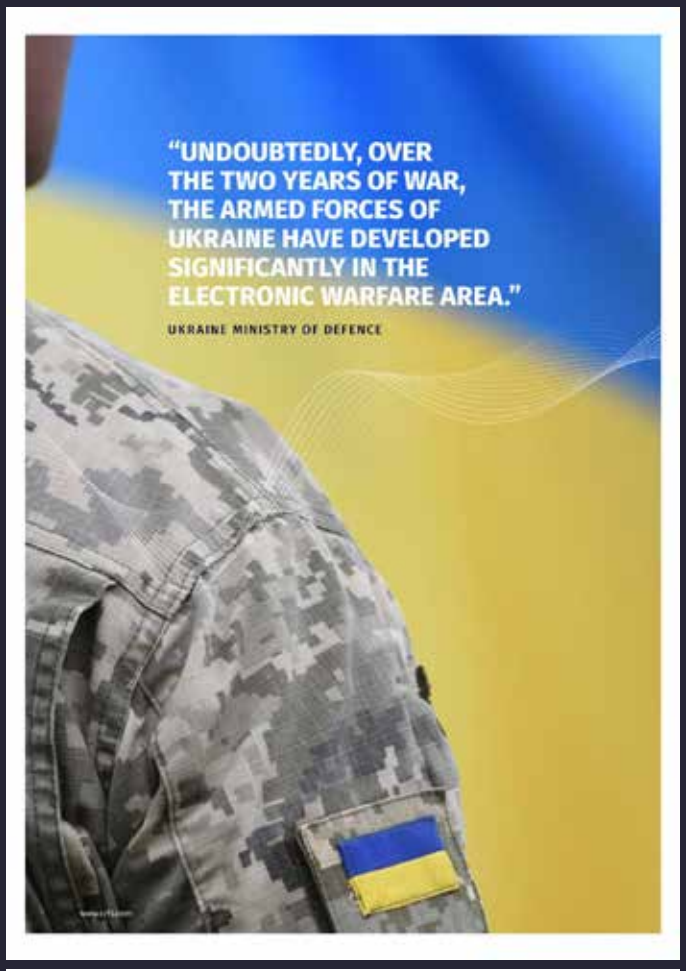
As the same report noted, investment is flowing into avantgarde technologies like quantum radar. Space is insufficient here to discuss quantum radar in detail but, broadly speaking, it uses photons (as opposed to electrons) to detect, identify and track targets. The technology is still in its infancy, but China's direction of travel in this regard is clear.

The PLA also maintains a dedicated combatant command, the Information Support Force, which specialises in strategic, operational and tactical communications. Furthermore, the report states that China's significant investment into civilian telecommunications infrastructure, including communications satellites, has clear military benefits. China currently possesses 60 communications satellites, four of which are dedicated to military use.

Quantum technologies are also receiving support. Quantum encryption, where photons are used to carry traffic, is of great interest to the PLA. Without going into technical specifics here, quantum encryption promises

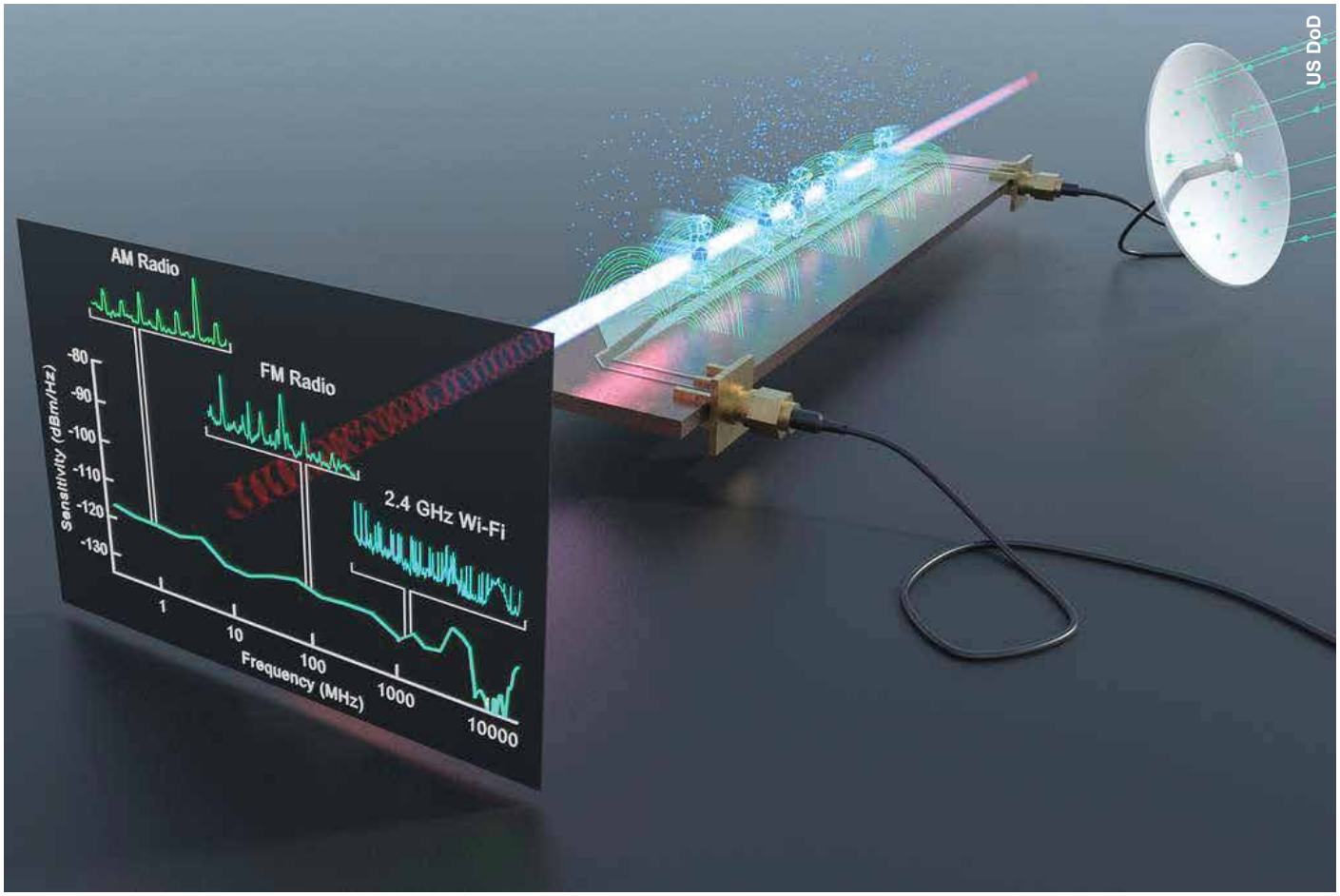
The Pentagon's 2024 report to the US Congress on Chinese defence and security developments articulates the significant investments into electromagnetically dependent technologies such as radar and radio communications that China and the PLA are making.





