NATIONAL SECURITY AND AEROSPACE NEWSMAGAZINE

FORCE day1

DEFEXPO 22 INDIA Ministry of Defence

INSIDE

A Brave New World

After suspenseful six months, DefExpo 2022 opens in autumn

SMRUTI DESHPANDE

THE 12TH EDITION OF DEFEXPO opens today at the Helipad Exhibition Centre (HEC). Unlike Aero India 2021, where limited number of foreign companies could participate due to the Pandemic, DefExpo 2022 will see no foreign participation. The DefExpo, which was earlier scheduled for March 2022, will now be held exclusively for Indian companies.

It is the 'first-ever edition exclusively for Indian companies.' While the waning of the Pandemic would have meant greater foreign participation, the rescheduled show has clashed with two important and major international shows in Europe—the Euronaval in Paris and the Future Forces Exhibition & Forum Exhibition at Prague. Since only Indian companies are participating, the government has stated that 'Indian companies', 'Indian Subsidiary of Foreign OEM', 'Division of Company registered in India', 'Exhibitor having a Joint Venture with an Indian company' will be considered an Indian participant.

Asia's largest exhibition on land, naval, and homeland security systems aims to showcase India's defence manufacturing capabilities in consonance with the government of India's policies to promote indigenisation as well as exports. Hence, the theme this year is 'Path to Pride'. According to the ministry of defence, the aim is to showcase the might of the domestic defence industry which is now powering 'Make in India, Make for the World' resolve of the government and the nation at large. The DefExpo 2022 will bring together more than 1,000 exhibitors.

The inaugural ceremony and seminars will be held at Mahatma Mandir Convention and Exhibition Centre (MMCEC), exhibition at Helipad Exhibition Centre (HEC), live demonstrations on all five days at Sabarmati River Front (SRF) and ship visits for public by Indian Coast Guard at Porbandar. The biggest drone show by the indigenous IIT Delhi start-up Botlabs (an iDEX winner) has also been organised.

The DefExpo 2022 will also mark the celebration of one year of the formation of the seven new defence companies, carved out of the erstwhile Ordnance Factories. All these companies will be participating for the first time at DefExpo. Towards greater participation by start-ups and MSMEs, 50 per cent discount on space charges was offered.

The India Pavilion of the department of defence production, ministry of defence, will showcase the maturity of indigenous defence products, start-ups, latest technology, including artificial intelligence in defence, and will present India's vision for 2047.

The second edition of the India-Africa Defence Ministers Conclave will be one of the highlights of DefExpo 2022, with invitations extended to 53 African countries. The first edition of the conclave was held in Lucknow during DefExpo2020, where defence ministers and 154 delegates from 14 African countries had participated. This conclave remains significant since India views the African continent as one of its potential markets for defence exports. A separate Indian Ocean Region plus (IOR+) conclave with participation of approximately 40 countries is also on the anvil. II

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President Murmu Inaugurates HAL's ICMF

PRESIDENT DROUPADI MURMU inaugurated HAL's Integrated Cryogenic Engine Manufacturing Facility (ICMF) and said it is not only a historic moment for HAL and ISRO but for the whole of India. "India is the sixth country in the world to have Cryogenic Engine Manufacturing capabilities. The glorious past of HAL and ISRO gives us an assurance that they will play a crucial role in the future," she said.

The President also went around the HAL facility. She virtually laid the foundation stone for Zonal Institute of Virology (South Zone) of NIV, Bengaluru. The Governor of Karnataka, Thaawarchand Gehlot, the chief minister of Karnataka, Basavaraj Bommai and others were present on the occasion.

Referring to Bengaluru as Space City, Bommai said the state contributed most of the space and defence related manufacturing activities in the country and Karnataka will continue to support the development of science and technology projects in the state to realise the 'Aatmanirbhar Bharat' vision.

Union minister of state for health and family welfare, Dr Bharati Pravin Pawar also spoke on the occasion. Karnataka's minister for health, family welfare and medical education Dr Sudhakar K. was present.

