

NATIONAL SECURITY AND AEROSPACE NEWSMAGAZINE



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Close Comfort

For J.D. Patil of L&T, Sudarshan Close-In Weapon System is the highlight of the Show

A FORCE REPORT

GANDHINAGAR: COMPRISING THREE platforms--a tracking radar and command and control unit; a fire control radar; and a firing unit, L&T Defence's Sudarshan Close in Weapon System not only has a place of pride in the company's display at the Show, it is also the system that member of the executive committee and advisor (Defence & Smart Technologies) to the CEO and MD L&T, J.D. Patil says he would like to celebrate at DefExpo 2022.

His reason is simple. Given Prime Minister Narendra Modi's thrust on showcasing India's indigenous technological achievements at the show, Sudarshan, a globally competitive, shortrange air defence system, according to Patil, is mostly indigenous, both in design and development. "We have not achieved this level of indigenisation in any other system," he says.

It has successfully completed the no-cost no-commitment (NCNC) tests for the Indian Air Force's programme for 240 guns and has emerged as the lowest bidder. The programme is yet to be finalised but given that the Indian Army also needs a similar system, Patil is optimistic about a positive outcome soon.

The system is displayed in two parts at the show. While the firing unit with electro optic sight and fire control system (EOFCS) is located at the L&T indoor pavilion alongside L&T MBDA stand, the tracking radar and the command and control units are placed at the outdoor display area. Facing them is the L&T offering to the Indian Army, the Trajan towed gun system, for which it has a tie-up with the French company Nexter.



Coming back to Sudarshan, it has 3D Active Electronically Scanned array (AESA) four faceted radar which provides seamless 360 degree surveillance coverage. It is capable of detection, tracking and classification of a variety of flying platforms, including low level high-speed aircraft, hovering helicopters, low velocity ultra-light aircraft, as well as drones. The fire control radar comes with integrated electronic counter-counter measure (ECCM) features, and has very high angular tracking accuracy. The gun has the range of 3.5km and can fire at the rate of 300 rounds per minute. Equipped with ECCM, it is capable of automatic gun levelling and tilt correction system for quick deployment.

With multiple programmes in the pipeline, Patil is hopeful that Sudarshan could show the way out of the tunnel. II

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Ashok Leyland Exhibits Three Advanced Products at DefExpo 2022



On Day 1 of the DefExpo, Ashok Leyland showcased three advanced-technology products and solutions at the ongoing DefExpo India 2022. Kargil War Hero, Col Sonam Wangchuk and recipient of Maha Vir Chakra, unveiled "JEET 4x4", an all-new Light General Service Vehicle, Indigenously Designed, Developed and Manufactured by Ashok Leyland. Vice President, Defence & Power Solutions Business, Ashok Leyland, Rajesh R unveiled and launched other products in the presence of senior dignitaries from the Indian Army and MoD.

Through partnering with the Indian Army for its logistics needs, Ashok Leyland has been at the forefront of offering the next generation mobility solutions and technology for the country's armed services, following its philosophy of 'Aap ki Jeet, Hamari Jeet'.

Executive Chairman, Ashok Leyland, Dheeraj Hinduja said, "We continue to evolve as a trusted partner to the Indian armed forces in providing end-to-end solutions in the area of mobility. The products showcased today demonstrate our team's capability and an innate understanding of the arduous operating conditions. We endeavor to expand our portfolio of products and solutions and

contribute significantly towards the 'Atmanirbhar Bharat' initiative."

Speaking at the DefExpo 2022, Vice President, Defence & Power Solutions Business, Ashok Leyland, Rajesh R said, "At the DefExpo, we are delighted to present our next generation capabilities for the Defence forces, keeping in view their anticipated mobility trends. These advanced technology solutions developed by our in-house R&D would also address the growing demand for resource efficiency and optimization."

Ashok Leyland has showcased the following products at the DefExpo-

1. JEET 4x4: 'JEET 4x4' is developed on a proven vehicle platform, most suitable for General Service (GS) role. The vehicle is well equipped to perform optimally in hills, high altitude, cross country, plains, and desert terrain. The vehicle also employs contemporary technology in all its system.

2. LBPV 4x4: Light Bullet Proof Vehicle 4x4 is a versatile platform, indigenously designed and developed to carry small team of six combat soldiers into various tactical missions ranging from Counter Insurgency/Counter Terrorist operations for Reconnaissance, Quick Reaction, and Patrolling. LBPV is designed for all-terrain mobility with armoured protection and fitted with a weapon mount to operate independently in the battle field. Features like all wheel Independent Suspension, ABS, Ride Height Management and many more options makes it class apart. LBPV 4x4 is a World Class vehicle 'Made-in-India'.

3. Tank T72 GB Assembly aggregates: These are gear boxes for Tank T-72, called 'Ajeya' in India. Ashok Leyland will begin to manufacture sub-assemblies and sub-components including the gear boxes for the Tank T72. ||

Defence Secretary Inaugurates HAL's Indigenisation Stall

Defence Secretary, Ajay Kumar inaugurated the HAL 'Indigenisation Stall' at the ongoing DefExpo 2022.

More than 200 items which are planned to be indigenised with private industries are at display at the HAL Indigenisation Stall.

In addition, more than 26 parts which are already indigenised by HAL are also displayed at the stall. ||



BAE Systems To Showcase Advanced Defence Capabilities And Commitment To 'Make In India'

NEW DELHI/GANDHINAGAR, GUJARAT, India: Global defence, aerospace and security company, BAE Systems, will exhibit a series of its state-of-the-art defence capabilities at the 12th edition of DefExpo scheduled in Gandhinagar, Gujarat.

With its strategy of 'co-creating for a self-reliant India', the company will showcase existing relationships with Indian industry. BAE Systems will also demonstrate how its defence capabilities and technology solutions are best suited to strengthen India's national security by advancing the growth of the country's indigenous defence manufacturing ecosystem.

Ravi Nirgudkar, BAE Systems' Managing Director India, Bangladesh, Sri Lanka said, "BAE Systems looks forward to participating at DefExpo as India is an important and key strategic market for us. Our presence at the show focuses on reflecting our commitment to India's 'Make in India' initiative and to demonstrate our industry-leading, advance defence capabilities – across land, air and sea."

"As a founding partner of defence manufacturing in India, we also look forward to meeting key stakeholders and industry partners to discuss ways to support India in its modernization journey, alongside bolstering its indigenous defence production capabilities."

BAE Systems' continuous support to India's 'Make in India' initiative and its growing partnership with the local defence industries will be demonstrated through the digital representation of the M777 Ultra Lightweight Howitzer (ULH), which is providing Indian Army with unparalleled tactical and strategic mobility alongside reliable fire support in the most hostile environments.

Under an agreement between the U.S. and Indian governments, the 155mm M777A2 ULH systems are being assembled, integrated, and tested in India by Mahindra Defence Systems Ltd. (MDSL), as part of the Make in India programme. The capability is in service with the Regiment of Artillery and to date, BAE Systems has produced and delivered more than 125 guns to the Indian Army.

Another important digitally represent-

ed defence capability will be the APKWS laser-guided rocket, the most cost-effective laser-guided munition in its class that transforms an unguided 2.75-inch (70 millimeter) rocket into a precision-guided rocket, giving rotary- and fixed-wing military aircraft a low-cost surgical strike capability.