Electronic Warfare by ARMADA INTERNATIONAL

READ THE LATEST SPECIAL REPORT ON ELECTRONIC WARFARE & THE TACTICAL LAND BATTLE IN UKRAINE



Quantum sensing, encryption and communications are all areas where the PLA and China are making investments. Quantum encryption offers potentially unprecedented levels of communications security, while quantum radar could help detect and track targets designed to produce a low radar cross-section.

unprecedented levels of communications security. Advanced communications and sensors also form a key tenet of the PLA's multi-domain precision warfare (MDPW) concept. MDPW has much in common with the US DoD's multi-domain operations (MDO) philosophy. MDPW, like MDO, emphasises the inter- and intra-force connectivity of all military assets such as personnel, platforms, weapons, sensors, networks, bases and capabilities. The goal of these two concepts is to facilitate better-quality decision-making at a faster pace than one's adversary.

MDO and MDPW hark back to the famous OODA (observe, orient, decide, act) loop devised in the 1960s by the US strategist John Boyd. Both approaches to war harness the theory that whoever navigates the OODA loop quickest with the best-quality decision-making will prevail in any fight.

Enhancing cooperation

Citing the UK's ongoing tensions with Russia, as underscored by the latter's occupation of parts of Ukraine, Nagashima asserted that "Japan and the UK each face increased [electromagnetic spectrum] threats, both geographically and strategically". The two countries are technological heavyweights, but middle-sized powers, so EW cooperation does make sense.

What should cooperative EW efforts concentrate on? The author recommends exploiting the analytical power offered by advances in artificial intelligence (AI). The electromagnetic spectrum is a complex place. Before a hostile radar, radio or communications network can be attacked, signals from these systems must be found. RF engineers go to great lengths to reduce the chances that the radar and radio signals that militaries depend on will be discovered. Signals are designed to blend into the prevailing electromagnetic noise that envelops our planet using low-probability of detection/interception (LPD/I) techniques.

To further complicate matters, the spectrum continually hosts billions of users around the world. The global growth of cellular communications over the past 30 years has done little to ease congestion in the spectrum. The ability of human cognition to find a signal protected by LPD/I techniques in the ether in a particular locale may have already been reached. AI could hold promise in helping the age-old EW challenge of teasing out a signal of interest from the morass of noise. Moreover, once the signal is detected, these same techniques could help analyse the signal to determine its identity, origin and the information it is carrying. Mirroring science and technology research trajectories in China, quantum technology is an area in which Nagashima feels the UK and Japan could collaborate.

Deepening electronic warfare collaboration is a key work strand of the tripartite AUKUS grouping. Work is ongoing to establish a framework by which the three nations can share EW data with ease.

The bedrock of this UK-Japan EW collaboration was laid in 2017 during a bilateral summit where both nations agreed to enhance dual-use technology collaboration. Technologies like AI and quantum will not only be applicable to the military sphere, as they potentially offer vast benefits for the civilian world too. An article published by the US National Cancer Institute noted that the number-crunching prowess of AI could hugely benefit cancer screening and treatment. AI has clear potential in helping to analyse the torrents of data generated by drug trials. As noted in an article entitled "Quantum, the Indispensable Ally of Modern Medicine", published by the Institut Polytechnique de Paris (Paris Polytechnic Institute), quantum technology continues to play a key role in medicine, enabling everything from magnetic resonance imaging to positron emission topography.

In fact, Nagashima argued that British and Japanese engineers and scientists should, in some cases, prioritise innovation in the civilian sector "to quickly demonstrate the effectiveness of fast-moving civilian advanced technologies". By doing so, this "could aid the speed at which these new technologies are implemented within defence equipment".

Future directions

The example cited by Nagashima is bilateral, with both Japan and the UK promising to work together to mutually strengthen their EW capabilities. Yet international collaboration and cooperation in the Asia-Pacific region regarding electronic warfare could deepen further. The region is home to several multilateral groupings, all of which have China's strategic posture as a core concern. The Quadrilateral Security Dialogue, better known as the Quad, groups together Australia, India, Japan and the USA. As with the UK-Japan relationship, all Quad members have vibrant science and technology sectors.

AUKUS combines Australia, the UK and USA. This latter grouping is already forging ahead with multilateral EW cooperation. In December 2024, the US DoD revealed that AUKUS was implementing a dedicated EW data-sharing framework. Reports stated that the framework would take three months to activate. It has a remit to develop methods by which EW data can be shared amongst the AUKUS membership. As noted above, nations, even the closest allies, can struggle to share such information. The goal, the reports continued, is to help AUKUS members easily share EW information across the sea, land, air, space and cyberspace domains. Easing the flow of such information is vital to helping realise MDO ambitions.

As Nagashima noted, Asia-Pacific lacks a NATO-like alliance and may not receive one anytime soon. However, this does not need to prevent cooperation in the EW sector. The efforts of the UK and Japan, and AUKUS, could provide a template by which other nations in the region could collaborate in this sphere.

Involving the USA in such initiatives will pay dividends. Groupings like AUKUS and the Quad will let the US defence community benefit from EW-related innovation shared by other members, and vice versa. Pooling EW research and development (R&D), where possible, will help lower everyone's R&D costs, while helping to develop dual-use technologies of relevance to the civilian sector. Such strategic win-win situations can only benefit all concerned. A

MILKOR UAE'S GLOBAL AMBITIONS. CEO JULIAN COETZEE ON INNOVATION, EXPANSION, AND THE FUTURE OF DEFENSE.

Julian Coetzee, who is based in Abu Dhabi, is CEO of Milkor UAE.

Perhaps some readers might not be familiar with the company Milkor. Can you provide a summary of your company's core activities?

Milkor was established in 1981 as the original equipment manufacturer of the 40mm Multi Shot Grenade Launcher, a product well known globally. Since its inception, the company has developed and produced a variety of products such as the flagship Milkor 380 unmanned aerial vehicle, as well as many other products positioned in the air, land, sea and weapon domains.

Importantly, our products are in operational use in more than 65 countries, and the company operates out of four global offices.

What are some of your key products, and in what regions do you have a strong presence?

Our key product at this stage is undeniably the Milkor 380 unmanned aerial vehicle. However, our other divisions are constantly innovating on a variety of products such as the Milkor Vanguard, which is a STANAG 4-level mine-resistant ambush protected (MRAP) vehicle launched in South Africa in 2024. Another new product is the Milkor Commander, which is a 16-metre fast patrol vessel that is being launched officially at NAVDEX 2025.

As far as regions go, we try to have a strong presence in almost all countries that we market or sell to. We do not favour specific countries or regions, and hence our large team of business developers is active in all their respective regions.

Can you elaborate on some of the new segments that Milkor has been expanding into in recent times, and the reasons for this?