Secretary, department of space and chairman of ISRO, Somanath S. said India can emerge as a superpower in rocket technology only with the help of HAL which has shown the ability to absorb complicated space technology with perfection. ISRO, therefore, is confident that the entire rocket manufacturing will happen at HAL's facility, he added. CMD, HAL, C.B. Ananthakrishnan welcomed the gathering. II

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'We are Looking Forward to Exploring New Relationships Across the Country, Including with MSMEs And Start-Ups'

— Vice president and chief executive, Lockheed Martin India, William L. Blair

How much has the location and Covid-19 shadow affected your participation at DefExpo 2022?

Lockheed Martin is proud to participate in DefExpo 2022. We would like to thank the ministry of defence and the state government of Gujarat for hosting us. Our presence at the show will be in strict accordance with Covid-19 protocols laid down by the ministry of defence and state government to ensure the safety of employees and visitors.

The show will provide us a platform to showcase our advanced technologies directly to the largest gathering of defence and aerospace partners and our customers in India. Moreover, the event offers us an opportunity to continue building upon our seven decades of association and more than three decades of partnership with India. We are looking forward to exploring new relationships across the country, including with large, micro, small & medium enterprises (MSMEs) and start-ups. For the past decade, we have supported the growth and development of India's innovation and start-up ecosystem and look forward to strengthening those partnerships to support the advancement of India's defence industry into the future as well.

What are the highlights of your exhibit at the show? What will be your areas of focus at the show?

Lockheed Martin has a reputation for innovation and helping our customers achieve their most challenging goals. We accomplish this by making long-term investments in technology development and bringing to market designs that meet or surpass expectations.

We have a wide array of capabilities including expertise in Aeronautics, Rotary and Mission Systems and Missiles and Fire Control. At DefExpo 2022, we will exhibiting our diverse portfolio of defence capabilities and solutions including:

- 'Made in India', fuel-carrying, 9G, 12,000 hour, interchangeable/ replaceable fighter wing
- F-21 fighter aircraft
- MH-60R multi-mission helicopter
- C-130J aircraft
- S-92 helicopter

MH-60R helicopter

Additionally, the show also presents us with an opportunity to reiterate our partnerships in India. We are proud of our association with civic organisations such as India Innovation Growth Programme with Department of Science and Technology and Tata Trusts; with India Chapter of Women in Aviation in STEM education field through our program Girls in Aviation Day; and the Diversity & Inclusion programme at our joint venture Tata Lockheed Martin Aerostructures Limited.

What are your expectations from the show? What boxes must be ticked for you to consider it a good show?

At DefExpo 2022, we hope to expand collaborations with local industry to support the evolution of indigenous aerospace and defence manufacturing ecosystem in India, and further advance the country's strategic security and industrial capabilities. Our objectives for the show include building on the company's existing foundation in India by identifying additional strategic partners from across the country, including companies of all sizes—large, Micro, Small & Medium Enterprises (MSMEs) and start-ups. II

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Growing Footprints

Thales is a key partner in India's defence modernisation journey

ASHISH SARAF

AS INDIA PROGRESSES TOWARDS its goal of becoming *Aatmanirbhar*, constructive measures are being taken across sectors including defence. These measures along with efforts of the industry will pave the way for long-term success of India's indigenous defence sector.

For close to seven decades, Thales has been partnering the Indian growth story by sharing its technologies and expertise in defence, aerospace, transport and digital identity & security markets. Over the years, it has developed a mature industrial footprint in the country's defence sector via a diverse range of high-tech products, services, and collaborations. The organisation has been proudly supporting the Indian armed services' modernization efforts, aiding them in preparing for, achieving, and maintaining tactical superiority over any form of risk, all with the purpose to build a future that everyone can put their trust in.

Comprehensive services for the Indian Armed Forces

Thales offers a broad spectrum of solutions to help the armed forces gain and maintain operational superiority. Thales has more than 50 offset partners and more than 75 supply chain partners and is cultivating local industrial and supplier ties to serve India's defence and aerospace needs. The organisation has formed various co-operative partnerships with public and private sector industries, like Bharat Electronics Ltd for radars and Reliance Aero-structures Ltd. for electronic warfare and radar, among others. Thales has developed extensive and broad skill sets in India through these collaborations and is contributing to sustainable manufacturing in India for India as well as for the world.