Additionally, BAE Systems' maritime capabilities at DefExpo will be showcased through Bofors 40 Mk4 Naval Gun and Bofors 57Mk3 Naval Gun System, which provides high survivability and tactical freedom at all levels of conflict and are equipped with agile, flexible weapon systems that enable a lightning-quick re-

sponse. 3P Ammunition and BONUS munition will also be on display.

About BAE Systems

At BAE Systems, we provide some of the world's most advanced, technology-led defence, aerospace and security solutions. We employ a skilled workforce of 90,500 people in more than 40 countries. Working with customers and local partners, we develop, engineer, manufacture and support products and systems to deliver military capability, protect national security and people, and keep critical information and infrastructure secure. ||



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On The Mark

Given the flux in the world, with targeted policies, India can exploit the gaps in the defence export market

INDIA HAS AMONG THE LARGEST defence industrial complexes in the developing world. It consists of 39 Ordnance Factories (OFs) and nine Defence Public Sector Undertakings (DPSUs) under the administrative control of the ministry of defence (MoD). Further, there are over 150 large, medium, and small-sized companies in the private sector. In addition, there are around 50 dedicated research laboratories and establishments forming the Defence Research and Development Organisation (DRDO), the research and development (R&D) wing of the MoD.

India is one of few countries to have designed and produced (albeit with some outside assistance) a fourth-plus generation fighter aircraft, nuclear submarines, main battle tanks, and intercontinental ballistic missiles with a range of more than 5,000km.

Reliance on Imports

Despite this infrastructure, India continues to be overwhelmingly dependent on arms imports to meet its defence requirements. The target of 70 per cent self-reliance in defence procurement set for 2005 is yet to be reached. Currently, India's self-reliance in arms stands at around 30-40 per cent.

According to the Stockholm International Peace Research Institute (SIPRI), India with a nearly 10 per cent share in global arms imports during 2016-20 was the world's second-largest arms importer. During this period, China which, not so long ago, was the world's largest arms importer has graduated to being the world's fifth-largest arms exporter with a 5.2 per cent share of global arms exports. India's share by contrast is 0.2 per cent of global arms exports.

Even in the equipment being designed and manufactured domestically, the indigenous content is extremely low. The Comptroller and Auditor General of India (CAG), in a 2011 report to the Parliament, had commented adversely on the 90 per cent import dependency of the state-owned Hindustan Aeronautics Ltd (HAL) for raw materials and bought out items used in the production of the Advanced Light Helicopter (ALH)—touted as being indigenously designed and developed—

even though it had been in production for over a decade.

The Salience of Arms Exports

The MoD's department of defence production (DDP) recognises the urgent imperative to rapidly accelerate the process of achieving self-reliance in defence equipment. A policy document (available on DDP's website) 'Strategy for Defence Exports,' recognises that large investments in local R&D and production would not be viable if it is intended to only cater to domestic demand.

The policy document highlights that 'though India has made rapid strides in defence technology and industrial base in recent past, it is yet to cover a significant ground in terms of new products development and scale of production. The domestic defence industry would have limited scope for investment in R&D and production if it relies only on the domestic demand.'

Investments in defence technologies are capital intensive and provide returns only in the long term. Also, such investments are viable only when, together with catering to domestic demand, exports, which provide economies of scale are also pursued vigorously. The DDP document goes on to state that 'the policy of maximising indigenous production without well supported R&D policy and export strategy may not bring desired results. Therefore, the defence industrial policy has to be supplemented by the strategy for defence exports without which the economic base of the defence industry would be difficult to sustain in the present economic competitive environment.'

Today's leading defence manufacturing countries have a long, established track record and history of arms manufacture and supply, that at least in the modern era, can be traced back to World War I. These countries developed and then test-



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ed, in combat, the arms that they manufactured.

The global geopolitical environment, the ultra-competitive arms market, and the ineluctable requirement to pursue arms exports (for economies of scale) to build a sustainable enterprise necessitate constant investment in R&D for newer technologies to make weapons ever more potent.

Export Ambitions

In such a scenario, how realistic are India's defence export ambitions? India has no credible track record of arms development, manufacture, or export to boast of. According to information available on the MoD/DDP website, the value of export by DPSUs, OFs, and private defence industry for the financial year 2020-21 was a paltry Rs 8434.83 crores or approximately USD 1,124 million. Just to put the amount in context, a single Krivak class frigate ordered from Russia in 2016 cost India USD 1,120 million with the total deal for four frigates costing USD 4.48 billion. The DDP has set itself a target to increase arms exports to Rs 35,000 crores (USD 5,300 million) by 2025. This would mean that during 2020-25, exports need to grow at a compound annual growth rate (CAGR) of nearly 40 per cent.

Domestically produced equipment suffers from a large number of quality issues. The Indian Army has repeatedly rejected an Indian-made rifle after it reportedly failed quality tests. Indigenously developed critical equipment like the Arjun tanks, the light combat aircraft, and even bullet-proof jackets are often not used because of performance issues.

If India's defence industrial complex is to achieve export targets, it would first need to design and develop arms that are accepted for induction by its own armed forces.

Currently, the Indian defence complex's design-to prototype-to final production cycle takes decades. Consequently, most of the equipment developed, often contains outdated and sometimes obsolete technologies at the induction stage itself. To be able to target the export market—the design to production cycle needs to be shortened and brought on par with global standards.

Although co-production and licensed production of arms with recognised manufacturers help acquire new technologies and new skills, such arrangements delay the attainment of self-reliance and export goals, since such contracts inevitably contain restrictive IP and licensing fee

clauses. Indigenous arms development, their induction by the armed forces, and actual, extended field service is the only credible means of demonstrating indigenous arms manufacturing ability.

Customers rely on 'cues' that reveal the qualities of the product. The most important cue in arms purchases is the proven, successful record of their use by the exporting country's own armed forces. The Indian MoD too, in its requests for proposal (RFP) for arms procurements, incorporates a clause that makes it mandatory for bidders to furnish proof of successful deployment of the equipment with the armed forces of the manufacturer's country and with armed forces of other countries.

Once a proven track record of arms manufacture is established, India will also need to overcome the negative country-of-origin association. Globally, India does not enjoy a favourable reputation for either high-quality engineering, modern manufacturing, or product reliability. Academic research has conclusively demonstrated that country of origin, provokes powerful customer reactions depending on how the customer views the country. Germany has a reputation for high-quality engineering and product reliability, the USA for innovativeness in technology, France for style and fashion, Japan for process innovation, etc. Such perceptions have a positive halo effect on the sale of all categories of equipment (including armament) made in these countries.

Additionally, research also shows that customer perceptions lag behind reality. For example, independent testing agencies give high ratings to South Korean consumer electronics and cars, but customers themselves do not. Hence, even after India achieves self-reliance in arms, through domestic production of high-quality and reliable arms, a lag in their acceptance by other countries is to be expected.

The perception linked to the country of origin comprises six dimensions—quality, innovativeness, aesthetics, prestige, price/value and social responsibility. Few countries rate favourably on all six dimensions. Germany comes closest, even though it does not rate high on price (it does not need to rate high on price given its strengths in all the other dimensions). India rates low on all the dimensions except on price. However, poor quality will mean low value for money and hence low price alone will not enable India to sell its products—especially arms.

Persuading prospective customers to

change strongly held perceptions is difficult. It will be doubly difficult in the case of arms purchases—seen as being critical for the defence of the nation, besides being high-cost purchases. In such a situation, a focused strategy is required to change the existing negative perception. This is only possible by speedily reducing dependence on arms import, by the field deployment of arms that are indigenously developed and manufactured, and which are globally competitive on technology, quality, performance, and value.