We have heavily invested in our software and communication divisions, plus we are constantly employing, improving and delivering communication solutions and incorporating them into our products. This advances interoperability amongst not only our products, but others as well. Furthermore, I must also mention our active research and development efforts and activities surrounding artificial intelligence (AI) and various air-launched munitions, more of which is to be discussed soon.

Please shed some light on future directions for Milkor too. Are there particular products, segments or regions that will take your company forward into the future?

I think that our mission has been very clear from the start – we aim to become one of the top 25 defence manufacturers/suppliers in the world. Indeed, all our efforts go towards achieving this goal, and this includes a combination of a diverse product range, together with sub-component development and supply. We will continue on this path until our goal is achieved on a global level. A

MILKOR

AIR | LAND | SEA | CYBER

YOUR RELIABLE PARTNER IN ADVANCED DEFENCE SOLUTIONS, BUILT FOR TOMORROW'S CHALLENGES

www.milkor.ae

By the end of 2025, the IAF will have 16 C295 transport aircraft in service

Airbus Defence & Space

FORCE REVIVAL

India's air force is looking to indigenously developed platforms to enhance its combat potential

By Mike Rajkumar

The Indian Air Force which is facing a continued depletion in its fleet of combat fighters is looking at the induction of indigenously developed aircraft and helicopters to maintain its combat effectiveness. This will be paired with domestic upgrades of its imported platforms. At present the air force's most modern combat aircraft is its fleet of 36 Rafale fighter jets. These are backed up by three squadrons each of upgraded Mirage 2000 T/TIs and MiG-29 UPGs. The backbone of the IAF is its fleet of an estimated 270 SU-30 MKI fighter jets and the air force also operates six squadrons of ageing Sepecat Jaguar strike aircraft.

"With the objective of maintaining the qualitative status with respect to our adversaries, IAF has, over the years, upgraded its legacy fleets and brought them to near 4th Generation Capability. However, because of their vintage, some sustenance issues do exist," an air force representative was quoted in defence report, presented to the Indian parliament in December 2024.

The IAF has also operationalized two squadrons of the indigenously developed Tejas Mk-1 light fighter, but its final two MiG-21 'Bison' squadrons are slated to be phased out from service this year. The Tejas Mk- IA, whose deliveries are yet to begin will replace the MiG 21 Bison fleet in the IAF. According to a retired IAF Air Marshal who formerly headed the air force's training command, "indigenous procurement of defence equipment is now inevitable and inescapable and the air force has been factoring this into its procurement plans."

Procurement Pipeline

Indian state-owned aerospace entities, the Aeronautical Development Agency (ADA) and Hindustan Aeronautics Limited (HAL) are pursuing three indigenous fighter aircraft programmes, which are of vital importance to the IAF. The air force has 83 Tejas Mk-1As on order, with the first aircraft to have been delivered last year. The air force is also expecting to soon finalise a contract for 97 additional Tejas Mk-1As. India's

Ministry of Defence (MoD) cleared the procurement in November 2023 and the process of finalizing the contract is ongoing. A formal deal is expected to be announced at Aero India in February. The air force has also said that will acquire six squadrons of the bigger Tejas Mk 2 'Medium Weight Fighter' which is well into development.

The Tejas Mk2 is a multirole combat aircraft that is intended to replace the air force's Mirage 2000, MiG-29 and Jaguar aircraft in the next decade. As compared to the smaller Tejas Mk-1A, the Tejas Mk2 will feature extensive self-defence capability to operate in dense and hostile Air Defence (AD) environments. The aircraft will be powered by a higher thrust engine GE Aerospace F414-INS6 engine, offering significantly improved performance metrics and will also feature an integral Unified Electronic Warfare Suite (UEWS) for survivability, new Digital Flight Control Computer (DFCC) and be easier to maintain as compared to the Tejas Mk 1/1A.

The air force will also look to acquire seven squadrons of the 5th gen Advanced Medium Combat Aircraft (AMCA). "The deliveries for LCA Mk2 and AMCA are expected to commence only into the next decade once the development cycle is successfully completed," an official with knowledge of the programme, told AMR. It is with this in mind, that the air force is continuing to process the case for induction of an imported Multi Role Fighter Aircraft (MRFA) for 114 aircraft. However, the MRFA procurement has yet to receive an Acceptance of Necessity (AoN) from the Indian MoD, which marks the formal start of the acquisition process.

The IAF presently has plans to induct a total of 180 Tejas Mk-1A fighter jets. However, deliveries of the type are delayed and yet to commence.

In December last year, the air force contracted HAL for procurement of 12 new-build Su-30MKIs along with associated equipment in a deal worth approximately US$1.6 billion. These aircraft will be built under license a HAL's Nashik plant. It is likely to be India's last order for the SU-30 MKI. HAL also received an MoD contract in September 2024 for license-production of 240 AL-31FP aeroengines for the air force's Su-30MKI fleet. The deal is worth approximately USD3.2 billion. 'These aeroengines are expected to fulfil the need of the IAF to sustain the operational capability of the Su-30 fleet for the defence preparedness of the country,' an MoD spokesperson stated. HAL has committed to supply of all 240 engines by 2032, delivering the engines at a production rate of 30 aeroengines per annum as per the contractual delivery schedule.

The Indian SU-30MKI fleet is also slated to receive a Mid Life Upgrade for 84 aircraft. The upgrade will include greater indigenous content and the integration of new mission computes, avionics, radar, an EW suite and a greater variety of indigenous air-to-air and air-to-ground weapons. The air force will also continue to fly its MiG-29 UPG fleet into the next decade. HAL'S Koraput Division received an MoD contract for new RD-33 aero engines for air force MiG-29s in March 2004 worth approximately USD640 million.

The IAF is eyeing the domestic upgrade of 84 SU-30 MKIs which will dramatically enhance its combat capability

Trainer Target

The air force has 70 HTT-40 Basic Trainer Aircraft (BTA) on order as part of a March 2023 contract. The air force has also committed to acquiring 36 additional HTT-40s, after the procurement and operationalization of the first batch of 70 aircraft. Deliveries are to commence in September, this year with HAL having committed to delivering all 70 aircraft on order. The airframer is targeting achieving a production rate of 12 aircraft per year, increasing to 16 and finally a peak production rate of 20 aircraft. Initial aircraft production as well as further development activities will be carried out at HAL's Bengaluru factor, but a significant number of the production aircraft are planned to be manufactured HAL's Nashik Plant. The HTT-40 was designed and developed by HAL, which is also working to complete the development of the HJT-36 Intermediate Jet Trainer (IJT), a replacement for the HJT-16 'Kiran'.