The Rafale aircraft have significantly augmented the combat capabilities of the Indian Air Force. Thales provides several state-of-the-art equipment and systems aboard the Rafale. It contributes to Rafale's game-changing capabilities through a variety of solutions such as the AESA RBE2 radar, the SPECTRA electronic warfare suite for 360-degree detection and action modes, advanced man-machine interface with displays in the cockpit, missile electronics, the front-sector optronic with infrared search and track systems FSO-IRST, the CNI suite (communication, navigation, and identification), as well as power generation systems and a logistics support component.

The RBE2 AESA radar is the key to Rafale's performance. Among other benefits, the RBE2 radar's range has been increased by more than 50% compared with fire control radars from previous generations, ensuring compatibility with weapons such as very long-range BVR air to air missiles. Likewise, the SPECTRA electronic warfare system is fully integrated in Rafale and boosts survivability from air-to-air and air-to-ground threats from radars, missiles, and lasers.

Captas-1

Ashish Saraf, VP and Country Director, India, Thales

A committed partner to India's growth story

Thales remains a close partner to India. Thales and its joint ventures in India now employ more than 1,800 people, and the organisation hopes to expand its presence in the nation by continuing to hire and nurture more talent in high technology roles. The organisation has also been fostering a culture of innovation in the country through its Engineering Competence Centres (ECC) in the National Capital Region and Bengaluru.

Thales is looking forward to participating at DefExpo 2022, which will provide a forum for stakeholders to establish partnerships and increase the country's technological level. At DefExpo 2022, Thales will showcase its diverse portfolio of capabilities covering Aero, Defence, Naval, and Land Defence as well as and Space that can effectively support the Indian armed forces' modernisation efforts. The different exhibits will demonstrate the organisation's commitment to 'Make in India for India and for the world' in tandem with the Government's aim of '*Aatmanirbhar* Bharat.'

Going ahead too, Thales will continue to develop its footprint in India by strengthening its local teams, partnerships and innovation. ||

(The writer is VP and Country Director, India, Thales)

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'We're Glad That we are Able to Participate in Another DefExpo and are Looking Forward to Another Fruitful Exhibition'

— Director, L&T MBDA Missile Systems Limited, Arun Ramchandani

How much has the location and Covid-19 shadow affected your participation at DefExpo 2022?

Covid-19 has been something that everyone globally has had to come to terms with. At LTMMSL we feel this is something we have done whilst ensuring our people and our customers were at the heart of every decision made. We're glad that we are able to participate in another DefExpo and are looking forward to another fruitful exhibition.

What are the highlights of your exhibit at the show? What will be your areas of focus at the show?

During Defexpo 2022 you can expect to see the very latest missile technologies that are the fruits of our close cooperation and deepening partnerships with Indian industry as we are a firm supporter of *Aatmanirbhar* Bharat.

As the show was rescheduled, what are your expectations from the show?

At LTMMSL, we're pleased that DefExpo has been rescheduled, and so providing us a fantastic opportunity to re-connect with all our partners across the Indian government, armed services and industry; and to discuss our many ongoing successful programmes as well as potential areas for co-operation in the future. Useful interaction with our customers and a strong display of indigenous capability would make this a good exhibition. ||

NEWS

Manoj Jain Takes Charge as Director (R&D) of BEL

Manoj Jain took charge as the Director (R&D) of Defence PSU Bharat Electronics Limited (BEL) on 26 September 2022. He was General Manager of the Electronic Warfare & Avionics SBU at BEL's Bangalore Complex prior to his elevation.

Manoj Jain joined BEL in August 1991 as Probationary Engineer after completing his BE (Electronics) from REC Jaipur (MNIT) with a Gold medal. In an illustrious career spanning over three decades, he has made significant contributions to the field of Research & Development.

During his initial years in D&E at BEL's Kotdwara Unit, Jain played a pivotal role in the development of Digital Multiplexers, Cross Connects, CDOT Exchanges and Military Switches. In 1999, he moved to BEL's Central Research Laboratory in Bangalore and was engaged in the development of technologies for Defence Networks and Network & Bulk Security Solutions. In the area of Radar, one of BEL's core businesses, he was involved in the development of VeXT, Scan Converter and Display using FPGA.