The pace at which, the unfavourable country perceptions are changed, can be accelerated by highlighting some positive nuggets of strength to build acceptance of India as a brand. In India's case, it is the country's recognised pool of talented technical manpower and its acknowledged strength in software development that can be used as positive nuggets. These nuggets will offset, partially or fully, negative country perceptions and accelerate brand acceptance.

China is rapidly expanding exports to the Middle East, Africa and Latin America. China's arms have been criticised for lacking global appeal. Detractors point out that over 70 per cent of its arms exports in the last five years went to just three countries—Pakistan, Bangladesh, and Myanmar. However, this criticism is unfair since even 'mature' exporters like the USA and Russia are dependent on a few core customers. The mature and the new-entrant exporters, amongst themselves, currently receive the custom of almost all the arms-importing nations of the world and are strongly entrenched with their core customers.

The Road Ahead

Reversing the negative perception and building a positive one will take time. Subsequently, the export of arms will require concerted efforts from the government, industry bodies, and the arms manufacturers, to persuade prospective customers to break ties with their existing arms suppliers and transfer their custom to Indian manufacturers. The existing suppliers well-entrenched with their customers will, understandably, not cede space easily.

India needs to formulate and execute a thought-out strategy to first, urgently, address all the issues impeding the attainment of self-reliance in arms, even as it prepares to act on its arms export ambitions. Clearly, for India, a long hard path lies ahead—for it to realise its goal of becoming a credible exporter of defence equipment. ■



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CAUTION, GAP AHEAD A cyberattack can bring public transportation to a standstill

The Great Vulnerability

India needs the whole of nation approach to face the cyber security challenge

SMRUTI DESHPANDE

IN A RECENT REPORT BY CHECK Point's Cyber Security, ransomware attacks around the globe went up by 102 per cent in 2021 as compared to the previous year. A software company, Check Point provides cyber threat intelligence by collecting and analysing global cyber-attack data.

The same report says that India was the most affected country with 213 weekly ransomware attacks per organisation. Furthermore, 68 per cent of Indian organisations surveyed were hit by ransomware in the previous 12 months. In another global survey titled *The State of Ransomware 2021* by cybersecurity firm Sophos, which came out in June 2021, India topped the list of 30 countries affected by cyberattacks. In 2019, Indian Army faced at least two cyber-attack attempts every month.

With militaries adopting digitisation, cyber vulnerabilities have increased. In

May 2017, India's Su-30 MKI crashed after taking off from Tezpur in Assam. It was suspected that the crash may have been caused by a cyber-attack launched by China as the IAF pilots who were flying the aircraft were unable to initiate the ejection process when the aircraft was plunging to the ground.

In 2006, mathematician Clive Humby coined the phrase, 'Data is the new oil.' What he meant was that data had untapped potential and if mined, it would become an essential resource that powers the information economy, akin to what oil did during the industrial age. That's where data localisation comes in. It is a practice of storing data on the device that is physically present within the borders of the country where the data is generated.

In 2017, the government constituted the Srikrishna Committee on data protection, which submitted its report along with the recommendations in 2018. The report highlighted data local-

isation saying that both critical data, as well as copy of all personal data be stored in India on Indian servers. It stated that cross-border transfers of data were subject to model contract clauses. However, the Personal Data Protection Bill, introduced in the Parliament on 11 December 2019 is yet to be passed. As technology advances, vulnerabilities of an increasingly technology-dependent world are increasing. Today, cyberspace has the power to inimically influence events in the physical space, posing threat to individuals and nations.

Militaries at Risk

The cyber domain holds the capability to influence and control war in all the other four traditional domains. In general terms, a cyber-criminal or terrorist can bring any and every sector to its knees whether it's the military or the civilian systems, creating havoc. It can even cause deaths if the hack is designed to do so. With systems collapsing, cyber-attacks can cause just as much, if not less damage, than an actual physical engagement. For instance, if a cyber-attack affects an air traffic

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control system, it is bound to cause confusion, leading to accidents. India, while still grappling with technological developments is extremely vulnerable to cyber warfare.

Many reports suggest that not much research is being undertaken in India in the field of cyber warfare—both defensive and offensive. Earlier this year, the Centre revealed that four of India's five load despatch units had come under cyberattack. These are regional centres critical to India's electricity load management functions. Red Echo, a hacker group affiliated with the Chinese government is suspected to have been behind several cyber-attacks on India's power grid. As reported by a news portal, the state-run Posco oversees the grid through the National Load Dispatch Centre (NLDC), the five RLDCs and 34 state load despatch centres (SLDCs). The grid is under constant attack, with at least 30 events being reported every day. Reports from early this year also stated that Chinese hacker groups had targeted at least a dozen critical infrastructure entities within India that included 10 power stations and two mar-

itime sector organisations. Efforts have also been made by hackers to attack India's transportation sector.

There are several reports which say that India intends to take help from the US and other western countries to shore up its defence infrastructure as critical military platforms and systems remain vulnerable to attacks. India's Defence Research and Development Organisation (DRDO), Indian Space Research Organisation (ISRO) as well Indian ministry of defence's website have been targets of the cyber-attacks.

Given the growing threats against Indian forces, the Department of Military Affairs (DMA) in June 2021 said that it plans to send nearly 100 military personnel to the US to get trained in the 'latest cybersecurity technology and artificial intelligence (AI) for future warfare under the 2016 Cyber Framework and Defence Cooperation Agreement.' This would help military personnel gain 'first-hand experience on how to counter cyber warfare' and the role AI would play in the near future.

Cyber warfare will be catastrophic with AI and increasing degree of auton-

omy. The future war will have an amplified 'speed, power and scale', as James Johnson and Eleanor Krabill write in an article for *War on the Rocks*. Physical systems will be manipulated by hacking. For instance, a car, aircraft, drone or standalone weapons systems can be hacked using the vehicles' digital systems through the internet. With this already having become a reality, vulnerabilities may be found in different military systems such as missiles. The adversary may be able to turn a weapon on and off or manipulate its target. Attackers may also penetrate the servers with all the stored information, bringing the entire functionality down. A 2018 report by the Government Accountability Office, US, stated that 'nearly all' weapon systems that were being developed by the US military from 2012 to 2017 were vulnerable to cyber-attacks.

Says Tyagi, "Before improving on offensive capabilities, it is important to identify where the vulnerabilities are. Hence, it is important for individuals, organisations and governments across the globe to measure cyber risk objectively and in real-time. We need to move from detecting to predicting cyber breaches before they occur. Once you know your present risk posture in real-time, only then can you know where to improve upon."

He adds, "According to HP's Nation States, Cyberconflict, and the Web of Profit, there has been a 100 per cent rise in 'significant' nation-state incidents between 2017-2020. In 2021 itself, we have seen multiple nation-state attacks and this number will continue to grow. In fact, the US Department of State's Rewards for Justice (RFJ) programme, which is administered by the Diplomatic Security Service, is offering a reward of up to USD10 million for information leading to the identification or location of any person who, while acting at the direction or under the control of a foreign government, participates in malicious cyber activities against US critical infrastructure in violation of the Computer Fraud and Abuse Act (CFAA)."