Rotorcraft Revival

Another large procurement is a soon

HAL is awaiting the first formal order for its three-tonne Light Utility Helicopter (LUH) from the air force and army.

expected order for 156 indigenously developed Light Combat Helicopters (LCH). Named 'Prachand' in service, the LCH is manufactured by the state-owned airframer Hindustan Aeronautics Limited (HAL). The MoD approved the procurement of 156 LCHs in January 2024, with 90 slated for the army and 66 for the air force. The IAF is the lead service in this project. "HAL was issued a Request for Proposal (RFP) for the attack helicopters in June 2024 and the Technical Evaluation Committee was constituted in Aug 24 and is under progress," an official with knowledge of the programme, told AMR. The air force had completed the induction of its first batch of Limited Series Production (LSP) LCHs in February 2024.

A small order is also expected for the Light Utility Helicopter (LUH Mk-I) which has been indigenously designed and developed in India by HAL. The three-ton class, single-engine multipurpose utility helicopter offers outstanding high-altitude performance and will be acquired by both, the air force and the army. Contract negotiations for the first batch of helicopters are underway between the MoD and HAL. Another vital programme for the air force and army is the future Indian Multi-Role Helicopter (IMRH) being developed by HAL as a replacement for the Mi-17 fleet.

HAL has said that between its four rotorcraft programmes, it expects to produce 1,000 helicopters of various types by 2045 at two production facilities. Its new helicopter factory, located at Tumakuru in Karnataka, is India's largest helicopter manufacturing facility and will initially produce Light Utility Helicopters (LUHs). "Initially, the factory will produce around 30 helicopters per year and can be enhanced to 60 and then 90 per year in a phased manner," an HAL official told AMR.

HAL's rotorcraft ambitions recently received a blow however, with a fleetwide grounding of its 5.5 tonne Dhruv military utility helicopter, following a fatal accident that resulted in the death of two pilots and one aircrew diver. An ALH MK-III helicopter of the Indian Coast Guard (ICG) crashed at Porbandar Airport Runway, while on a routine training sortie on January 5, this year. Following the fatal accident, the entire operational fleet of Dhruv helicopters in India, comprising approximately 330 aircraft has been grounded. The fleetwide grounding is a major blow to the air force and army, which utilise the helicopters extensively. HAL is today producing the Dhruv in three main variants – MkIII utility, Mk III 'Maritime' and MkIV Weapons System Integrated (WSI). While the MkIII and Mk IV variants are operated by both the air force and army, the Mk III 'maritime' variant is operated by the IN and ICG. The Navy also operates older MkII variants of the Dhruv.

C295 Transport Programme Shows Way Forward

The IAF formally inducted its first C295 MW transport aircraft into service in September 2023, marking an important milestone in the recapitalisation of its transport aircraft fleet. At least six aircraft have already been inducted with 11 Sqn based at Vadodara. Airbus is slated to deliver nine more C295s this year, which will delivered in flyaway condition to the air force by August 2025. New Delhi has

The recent fatal crash of a Dhruv utility helicopter belonging to the Indian Coast Ground, has resulted in a fleetwide grounding of the type across all operators.

HAL is expecting a production contract for 156 Light Combat Helicopters (LCH), adding to an early order for 15 from the air force and army.

placed orders for 56 aircraft to replace its obsolete HS-748 'Avro' fleet, making India the largest customer worldwide for the C295 transport aircraft.

Under this project, 16 aircraft will be delivered in 'Fly Away' condition and 40 aircraft will be manufactured in India by a Tata Consortium, led by Tata Advanced Systems Ltd (TASL) with Tata Consultancy Services and in collaboration with Airbus Defence and Space S.A., Spain. The C295 programme is a first for India, in that this is the first time that an Indian private sector firm will produce a military aircraft under license in India. "It will involve the full development of a complete ecosystem from the manufacture to assembly, test and qualification, to delivery and maintenance of the complete lifecycle of the aircraft," an official involved in the programme told AMR.

The Final Assembly Line (FAL) complex for the Airbus C295 aircraft in Vadodara, Gujarat in India was inaugurated by Indian Prime Minister Narendra Modi in October 2024. This is the first private sector Final Assembly Line (FAL) for military aircraft in India. It is also the first time, that Airbus Defence has deployed the entire production system for an aircraft outside its home nations. The first Indian C295 assembled under license is slated to rollout in September 2026. The parts for the first aircraft have already been shipped to the Vadodara FAL, where the aircraft will be assembled and then delivered to the IAF. The last of 40 aircraft to be delivered by August 2031.

The license-manufacture programme of the C295 in India will involve the production of more than 85 percent structural components and final assembly of 40 aircraft. 13,000 detail parts will be manufactured in India, for which 21 special processes have been certified and 37 India-based suppliers, both from the private and public sectors, have been onboarded. All 56 aircraft will be fitted with an indigenous EW suite that includes radar warning systems, missile warning sensors and countermeasure dispenser systems that will be manufactured by Bharat Electronics Limited & Bharat Dynamics Limited.

The indigenously developed LCA Mk2 is slated to replace three air force fighter types in the Mig-29 (pictured), Mirage 2000 and Sepecat Jaguar.

In the Balance

Despite these inductions, the IAF's combat strength is woefully inadequate and will remain so until the government accepts that threat of retaliation must be credible for any deterrence," cautions Air Cmde (retd) KA Muthanna, a former Chief of Test Flying [Fixed Wing] at Hindustan Aeronautics. According to Muthanna, this is because the IAF will have to undertake operations also along the entire maritime boundary, in case of an all-out war. "The PLA Navy is the world's largest and cannot be faced by the Indian Navy alone," he stresses. The IAF needs to urgently induct new aircraft and at the present moment is focussed on the commencement of deliveries of the Tejas Mk-1A, which is critical as the air arm will have to phase out its last two MiG-21 squadrons from service this year. At the present moment, the speedy induction of indigenously designed and developed platforms appears to be the only way for it to tilt the balance in its favour. However any significant delays in indigenous programmes will disrupt the IAF's efforts to recapitalise its combat fleet.

Handheld RPGs are a threat to combat and tactical vehicles. Counter-RPG nets like the AmSafe Bridport Tarian or Qinetiq Q-Net shown offer a simple protective solution.

UK MoD/Daily Mail

PASSIVE AND ACTIVE COMBAT VEHICLE PROTECTION

As lethal threats proliferate on the modern-day battlefield, it is imperative that armoured vehicles utilise a variety of self-protection means to improve their level of survivability.

By Stephen W. Miller

"If you can be seen, you can be hit; if you are hit, you can be killed." This military adage has taken on increasing importance with the fielding of improved longer-range weapons, optical sighting systems and increasingly lethal munitions. Advanced ballistics, electronics, computers and sensor technologies for military operations have expanded the ability to "see" at night time and in previously limited-visibility conditions. This, coupled with the development of precision and guided munitions that increase the likelihood that any target engagement could ensure a hit, has made protection for combat vehicles increasingly challenging.

Today's "transparent battlefield" uses relatively economical but advanced surveillance and acquisition sensors in manned and unmanned ground and air platforms. These threats apply to every soldier on the battlefield, but they are of particular concern to combat vehicles. If not effectively addressed, they have the potential to nullify the benefits of mobility, firepower and protection that these systems have brought to ground warfare.

Countering this battlefield reality requires taking a step back to view the basics of what protection actually entails. First, it should include taking every action to reduce one's ability to be seen. Second, one needs to detect an enemy before he finds you, thereby precluding his engagement of you. Third, if you are engaged, one must keep from being hit while at the same time neutralising the opponent. Fourth, reduce or eliminate the damage, and enhance the survivability of the system and crew.

Achieving these objectives necessitates multiple approaches, both passive and active. Some are simple while others are technologically sophisticated. When combined with judicious tactical movement, employment techniques and tactics that recognise and respond to the realities of battle, these measures taken together can effectively contribute to not only one's own survival, but also to degrading the enemy and gaining an edge against them.

Do not be seen

"If you're not seen, you cannot be effectively engaged" is a second combat axiom, and it would seem self-evident. However, the application of camouflage and concealment, as well as the skills of using terrain and cover to discretely move on the battlefield, are not always evident, even with supposedly well-trained troops.

The size of combat vehicles makes this even more difficult. Additionally, counter-surveillance and counter-acquisition efforts are complicated because these must deter not only visual and acoustic detection, but also the infrared, thermal

LAAD
DEFENCE & SECURITY
2025

01 - 04 | April

Riocentro | Rio de Janeiro

BE AN EXHIBITOR

The most important Defense and Security SHOW in Latin America

Organiside by

Creative Events Brazil

www.laadexpo.com.br

LAADEXPO | LAAD EXPO OFICIAL | LAADEXPO

and radar spectrums. Solutions that can achieve this goal are particularly challenging for combat vehicles, since any solution must also allow the systems to simultaneously move and shoot.

One proven combat vehicle solution is Saab Defence's multispectral Mobile Camouflage System (MCS). It is designed to reduce the effectiveness of visual, ultraviolet, near and far infrared, thermal and radar sensors in detecting a stationary or moving combat vehicle. The MCS diminishes the signature of the host system, allowing it to blend with its surroundings. The system consists of specifically formulated coatings with absorbent/reflective properties, augmented by specially designed screening that defeats various imagery sensors, scatters radar waves and dissipates heat.

A Saab spokesperson explained, "Together, these manage the overall vehicle signature by minimising its contrast with objects in the background, making sensor detection much harder. In field and combat use, this has been shown to contribute to reducing exposure while making identification and targeting more difficult."

Efficient passive camouflage is also one of the relatively less expensive protection solutions available. In Ukraine, its combat vehicles – including Leopard 2 main battle tanks (MBT) and CV90 infantry fighting vehicles (IFV) equipped with the MCS – have proven able to stay undetected, even at close ranges, something which obviously offers significant tactical advantages. Seasoned crews in Ukraine recognise the importance of taking the time and effort to apply passive camouflage, as well as the potentially fatal result of neglecting to do so.

Threat detection and warning

Equally relevant to survival is the protective advantage offered by detecting an enemy first. Advanced optronics and panoramic sights contribute to survivability by allowing better observation. However, identifying threats can be enhanced by onboard systems designed to alert the crew to enemy actions that endanger their vehicle. Threat detection and warning systems can detect a signal such as a ranging laser or radar associated with a hostile weapon system. They detect, categorise and accurately pinpoint sources such as enemy rangefinders, guided missiles, target designators and illuminators.

The level of protection improvement possible is evident in Singapore's Leopard 2SG tank that incorporates AMAP protection and survivability upgrades.

Integrated into the vehicle communications and weapon controls, they can provide critical seconds of warning, allowing deployment of screening smoke or aimed counter-fire and evasive manoeuvre. Versions of laser warning receivers include the Aselsan LIAS-400, Israel Military Industries (IMI) Third Eye as used by the Israel Defense Forces, the Thales Antares and Elbit Systems ELAWS, the latter being selected for the UK's Challenger 3 tank.

The Swedish CV90 includes a laser warning in its defensive aids suite too. In 2023 the US Army procured the AN/VVR-4 laser detecting systems for its combat vehicles from Danbury Mission Technologies, an ARKA company.

Another passive approach to threat detection and warning capitalises on capturing the acoustic signature of a weapon. Gunshot detection and ranging systems, such as the Thales Acusonic, Metravib Pilar and Qinetiq EARS, automatically detect and identify the direction – even precise grid locations – of small arms, cannon, rocket-propelled grenade (RPG) or mortar fires. They can be linked to weapons allowing "skew-to-cue" that direct the vehicle's weapon onto the firing source, thus allowing rapid counter-fires.

Such systems are of particular value to crews operating under armour, as well as just overcoming the noise of the vehicle itself. Passive detection and alerting systems are often employed with vehicle-

Rheinmetall's Strike Shield, shown here on a Leopard 2 MBT, defeats an incoming projectile in live-fire tests. Its first operational fielding will be on Hungary's Lynx IFVs.

Vehicle-launched rapid screening systems like Rheinmetall's ROSY offer an immediate response to contact by obscuring the vehicle and disrupting weapon guidance systems.

launched screening systems that provide a rapidly deployed, multispectral, sensor-defeating screen that obscures the host vehicle from the enemy. Systems, such as Lacroix's Galix and Rheinmetall's ROSY, provide a screen that hides the vehicle from visual, thermal and other sensors, as well as obstructing laser guidance. This allows the vehicle to take evasive action to avoid being hit.

Passive protection – armour

Traditionally, combat vehicle protection used armour to prevent penetration. As types of munition warhead effects have expanded, such as shaped charges and explosively formed penetrators, and as ballistic calibres have increased, various new combinations of protective materials and configurations have been created to defeat these threats while still achieving a reasonable weight.

The reality remains, however, that increasing protection can often add weight, which in turn degrades mobility. This concern was a factor in the US Army's 2024 decision not to pursue its M1A2 SEPv4 Abrams development. Composite and/or layered protective armour are common on combat vehicles today. In addition, both upfront provisions for modular armour, as found on the German Puma IFV, and kits or upgrades, have become standard practice. This is essential for responding to increasing expected threats. For example, today 14.5mm all-around and 30mm frontal-arc protection are considered essential for IFVs.

The constantly evolving dynamics of battlefield threats and the need to respond to them are further illustrated by the attention now being directed toward top protection against overhead attack by first-person view drones, such as AMAP-R roof armour from Germany.

This continuous evolution of threats faced by combat vehicles has placed a premium on developing add-on and supplemental protection to existing vehicles. This has fostered industrial initiatives such as the IBD Deisenroth and Rheinmetall alliance firm Rheinmetall Chempro that produces the Advanced Modular Protection System (AMAP), a widely used supplemental protection system. It features on Singapore's Leopard 2SG MBTs, for example.