He adds that while physical and cyber warfare happen on different fronts and with different sets of tools, cyber warfare often leaves an impact on the physical world, damaging critical infrastructure and foreign relations. "One could be sitting in any part of the world and possess the tools to launch a cyberattack whether on an individual, organization, or a nation, and this makes it cumbersome to attribute the attack to any particular organisation (or nation)," he says. ■

Attack After Attack

Cosmos Bank: In 2018, Pune's Cosmos Cooperative Bank fell victim to a cyber-attack that siphoned off Rs 94.42 crore by using cloned debit cards of the same bank within India and 28 other countries. This came to be known as one of the biggest cyber-attacks on an Indian Bank.

Mumbai Power Outage: In October 2020, Mumbai faced a cyber-attack which led to the power outage for nearly two hours in the entire city. Mumbai being India's financial capital, the damage that two hours of power outage caused can only be imagined. Stock exchanges closed down, trains were cancelled, and offices were shut. A preliminary report from early this year regarding the incident suspected a foreign country to be behind the attack.

The state's home minister Anil Deshmukh told the press, "Some 14 trojan horses (a virus often disguised as a legitimate software) may have been introduced in the server of the Maharashtra State Electricity Board (MSEB), data of around 8GB may have transferred from unaccounted foreign servers, similarly, login may have been

made by blacklisted IP (internet protocol) addresses in the MSEB server, says the findings of cyber police, following the analysis of supervisory control and data acquisition (SCADA) networks." SCADA is a framework of control systems used in industrial operations. A US-based firm Recorded Future indicated that a cyber-attack from China led to the power outage.

Kudankulam Nuclear Plant: In November 2019, a cyber-attack struck Nuclear Power Corp. of India Ltd's (NPCIL) Kudankulam Nuclear Power Plant (KKNPP), which is India's largest nuclear plant in Tamil Nadu. A malware was detected in NPCIL KKNPP Internet-connected system. A statement from the government had stated that there was an identification of a malware infection on the KKNPP administrative network used for day-to-day administrative activities. The affected system contained data related to administrative function. Plant control and instrumentation system is not connected to any external network such as Intranet, Internet and administrative system, the statement clarified.

Thank you, Stakeholders. We owe it to you.



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Where's the Driver

Indian Army accelerates efforts to develop Unmanned Ground Vehicles

ATUL CHANDRA

THE INDIAN ARMY IS ACCELERATING its efforts to catch-up with global militaries in Unmanned Ground Vehicles (UGV). It would appear that the rapid pace of progress with UGVs has largely passed the army by and it is now accelerating efforts to ensure that it is not left behind in a technology race.

Unmanned systems could deliver significant benefits. However, the DRDO which is tasked with undertaking cutting-edge defence research has proved unequal to the task of delivering the armed forces with UGVs of operational utility. This has resulted in an unmatched opportunity for Indian private sector defence industry and start-ups to deliver on the army's requirements for unmanned systems.

Forging Ahead

The army is already seized of the imperative of inducting UGVs into service and 'UGV Experiment-2021', an interaction organised by the Army Design Bureau (ADB) with firms developing such systems in December last year can be considered as a landmark event and high-

lighted the army's strong intent to induct autonomous military vehicle technology. The event was held at the *Babina* Field Firing Ranges December 9-13 and brought both the user and developers together on a single platforms to allow an exchange of ideas with the industry.

More than two dozen Indian firms showcased 35 UGVs of varying sizes and capabilities in systems for surveillance, tactical receive, intelligence, kinetic effect, and evacuation. This allowed army personnel present to gauge their effectiveness and suitability for military use. Amongst some of the UGVs for which the army has a requirement is one that can carry a load of 250-500kg and operate for a duration of 12 hours. In another significant achievement announced in late January, Tata Advanced Systems Limited (TASL) announced that it had conducted successful trials in Ladakh with its Wheeled Armoured Platform 8X8 (WhAP), which is an indigenously developed amphibious wheeled Infantry Combat Vehicle (Wheeled). The development of military vehicles of such capability (albeit manned) also augurs well for the development of smaller UGVs in the years to come.

Growing Indigenous Capabilities

Amongst the UGVs showcased to the army in December was the Enhanced Collaborative Autonomous Rover System (ECARS) which is available in 4X4 and 6X6 configurations. Developed by the *Kalyani* Group, the ECARS 6X6 is a multi-terrain vehicle and has a plethora of sensors for positioning, mapping, path planning & obstacle detection, allowing operation on all types of terrain. It can perform surveillance, security, safety and rescue missions and operate in temperatures ranging from -20 degree C to +50 degree C.

Growing Indian innovation is also on display with young start-ups such as Tamil Nadu based *Torus Robotics* which is working on UGVs, robotics and indigenous & disruptive power-train technologies. The company has already received recognition from Start-up India (DIPP 51485) and inked an MOU with *Bharat Earth Movers Limited (BEML)* at Aero India 2021 for development of Artificial Intelligence (AI) based UGVs.

The Chennai based company has designed, developed and delivered a fully



1. Muntra-N; 2. Team of Torus Robotics; 3. Torus's Fully Electric UGV; 4. Muntra-B; 5. Kalyani Group's ECARS; 6. Arista UGV; 7. Indigenous UGVs at the 'UGV Experiment-2021'

electric, one tonne UGV, fitted with a six Degrees of Freedom (DOF) robotic arm for detection, identification and disposal of explosive ordnance and Improvised Explosive Devices (IED). The vehicle can be operated by its controller from a distance of one km and can also be used to explore hazardous areas. It can also be used to carry heavy loads at high altitudes. The company got in touch with the Army Design Bureau (ADB) towards the end of 2018 to understand the requirement for this type of UGV. Development of a prototype began in 2019 and was ready before the end of the year. With the support of the army and DRDO, Torus partnered with BEML to develop the AI based 750kg UGV. It will be used to carry heavy equipment at high altitudes and production could commence as early as 2023.

Another Chennai based start-up, Combat Robotics, is developing the Arista Unmanned Ground Vehicle (UGV), which it terms as the world's first chassis-less UGV. The innovative platform features an integrated motor drive and a modular design which makes it portable and easily deployable. The Arista UGV offers high manoeuvrability in varied terrain and has a three hour endurance. Combat Robotics is also well advanced in the development of a smart spherical robot which has been selected for further development by the army.

The 2.5 year old company is developing

'TOTA' which is a smart technical throwable robot featuring AI-based vision with a thermal feed and two-way communication. It can be used as a surveillance and reconnaissance tool to help plan high-risk missions or even aid in searching and rescuing individuals in confined spaces. Combat Robotics is being supported by the Indian Army's College of Military Engineering and trials are also slated to take place at Pulwama. The company is now developing a real-time data transfer system, which can stream videos at low latency and is at a prototype stage.

DRDO Efforts on UGVs

The DRDO appears to be well behind the private sector in UGV offerings, despite having started work on them 15 years ago in 2007. It had identified four laboratories for UGV development: Centre for Artificial Intelligence & Robotics (CAIR), Bengaluru, Combat Vehicles Research & Development Establishment (CVRDE), Chennai, Research & Development Establishment Engineers (R&DE(E)), Pune and Vehicle Research & Development Establishment (VRDE), Ahmednagar. Development of tracked UGVs was the remit of CVRDE, while wheeled UGVs up to 5 tonne were to be taken by VRDE. R&DE would handle development of UGV between 1-3 tonne and micro/macro UGVs in the 5-50 kg weight category would be handled by CAIR.