AMAP consists of kits addressing various threats, including AMAP-ADS, a hard-kill active protection system that detects and intercepts incoming projectiles; AMAP-SC, a composite specifically designed to defeat shaped-charge projectiles like RPG-7s; AMAP-R roof protection against bomblets; AMAP-L, an interior spall liner; and AMAP-IED for mine and blast protection. Another modular add-on armour system, LAST (Light-appliqué Armor Systems Technology), is designed for tactical vehicles, as well as fixed-wing and rotary-wing aircraft and naval vessels. It is installed using heavy-duty, hook-and-loop fastenings.

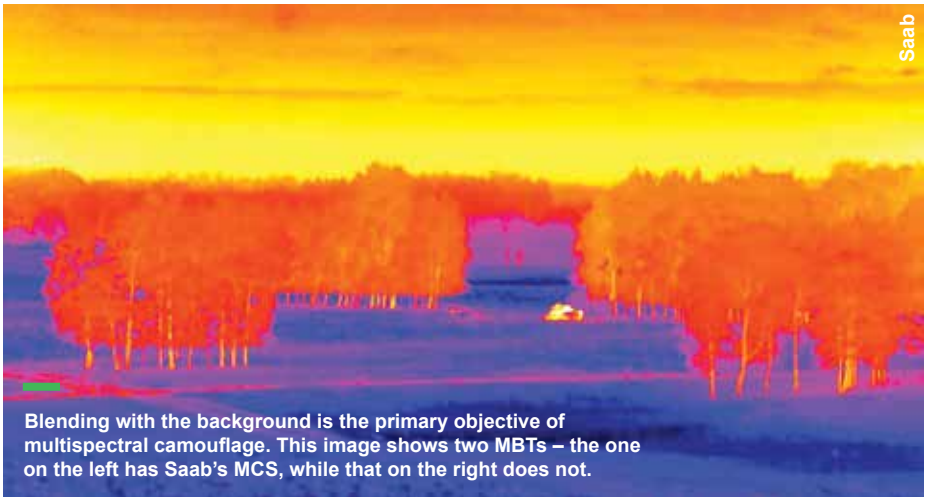
Another form of add-on protection is bar armour or nets designed to defeat handheld, shaped-charge projectiles such as RPGs. These consist of steel or aluminium lattices, as in the BAE Systems L-ROD, or an aramid cord net surrounding part of or even the entire vehicle. They are relatively light, especially net versions like Qinetiq's Q-Net and AmSafe Bridport's Tarian. As a result, they can be employed on a wide range of vehicles. A drawback is their required stand-off distance that adds width; this can hinder movement in close quarters and urban areas.

Additional protection for the crew can also be provided by installing spall liners to a vehicle interior. These soft-armour liners are typically attached to the inside of a vehicle, helicopter or watercraft. They protect the crew by catching dangerous fragments that can be released inside the vehicle as the result of impacts against exterior armour.

Reactive armour – explosive and non-explosive

The shaped-charge warhead introduced in World War II uses explosive chemical energy to penetrate armour. It is widely used in handheld and antitank missile weapons. Explosive reactive armour (ERA) defeats these with a counter-

Saab's MCS is designed to allow a combat vehicle to blend with its surroundings and reduce an enemy's ability to detect it. Shown here is a Swedish MBT with MCS.



Blending with the background is the primary objective of multispectral camouflage. This image shows two MBTs – the one on the left has Saab's MCS, while that on the right does not.

explosive charge placed between steel or ceramic plates. As the projectile penetrates the outer plate, the explosive detonates, disrupting the effectiveness of the warhead. ERA reduces heat-jet penetration, but it also requires strong base armour, meaning it is used primarily on MBTs and heavier fighting vehicles. The ERA detonation also presents a danger to infantry that may be around the vehicle.

Non-energetic reactive armour (NERA) substitutes the ERA's explosives with an inert elastic elastomer, a rubbery polymer. This dissipates the strike energy of the attack to minimise impacts on the base armour. It has the advantage of being able to take multiple hits.

Reactive armour is relatively easy to add, so it is widely used in updating protection on older vehicles. Ukraine has been particularly successful in using it on donated MBTs such as the 1970s-era Leopard 1A5, and these have performed quite well in combat. Reactive armour is relatively simple to produce, with many versions fielded. Examples include Soviet/Russian Kontakt-1 and 5, American ARAT and Chinese VT-IV ERA.

Active protection systems

Versions of active protection systems (APS) have been fielded since the 1980s. The Soviet Union's Shtora-1 (Russian for "curtain") introduced on the T-90 MBT was intended to disrupt the infrared and laser guidance of US and NATO precision weapons and antitank guided missiles. However, this soft-kill approach is giving way to hard-kill methods that use 360°, continuous-coverage radar to detect and track, and then use various effector types to destroy incoming projectiles before they hit. To be effective and to respond rapidly enough, APS is autonomous.

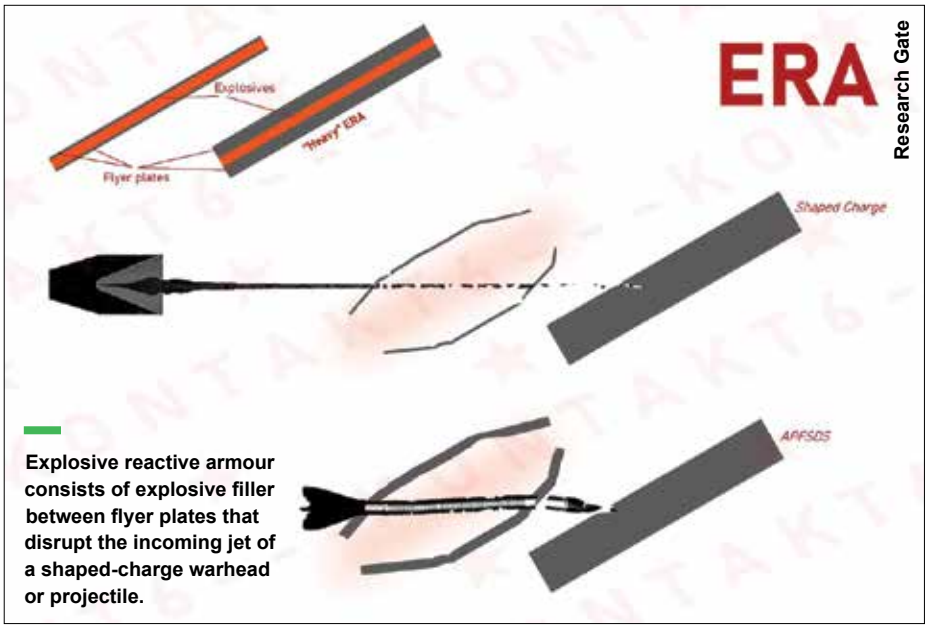
The well-known Rafael Advanced Defence's Trophy APS uses kinetic-energy, explosively formed penetrator effectors, launched from a turret-mounted launcher. It is operational with Israel, and is being acquired for the latest US Army M1A2 Abrams, as well as Leopard 2s of Germany and Norway. Its 3,272kg weight, power demands and projectile residuals limit its use to MBTs. However, the Trophy Light MV/VPS, which is 40% lighter, has been developed for lighter armoured vehicles.