CVRDE has scaled up to the development of a tele-operated modified BMP Nag Missile carrier (NAMICA) and subsequently took up the technology demonstrator project 'Conversion of BMP into Tele-operated and Autonomous vehicle', later named as Mission Unmanned Tracked (MUNTRA). CVRDE states that it has completed development of the MUNTRA series of tracked UGVs with three vehicles being completed and configured for Surveillance, NBC Reconnaissance and Mine Detection and Marking. The UGVs have successfully completed rigorous validation trials conducted in summer/ winter conditions at the Mahajan Field Firing Ranges (MFFR), Rajasthan, few years ago.

VRDE, Ahmednagar has developed the CBRN Mini UGB which can traverse through confined areas and is a tracked platform with four flippers. It was designed to facilitate CBRN detection, digital marking of contaminated zones and soil/liquid sample collection using a robotic arm, thereby reducing the risk of exposing personnel. This Mini-UGV has stair climbing, water fording and ditch crossing capabilities. The hand-held operator control unit facilitates tele-operation of driving & payload operations using wireless communication link. It has an endurance of two hours and a wireless communication range of 500m in near Line of Sight (LoS) mode and 1,000m in LoS mode. ■



Harden the Networks

Unless communication is secure, network centricity is meaningless

FROM THE EARLY 20TH CENTURY WHEN THE RAPID mechanization transformed all aspects of warfare, effective communication system has always been vital to success of all military operations. In the present era of combined operations, it is equally essential to have clear and secure voice communication, backed by shared data services, creating an information network in which all elements have access to vital intelligence.

From the early days of C2 i.e., Command and Control to the present 'Command, Control, Communications, Computers, Information and Intelligence, Surveillance and Reconnaissance (C4I2SR) systems', communication networks are the backbone on which military organisations operate and function as force multiplier for commanders at all levels. The communication network that is at the heart of C4I2SR provides the forces with the network centric warfare capabilities and for it to be effective, military communications must be reliable and secure in all conditions, including in degraded and denied network environments.

The basic and fundamental communication networks are the tactical communications that serve to convey information, commands or military intelligence across various points on a battlefield. They are designed to provide communication assistance to the military during combats and critical operations under varying environmental conditions. A recent development is the use of cognitive radios that are vital components in today's military operations, enabling soldiers to securely communicate under all battlefield conditions. They can intelligently detect which communication channels are in use and which are not and can instantly move into vacant channels while avoiding occupied ones. They can identify potential interference; path-loss, shadowing and multipath fading that might impair use of a particular frequency. This ensures highly secure and extremely efficient military communications.

Besides radio, Very Small Aperture Terminal (VSAT) network is one of the most widely-used communications systems for battlefield operations that can relay mobile, secure, real-time information via satellite over commercial or government frequencies, or combination of both. With continued reliance on radio, OFC and VSAT, India plans to upgrade its communication network and in October 2020, approval was accorded for the new Army Static Switched Communication Network (ASCON) for a more secure and better communication network. The project aims to upgrade the existing Asynchronous Transfer Mode Technology to Internet Protocol (IP) and Multi-Protocol Label Switching (MPLS) Technology. The communication media will be Optical Fibre Cable (OFC), Microwave Radio and Satellite and high bandwidth in any operational scenario and enhance the communication coverage of the network closer to International Border, Line of Control and Line of Actual Control.

While the radio and VSAT networks may still be in wide use, the introduction of 5G networks opens up a new era of possibilities—and threats—for military communications. The challenges notwithstanding, the military applications of 5G will



ABOVE AND FACING PAGE HAL-developed software-defined radio and ISRO INSAT 4B satellite

enable remote and reliable connectivity, reduce latency, energy-efficiency and will have wide bandwidths that will improve the information sharing within and between various combat groups, with secure and reliable video sharing using bodycams and location sharing.

A related aspect of the need for better 5G technology-based communication networks is to field a system capable of intercepting or guiding hypersonic weapons that is beyond the scope of current generation networks because of the super high speed (15-20 times the speed of sound) of these weapons. It is only 5G that has the potential to provide real-time connectivity to these hypersonic weapons from ground stations as well as to detect them by the future air defence systems.

While 5G offers great advantages, it needs to be remembered that 5G networks are more vulnerable to attacks than their predecessors because of the following:

- The network has moved away from centralized, hardware-based switching to distributed, software-defined digital routing. Earlier networks were hub-and-spoke designs in which everything came to hardware choke points but as that activity is pushed outward to a web of digital routers throughout the 5G software defined network, the potential for choke point inspection and control is denied making it more vulnerable.
- In 5G networks higher-level network functions formerly performed by physical appliances are now virtualised in software. As these activities are based on the common language of Internet Protocol and well-known operating systems, they remain a point of vulnerability.
- The network is also being managed by software—often early generation artificial intelligence—that itself can be vulnerable.
- The dramatic expansion of bandwidth creates additional avenues of attack. A large number of short range, small-cell antennas of 5G networks become new hard targets.

While 5G offers potential unlike anything before it within the military domain, it had attendant challenges of which undoubtedly the biggest single threat is jamming and signal interception. The need for suitable mechanisms in terms of enhanced processing or different cell architecture required to compensate for the higher losses of mm Wave signals will be an added challenge when operationalising 5G based networks. Even if these requirements are met, it is not clear if the military will be able to utilise the network to its full potential given the increasing data demands of the commercial sector.

Just as 4G technology is expected to be replaced by 5G, it is inevitable that 5G will be replaced by a new network in the future though it is not yet what 6G will be. Not waiting for 6G to be formally defined per se, China successfully launched a Long March 6 rocket on 6 November 2020 sending a payload of 13 satellites into orbit. Among them was what has been described as 'the world's first 6G satellite'.

The satellite, known as Tianyan-5, is a remote-sensing satellite jointly developed by the University of Electronic Science and Technology of China, Chengdu Guoxing Aerospace Technology, and Beijing Weina Xingkong Technology. In addition to Earth observations, the satellite will test a high-frequency tera-hertz communication payload that could send data at speeds several times faster than 5G. It is not that 6G does not have its challenges as it uses tera-hertz waves (THz) that are submillimetre waves sitting between microwave and infrared light on the electromagnetic spectrum. Unfortunately, THz waves share an Achilles' Heel with the millimetre waves used in 5G. Water vapour in Earth's atmosphere is a strong absorber of tera-hertz radiation, limiting the range of THz applications. The same issue continues to slow the widespread development of 5G, and will likely hinder the roll-out of 6G if it uses THz waves. It will be interesting to follow the developments in this field of communications.

The challenges aside, advances made by China in communications are not surprising as while a large part of the world may be looking at 5G Technology to meet its future communication needs, China is looking beyond 6G and is investing in Quantum Communication networks to ensure secure and reliable communications.

One of the most promising developments in ensuring secure communications is in the field of quantum communications which is a field of applied quantum physics closely related to quantum information processing and quantum teleportation. Its most interesting application is protecting information channels against eavesdropping by means of quantum cryptography. The most well-known and developed application of quantum cryptography is quantum key distribution (QKD). QKD describes the use of quantum mechanical effects to perform cryptographic tasks or to break cryptographic systems.