Other APS types include IMI's Iron Fist and Rheinmetall's Strike Shield. Iron Fist weighs just over 683kg and it fires an explosive, non-fragmenting effector. Strike Shield is not only modular, but it is intended to be integrated into a vehicle's passive armour, as in Hungary's new Lynx IFVs. In addition, Rheinmetall explains, "It's extremely low, 350m electronic emissions minimise it from being electronically detected, while its reaction time can respond to an ambush at only 10m distance and defeat multiple shots." Shrike Shield's design is adaptable to all armoured tactical and combat vehicles, from MBTs to light armoured vehicles.

Incorporating an APS capability in future MBTs is becoming expected. Demonstrating this, South Korea's Hyundai Rotem in October 2024 debuted its latest version of the K2 Black Panther that included a hard-kill APS. China's Norinco also offers an APS called the GL5 able to be installed on export VT4 and VT5 tanks.

Battlefield survivability and protection

Combat vehicles offer a balance of firepower, mobility and protection. Historically, the latter characteristic suggested traditional armour, but in modern warfare this may now be a too-narrow definition. The many threats faced require application of a range of survivability solutions and technologies. As a result, providing protection is just one of many equally critical elements contributing to survivability, from reducing detectability to avoiding being hit, and to continue operating if hit. Achieving survivability, and all factors contributing to it, must be focused upon upfront in combat vehicle requirements, rather than, as has sometimes been the case, appearing as an afterthought. A



Explosive reactive armour consists of explosive filler between flyer plates that disrupt the incoming jet of a shaped-charge warhead or projectile.

AVALON

AUSTRALIAN INTERNATIONAL AIRSHOW

BE PART OF THE NEXT GENERATION

33% more exhibition hall space

New external exhibition spaces

Premium corporate hospitality

25-30 MARCH 2025

AVALON AIRPORT GEELONG, VICTORIA AUSTRALIA

TRADE VISITOR REGISTRATION NOW OPEN

expo@amda.com.au | www.airshow.com.au

AIR FORCE

VICTORIA State Government Australia

CITY OF GREATER GEELONG

AMDA FOUNDATION LIMITED

BOTH RUSSIA AND THE WEST COURT VIETNAM

By Gordon Arthur / Christchurch

Viettel's subsonic VCS-01 Truong Son coastal defence missile system. Its VSM-01A anti-ship missile has a listed range of 80km.

Gordon Arthur

Hanoi hosted the second edition of the Vietnam International Defence Expo (VIDEX) from 19-22 December 2024. While the exhibition has a long way to go organisationally, it was an ideal opportunity for Vietnam's military and national defence industry to show off their wares.

Also evident was the political and economic tug of war between Russia and the West, as far as Vietnam is concerned. Russian defence companies were out in force to tantalise Vietnam's armed forces at VIDEX 2024, with the nation a loyal customer of equipment from Moscow.

Earlier that year, in June, tsar Vladimir Putin made a two-day state visit to Hanoi to meet Vietnamese Communist Party General Secretary Nguyen Phu Trong and new President To Lam. Putin noted that "strengthening a comprehensive strategic partnership with Vietnam is always one of our priorities". Putin added, "We're grateful to our Vietnamese friends for their balanced position on the Ukraine crisis, and their desire to facilitate the search for practical ways to settle it peacefully. All of this is fully in line with the spirit and nature of our relations."

However, Putin's visit irritated Washington DC, with a US official saying "no country should give Putin a platform to promote his war of aggression and otherwise allow him to normalise his atrocities".

The West, like Moscow, is courting Vietnam too. This was evinced by the sharp rise in Western defence companies exhibiting at VIDEX 2024. The likes of Boeing, L3Harris, Lockheed Martin and Textron from the USA were there, as well as European giants like Airbus, BAE Systems, Leonardo, Rheinmetall and Thales.

Also out in force were the Czech Republic, India, Iran, Israel, Japan, South Korea, Turkey and the UAE, as this disparate group of countries sensed opportunities in Vietnam's emerging market. The Vietnam People's Air Force has already turned to non-Russian companies for recent purchases, including C295M transport aircraft, SPYDER-MR/-SR air defence systems and L-39NG jet trainers.

The US military had a strong VIDEX 2024 presence too, with A-10 Warthog and C-130J Hercules aircraft present, plus a US Army M777A2 howitzer and Stryker vehicle. Their appearances hint at current sales opportunities the USA perceives in Vietnam. Certainly, the C-130J is regarded as a contender for future requirements, coming on top of an earlier landmark deal for twelve Beechcraft T-6C trainer aircraft. Five T-6Cs have been delivered so far, and the remainder will follow this year.

A tentative dance is now going on between Vietnam and Western defence companies/governments. Vietnam has minimal experience dealing with foreign defence companies, and ditto for the latter in Vietnam. In the past, deals were done at the governmental level with Moscow, for example, so concluding contracts with the West is a completely different ballgame. Note too that Western companies – hopefully – have far higher standards when it comes to anti-corruption measures.

Vietnam's bamboo diplomacy policy aims to balance relations with competing powers such as China, Russia, the USA and India. It is a balancing act but one that Vietnam seems adept at. In 2023, for example, it hosted both the Chinese and American leaders.

Indeed, President Joe Biden's visit in 2023 resulted in a comprehensive strategic partnership being signed. This is no mean feat, given the bloody history of the Vietnam War. Washington DC had also annulled a weapon sales ban to the Southeast Asian country in 2016. The USA views Vietnam as a useful counter against rising Chinese influence in the region, especially as Hanoi is alarmed at China's build-up in the South China Sea.

While the USA is growing in importance as a trading and diplomatic partner for Vietnam, it is possible to overemphasise the partnership role that Hanoi could play against China. As Putin's visit last year illustrated, Vietnam will not commit fully to any one side, because it knows this would damage relations with the other. Vietnam will not sacrifice ties with one power in order to satisfy the USA, as autonomy and a diversified foreign policy remain crucial to Vietnam.

Furthermore, in the defence technology realm, Vietnam is striding forwards in terms of greater self-reliance. The leading light is Viettel, owned by the Ministry of National Defence. With strengths in communications, radars, electro-optics and the like, Viettel is now delving into new areas such as missiles. At VIDEX 2024, for instance, Viettel unveiled its operational VCS-01 Truong Son coastal defence missile system.