Using the basic principles of quantum communications, a team of Chinese technicians, engineers, and scientists sent pairs of photons from a single satellite called Micius to two

ground stations in China separated by over 1,120 kilometres in 2019. The photons were prepared in such a way that they carried information that remained perfectly correlated in spite of the distance between them. In addition, the two receiving stations in China were able to ensure that the two receivers could not be disrupted or deceived by any third party. The experiment demonstrated the ability to share secret cryptographic keys between the two locations in China, with no known means for a third party to covertly observe or copy them.

Presently, the top speed for Micius is just a few kilobytes per second; enough for transmitting a few quantum keys between two science teams, but not enough to meet the simultaneous requirement of millions of internet users. Although the rate of the key exchange was too low for practical use, the achievement represented a step toward secret communications guaranteed by the laws of physics.

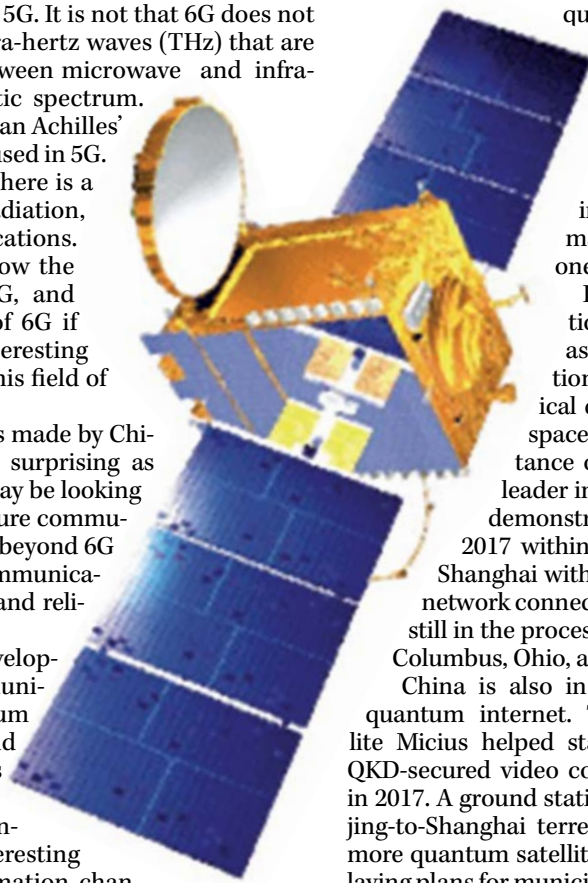
Besides the low rate there are other limitations as well. As a quantum satellite needs line-of-sight to transfer data, communication coverage by the satellite is very limited. The way to overcome this limitation is either to have a satellite with a higher orbit or increase the number of satellites to form a global satellite network. The limitations notwithstanding,

quantum communications are bound to grow because of inherent advantages of providing secure communications though phones or laptops matching this technology are unlikely to proliferate soon. Presently, these devices are cost prohibitive and large in size. Eventually, it may be possible to make one that can fit on a chip and stick one in every computer.

In the field of quantum communications, India has made modest advances as the Indian Space Research Organisation (ISRO) in a breakthrough technological development had recently tested a free space quantum communication over a distance of 300 metres though China remains a leader in this sphere and already has the largest demonstrated network that began operating in 2017 within the cities of Beijing, Jinan, Hefei, and Shanghai with a 2,000 kilometres quantum backbone network connecting them. Comparably, United States is still in the process of constructing a 600km link between Columbus, Ohio, and Washington, D.C.

China is also in the vanguard of the push toward a quantum internet. The quantum communications satellite Micius helped stage the world's first intercontinental, QKD-secured video conference, between Beijing and Vienna in 2017. A ground station already links the satellite to the Beijing-to-Shanghai terrestrial network. China plans to launch more quantum satellites, and several cities in the country are laying plans for municipal QKD networks. The eventual roll out will have a major impact and will seriously bolster the Chinese communications capabilities giving it a significant advantage over its adversaries.

In the field of technology, there is an exciting world out there and it is for the taking of those brave enough to venture out and conquer new territories. This is equally true of communications and only those with the foresight will rule the (communication) waves in the future. The others can only rue the missed opportunities. ■



'The Key Things That We Are Looking for in The Brahmos NG Is That It Should Be Smaller, Stealthier and Faster'

— Chief Executive Officer and Chief Managing Director, BrahMos Aerospace, Atul Dinkar Rane



How can exports be encouraged in BrahMos and DRDO?

It is great that the Philippines deal took place. The Philippine Department of National Defence had shown interest for quite some time. In fact, BrahMos has been in contact with them since 2008-2009, so it did not happen overnight. Finally, they needed a potent weapon and BRAHMOS was an obvious option. We thought that the Philippines would use the Line of Credit (LC) that India had given them, but they decided to use the LC for something else, we

hope for more BRAHMOS orders. They are buying from us for the Philippine Marine Corps.

Would you like to confirm what sort of number the Philippines is looking at? Are you in talks with the Philippine Army too?

That is the prerogative of the Philippines. Our task is to complete the delivery in the stipulated time frame.

The Philippine Army also has shown interest. There is hardly any difference between the navy and the army config-

uration. Our system is universal. The same missile can be used for anti-ship as well as for land attacks. The Philippine Army, at present, wants missiles that are identical to the Philippine Marine Corps. They intend to equip the first regiment with the anti-ship version.

As of now, the contract has been signed and the notice to proceed has been received and very soon, the hardware will start flowing.

Which are the other countries interested in BrahMos?

Many countries have spoken to us. The joint venture was originally created with the idea of producing anti-ship missiles and marketing them to friendly countries, depending upon country-to-country agreements. Many years back in 2001, when we participated in LIMA Malaysia, there was an interest in the capabilities and whether what we were claiming were actually true. The naval chief of one country, who had attended the show remarked, "I don't want to be on the other side of this missile, I want to be on the side of this missile." Basically, when you have such a product, everyone wants it. We are in serious talks with three or four countries who want to buy this missile. In addition, we are in preliminary talks with another five or six countries.

Is there room for improvement in the delivery, both for ourselves as well as the export market?

Our users are content with the numbers they have currently. They still need and we still have several deliveries for them. But they have enough to take care of our country, currently. Former defence minister Manohar Parrikar had once suggested that even when we are producing to fulfil our users' needs, we should keep five per cent of the production line open for exports, provided we find a market.

Luckily or unluckily, we didn't find a market, so everything was pumped in for our users. Now that we have found a market, our production lines are working in shifts, and we have the capabilities for expansion as the Integration centres were planned with futuristic export orders in mind which has ensured that we will be able to fulfil all commitments on export.

Can you give an overview of BrahMos facilities across the country today? Would you want anything additional for exports?

Our major production centre is in Hyderabad. Then we have one in Nagpur. There's one more unit we have started in Pilani. Defence minister Rajnath Singh laid the foundation stone on 26 December 2021 for a BrahMos Production Facility on 200 acres of land in the Uttar Pradesh Defence Corridor, on the Lucknow-Kanpur highway. We aim to factor that too for our future production. I recall his resounding and powerful words, "India wants to manufacture the BRAHMOS missile and other weapons, not to attack any other country but to

defend its people from any nation with hostile intentions."

We are constantly improving in terms of accuracy and performance. We have already started our work on a newer version, which we have been showcasing all over by taking it to at least 10-12 exhibitions over the last three-four years. It is the BRAHMOS-NG (Next Generation).

The key things that we are looking for in the BRAHMOS NG is that it should be smaller, stealthier and faster. We would like to incorporate anything that applies to an Olympics athlete to this missile. It should be swifter, higher, stealthier. That is our motto. The missile will be lighter, so that it can be fitted onto more platforms. Right now, on the Su-30, it is under the belly. It can't be put on the wings because it's too heavy. We want to make it lighter and put it on the wings. If it is lighter, we can in fact even put it on LCA, MiG-29 or any other platforms. That is for the air force to decide. The LCA would be our main aim, because then we could sell a package. When you buy the Su-30 or Rafale, it comes with its armaments. Why not start selling the LCA with the armament? The moment you make a sale of the LCA, by the way of increasing exports, we can give air-to-air missile Astra and BRAHMOS-NG (if it is ready by then). It is a way to start.

BRAHMOS-NG has been envisioned as a smaller and lighter, yet smarter weapon system having more versatility, lethality and flexibility along with ultra-precision for deployment on-board a wide range of military platforms, aerial as well as naval. Key features of the missile are—reduced dimension and

weight for widespread usage; advanced next-generation stealth, greater effectiveness against ECCM, higher versatility in underwater combat applications, launch readiness from torpedo tube and vertical orientation. The miniaturised missile could also be deployed in land-attack configuration.

One of the biggest problems we have on exports is the stiff competition we have from the 'haves'. I use that word for the ones who already have exports. Exports sound great. In terms of the Philippine deal, from the USD 375 million deal, we are taking a pittance of the profit. That is because we want to get into the market. We will think of the profits later on, or even plough back the profit into something else, if at all there is any. Once, the strategy was that even if it is at a bit of loss, at least put the foot in the door. Once our Indian weapon is seen as reliable in terms of after-sales support and maintenance, an ecosystem develops.

We should be looking at the indigenisation percentage going up, even to the extent of the propulsion. Why get the propulsion from Russia and why not get the Transfer of Technology (ToT) here? What are the plans on that?

Everything comes at a cost. Now, do we spend the money on the propulsion and forget about the improvements or do we look at the improvements and worry about the propulsion a little later? The propulsion system we are talking about is futuristic, with a ramjet engine. No one has that kind of technology. And it can also be souped up. In that case, why take the technology and then try to learn how to soup it up? Why not let it soup up through improvements and then go for the technology?

As per the new policy, for defence equipment which has a foreign OEM content, we have to start reducing the foreign OEM content. This also applies to all DRDO designed systems. In fact, with the negative list, there is a huge step. It'll help create an internal base. Once we have an internal base working, we can think of stepping up and moving to exports. Both these things go hand in hand. Exports are not possible without indigenous content, and indigenous content is not possible without looking at foreign partners. Regarding the indigenous content in BrahMos, we have reached a stage of saying that we could be 70 per cent but that 70 per cent is also with a lot of difficulty. BrahMos that way is in itself an industrial com-

The Philippine Army also has shown interest... The same missile can be used for anti-ship as well as for land attacks. The Philippine Army, at present, wants missiles that are identical to the Philippine Marine Corps. They intend to equip the first regiment with the anti-ship version. As of now, the contract has been signed and the notice to proceed has been received



plex, where we have about 200 companies working with us.

How many of the 200 companies are involved in the guidance system, which is our main contribution?

About 20-25 Indian companies are involved as vendors and sub-vendors for the guidance system.

Are you putting money into the R&D? Where exactly are you putting it in so far as BrahMos is concerned?

BrahMos doesn't have an R&D per se. It is an integration. How did we get there? We had design partners. We asked them to work on improvements. If BrahMos is making any profits, these profits are ploughed back to the designers. We give money to DRDO and NPOM of Russia. They design and then we go to the industry. It is the DRDO- industry synergy on how the R&D synergy is moved forward. Even in case of indigenisation, BRAHMOS has an indigenous content. But it has been designed

by DRDO, along with the industry.

BrahMos will have to move ahead in terms of the engine. From ramjet it may have to go to hypersonic, maybe. Why is it for the DRDO to decide, why not BrahMos?

BrahMos is a joint venture of two tech-

As per the new policy, for defence equipment which has a foreign OEM content, we have to start reducing it. This also applies to all DRDO designed systems. In fact, with the negative list, there is a huge step. It'll help create an internal base. Once we have an internal base working, we can think of stepping up and moving to exports

nological partners. DRDO and our Russian partner NPOM work in tandem for the improvements of the BRAHMOS product. When the time is right and the technologies mature a decision will be taken.

BrahMos is a success story. One key reason for that is that it became independent of the DRDO. Why don't we have other things working in the same manner? Why can't we do that?

As stated, BrahMos is a successful Joint Venture through a wonderful synergy created between the joint venture partners in providing technology towards the design and involving the industry of both countries. The model was meant to work from Day One. The model can be and should be tried out in various domains in the future.

I can add that there is not a single country who owns aircraft manufacturing on their own. They are all joint ventures. Maybe it's time for us to go into a joint venture in other areas of defence technology and systems. ||

Tata Advanced Systems Delivers 200th CH-47 Chinook Crown and Tail cone to Boeing

Tata Advanced Systems Limited (TASL) has successfully delivered the 200th Crown and Tail-cone for Boeing's CH-47 helicopter. The CH-47 Chinook is one of the world's most advanced multi-mission, heavy-lift transport helicopters. Manufactured by TASL in Hyderabad, the parts of the CH-47 helicopters will be integrated at Boeing's facility in Philadelphia.

Commenting on the milestone, Managing Director and Chief Executive Officer, Tata Advanced Systems Limited, Sukaran Singh said, "TASL is a proud partner to Boeing for the CH-47 programme. Since the first assembly line for the Crown and Tail-cone in 2017, TASL has built and delivered multiple configurations to multiple countries and for multiple missions, globally. TASL's world class quality and delivery mechanism has helped in forging a strong relationship with Boeing on both military and commercial platforms. This partnership reflects our continued commitment to develop an aerospace and defence manufacturing ecosystem in India"

"This is a significant milestone and a testimony of our commitment to strengthen the manufacturing capabilities of the Indian aerospace and defence industry along with our strategic partners," said President, Boeing India, Salil Gupte. "The future looks promising, and Boeing's vision for India continues to be to bring the best of Boeing to India and take the best of India to the world," he added.

TASL has delivered the Crown and Tail-cone for CH-47 Chinook helicopters for the U.S. Army and other international customers. The CH-47 Chinook is an advanced multi-mission



(L-R) HAL-Mrs Rema, Independent Director, MIDHANI, Mr V Arunkumar, Senior Manager Marketing, MIDHANI, Mr Abdul Sadique Ali, DGM Marketing, MIDHANI, Mr Gowri Shanker Rao, Director, Finance, MIDHANI, Mr T Muthukumar, Director (P&M), MIDHANI, Dr SK Jha, Chairman & Managing Director, MIDHANI, Mr Salil Gupte, President, Boeing India, Mr Anubhav Kumar, Director Strategy, Boeing India, Mr Ganapati Hebbar, Manager Supply Chain Development & Growth, Boeing India

helicopter operated by the U.S. Army and 18 other defence forces around the world. In June 2017, TASL had also delivered the first crown and tail cone parts for one of the 15 CH-47 Chinook helicopters for delivery to the Indian Air Force. ||

HAL Releases Orders Worth Rs 52 Crore at DefExpo 2022

Hindustan Aeronautics Limited (HAL) released Project Sanction Orders to domestic Indian Partners to the tune of Rs 52 Crore, at the ongoing DefExpo 2022 on Day 1 of the DefExpo.