Vietnam is seeking to reduce dependence on overseas suppliers, but both Russia and the West will find plentiful opportunities for defence deals in coming years. A

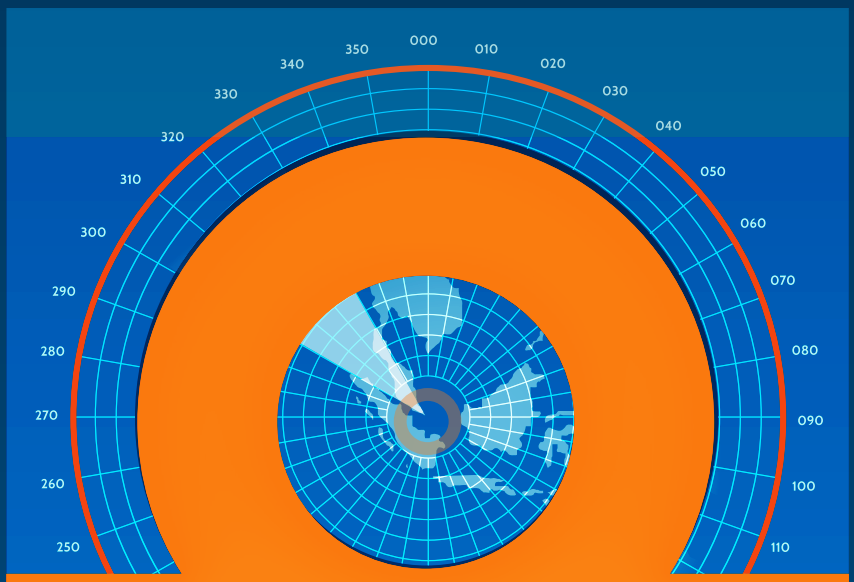


CHART THE NEXT WAVE OF TRANSFORMATION

Asia's leading naval and maritime defence event, IMDEX Asia is the region's epicentre of thought leadership and partnerships. Showcase your innovations to the world's naval elite when they converge at IMDEX Asia.

2023 SHOW FIGURES

11,823 attendees from **71** countries/regions

250 participating companies from **25** countries/regions

51 VIP delegations from **44** countries

BE AT IMDEX ASIA 2025!

FIND OUT MORE

Danny SOONG / Cathryn LEE
+65 6542 8660
sales2025@imdexasia.com
IMDEX Asia
@IMDEXAsia

Scan for participation options

Organised by: experia events that influence

Supported by: DSTA Defence Science & Technology Agency; MPA Singapore; Republic of Singapore Navy; RSiS S. Rajaratnam School of International Studies, Nanyang Technological University, Singapore; Singapore Exhibition & Convention Bureau; aif Approved International Fair

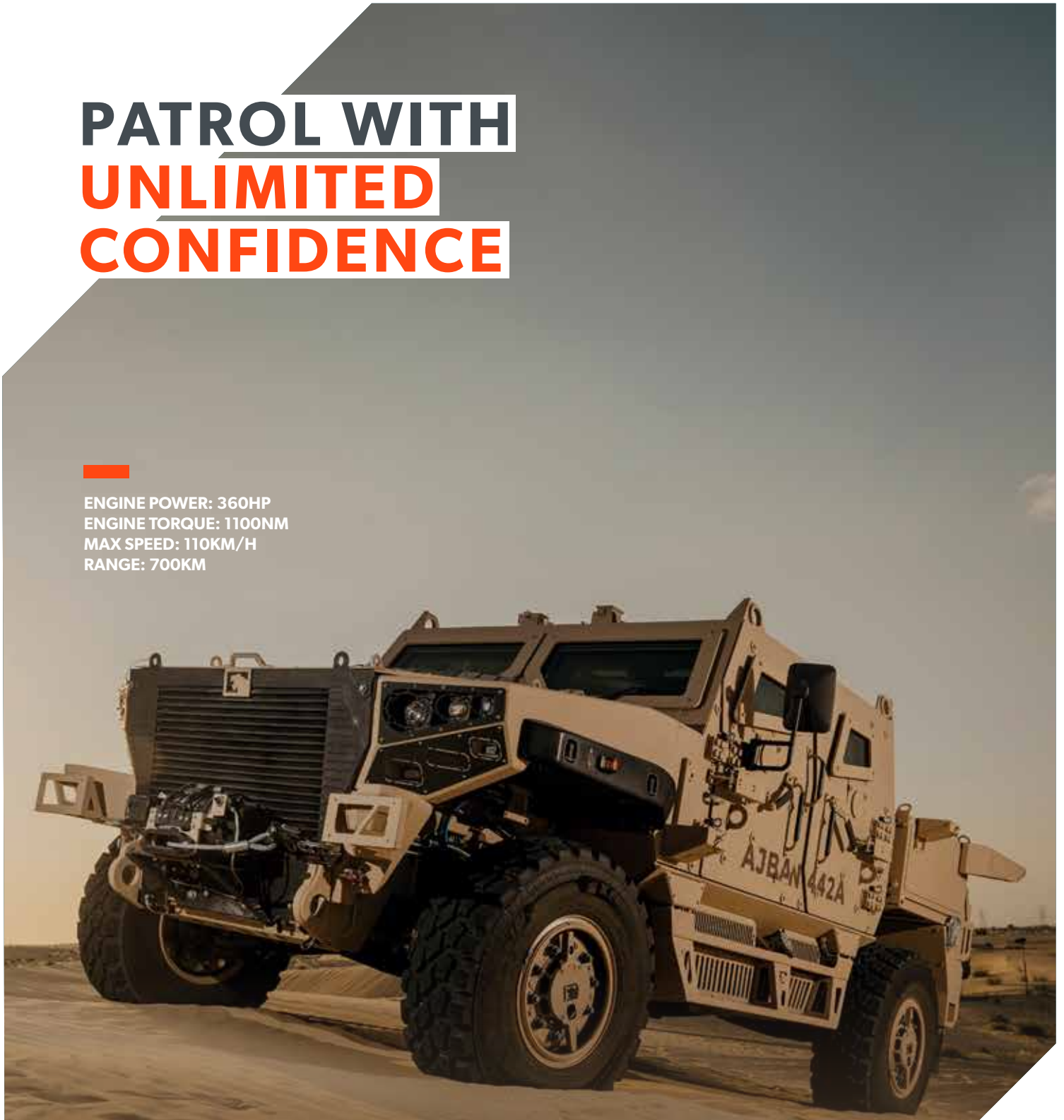
Business Intelligence Partner: SHEPHARD

Made possible in: Singapore Passion Made Possible

IMDEX ASIA 2025 6-8 May
Changi Exhibition Centre

PATROL WITH UNLIMITED CONFIDENCE

ENGINE POWER: 360HP
ENGINE TORQUE: 1100NM
MAX SPEED: 110KM/H
RANGE: 700KM



AJBAN MK2 takes tactical patrol capability further than ever, in all weathers. 4x4 power, on and off road. Full ballistic protection. V-hull structure for blast protection. Armoured cargo compartment. And capacity for a crew of five. So whatever you encounter on patrol, AJBAN has the mobility and flexibility to handle it.

We are EDGE. Unlimited.

VISIT US AT IDEX 2025, HALL 5

Discover complete tactical mobility at **edgegroup.ae**

EDGE