Defence Secretary, Dr Ajay Kumar handed over the Orders to Industry partners at a programme held at the HAL Stall, in the presence of CMD, HAL, C B Ananthakrishnan. The domestic Indian partners will now manufacture the LRUs which were being imported till now.

The Indian industry partners will indigenously design and develop parts like Infra-Red Radiation Suppression Systems, Engine Air Intake Particle Separator, Emergency Flotation System and Night Vision Goggles for Light Utility Helicopter and others.

The Defence Secretary also launched the Indigenisation Supplier Relationship Management Portal (I-SuRe) on the occasion. The portal is the new digital initiative to boost the indigenisation initiatives of HAL and will facilitate faster collaboration between HAL and the Indian industry partners.

HAL has strategically shifted from Transfer of Technology based manufacturing system to indigenous development by



involving industry partners. The success stories in indigenising 75 items are captured in the form of the Album. The Defence Secretary released the album.

Director (HR), E P Jayadeva, Director (Operations), Alok Verma, Director (Eng, R & D), Dr D K Sunil and other senior officers of HAL and DRDO were present on the occasion. ||

► NATIONAL INTEREST

Indian Army Celebrates 73rd Raising Day of Territorial Army

The 73rd Raising Day of Territorial Army was celebrated across the country on October 9 to commemorate its raising by the first Governor General C Rajagopalachari on this day in 1949. Director General of Territorial Army (TA), Lieutenant General Preet Mohindera Singh paid tribute to the fallen heroes of the Territorial Army by laying a wreath at the National War Memorial.

The celebrations commenced on October 7 with tree plantation at Bhatti Mines in Delhi, wherein 10,000 saplings were planted. The Ecological task forces of TA have so far planted more than 8.5 crore trees in various parts of the country. The officers, families and Veer



Naris of the Territorial Army called on the President & Supreme Commander of the Armed Forces, Droupadi Murmu on 8 October. In addition, all ranks, and families voluntarily participated in a Blood Donation Camp at 124 Infantry Battalion (TA) SIKH in Delhi.

The Territorial Army has several Infantry and Engineer units affiliated to various regiments of the Indian Army, apart from 'Home and Hearth' battalions based on the concept of 'Sons of Soil'. The Territorial Army also has 10 Ecological Battalions working for restoration of environment in the country by carrying out afforestation in rugged and inhospitable terrain, reviving wetlands, restoring water bodies and contributing to Clean Ganga project. TA Battalions also perform specialist tasks as part of Indian Railways and Oil Sector Public Sector Undertakings (PSUs). II

► ACROSS OCEANS

CNS Admiral R Hari Kumar Visits Australia

The Chief of Naval Staff (CNS), Indian Navy, Admiral R Hari Kumar visited Australia from September 26-28. This was his first official visit to Australia upon assuming the office of the CNS.

During the visit, he held meetings with the Chief of Navy, Royal Australian Navy (RAN), Vice Admiral Mark Hammond, Vice Chief of Australian Defence Forces, Vice Admiral David Johnston, Secretary of Defence, Greg Moriarty, Chief of Royal Australian Air Force (RAAF), Air Marshal Robert Chipman and Deputy Chief of Joint Operations, Air Vice Marshal Mike Kitcher. During these meetings, the leaders expressed their commitment to pursue collaborative activities in several areas of bilateral convergence.

Admiral R Hari Kumar visited RAN facilities at HMAS Penguin and Hydrographic School. The CNS, accompanied by Ambassador of India to Australia, Manpreet Vohra and the Chief of Navy, RAN interacted with the prominent members of Australian think tanks to understand and develop new maritime cooperation opportunities. The discussions also highlighted the need for raising the



level of synergy and focused efforts for overcoming the challenges of the maritime environment.

India and Australia share the commonality of perspectives on several contemporary maritime security issues in the Indo-Pacific and have been working together closely in several bilateral and multilateral fora such as the Indian Ocean Naval Symposium (IONS), Indian Ocean Rim As-

sociation (IORA), and Western Pacific Naval Symposium (WPNS).

Coming on the heels of the successful participation of Indian Naval Ship Satpura and one P8I Maritime Patrol Aircraft the Indian Navy in the recently concluded multilateral exercise KAKADU, hosted by the RAN at Darwin, the visit of the CNS further consolidated the strong and long-standing bilateral relations between two countries. II

» FOREIGN SHORES

INS Tarkash Arrives for IBSAMAR-VII in South Africa

INS Tarkash reached Port Grequhrea (also known as Port Elizabeth) in South Africa to participate in the seventh edition of IBSAMAR, a joint multinational maritime exercise among Indian, Brazilian and South African Navies from October 10-12.

The previous edition of IBSAMAR (IBSAMAR VI) was conducted off Simons Town, South Africa from 1 to 13 October 18.

The Indian Navy is represented by the Teg-class guided missile frigate, INS Tarkash, a Chetak helicopter and the personnel from the Marine Commando Force (MARCOS).

The harbour phase of IBSAMAR VII includes professional exchanges such as damage control and fire-fighting drills, VBSS/cross boarding lectures and interaction among special forces.

The Joint Maritime Exercise will strengthen maritime security, joint operational training, sharing of best practices and building interoperability to address common maritime threats. II

» HIGH TIME

Army Pilot Killed near Tawang in Arunachal Pradesh

A Cheetah helicopter of the Indian Army that was flying in the forward area near Tawang, one of India's last points on the China border, crashed during a routine sortie on September 5, killing one of the two pilots. The deceased pilot as Lieutenant Colonel Saurabh Yadav.

In a statement the Army stated, "An army aviation Cheetah helicopter flying in the forward area near Tawang has crashed on 05 October (today) at around 10 AM during a routine sortie. Both the pilots were evacuated to nearest Military Hospital. No visuals of the same have been released." While one of the pilots succumbed to injuries, the second pilot was undergoing treatment.

The Army said that the details of the crash were being ascertained. II

» PEACE OF MIND

Wellness Centre 'Niramaya' Inaugurated at INHS Asvini On World Mental Health Day



President NWWA (Western Region), Charu Singh inaugurated 'Niramaya', a Wellness Centre at INHS Asvini, Mumbai, on the occasion of World Mental Health Day on October 10. The Centre is an innovative wellness promotion initiative and aims to address mental health needs of the naval community at Mumbai in a facility outside the Hospital premises for a Humane Touch.

Located in a heritage building adjacent to the hospital, it is a stand-alone facility that will encourage sharing of thoughts, feelings and concerns with expert counsellors from Asvini, who will offer guidance on improving well-being and resilience through twelve specialised services including guidance on positive parenting, student and career guidance, marital enrichment, coping with chronic illnesses, taking care of the elderly, and dealing with grief and trauma.

Speaking on the occasion, NM, Commanding Officer INHS Asvini, enumerated the multiple steps envisaged by the hospital to address the holistic wellness needs of naval community at Mumbai Inauguration of the Centre celebrated this year's theme "Make Mental Health and



Well-being for all a Global Priority".

This message was elegantly communicated through a skit on wellness and a yoga demonstration put up by cadets of the College of Nursing, INHS Asvini. A poster competition on the theme was also organised and saw a large participation from the naval community. Award winners were felicitated by the Chief Guest, Charu Singh, who also addressed the gathering and lauded the efforts made to enhance holistic well-being and hoped that the project will be well utilised by the community. II

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