He served as Chief Scientist of CRL-Bangalore from December 2017 to May 2019, overseeing technological developments in all technical areas. He took over as General Manager of BEL's Product Development & Innovation Centre (PD&IC) in June 2019. During his two-year stint here, PD&IC developed many new products/sub-systems required for BEL, thus ensuring innovation and value addition, leading to self-reliance.

Jain took over as the General Manager and Head of the Electronic Warfare & Avionics SBU at BEL-Bangalore, in June 2021. Apart from overseeing all the business operations of the SBU, he provided the much-needed vision for this business vertical.

Jain received various R&D awards, Key Contributor Awards, Defence Minister's Award and SODET Awards. He has published many technical papers, applied for several patents and delivered talks to Defence users and DRDOs. ||

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‘Our Sourcing from India Stands at USD1 Billion A Year From 300 Suppliers Who Are Part of the Global Supply Chain’

— Managing director, Boeing Defence India, Surendra Ahuja

Boeing is one of the key contributors to modernisation efforts of India’s armed forces. How does India market fit in for future opportunities?

Today, India operates 11 C-17s, 22 AH-64 Apaches (with six more on order), 15 CH-47 Chinooks, 12 P-8Is, 3 VVIP aircraft and two Head of State aircraft, all Boeing platforms. What’s more, major fighter aircraft offerings and services opportunities are being actively discussed that could further advance the India and Boeing relationship.

As one of the fastest growing economies in the world, India offers tremendous growth and productivity opportunities for the aerospace industry. In addition to our response to the Indian Navy’s Multi-Role Carrier Borne Fighter (MRCBF) with the F/A-18 Super Hornet Block III, there are several other opportunities we are pursuing here in India. We are also engaged with the Indian Air Force (IAF) on their requirement for Multi-Role Fighter Aircraft (MRFA). The F-15EX will excel as a candidate in India’s MRFA programme. Given the contemporary sensors and radar, advanced cockpit, range, endurance, speed and payload capacity, the F-15EX brings capabilities that no other fighter aircraft can offer. We also believe that India has requirements for more P-8Is, Apaches and Chinooks, and we stand ready to support them.

Through Boeing Defence India (BDI), we are delivering services that ensure high availability of our customers’ fleets at competitive costs. We are seeing the growth of our services business and with it, in the value Boeing is able to provide through product lifecycle support. Another area of our services commitment is the investments we’ve made in infrastructure, the build-up of local capability, the workforce and local partnerships that are all accelerating our strategy to provide lifecycle value to our customers in India.

Our focus is to help build a strong indigenous Indian aerospace and defence ecosystem, and invest in partnerships and talent to contribute to the vision of an *Aatmanirbhar* Bharat. We want to bring the best of Boeing to India and export the best of India to the world.

In line with the theme of the DefExpo, can you elaborate on the initiatives from Boeing to support Make in India?

Boeing has always supported the development of indigenous aerospace and defence capabilities in India and has through the years invested in partnerships with the Indian aerospace ecosystem in skilling, research and technology, and manufacturing. Our growing partnership with the country’s defence forces and our expanding supplier base makes it imperative for us invest in, develop, and nurture talent.

Our sourcing from India stands at USD1 billion a year from 300 suppliers who are part of the global supply chain. Boeing’s industrial partners in India are raising the bar to deliver world-class quality, cost-efficiency, and productivity, as they become an important part of the company’s supply chain for some of the most advanced platforms in the world.

There are several examples where our Indian partners are global suppliers of critical parts on Boeing’s defence airplanes. We are developing MSMEs in support of our commitment to *Aatmanirbhar* Bharat. In fact, over 25 percent of our suppliers from India are MSMEs. For example:

- Tata Boeing Aerospace Limited (TBAL), Boeing’s joint venture with Tata, is an example of our strategic focus on Make in India. Spread over 14,000 sqft., this state-of-the-art facility with over 500 engineers and technicians, it demonstrates co-development of integrated systems in aerospace and defence in India. Our efforts in TBAL align not just with the mission of Make in India but with the Prime Minister’s call for ‘Make in India, for the World’. We say this because the Apache fuselages made in this facility in Hyderabad are meant for not just the six Apaches that the Indian Army is on contract with Boeing for, but also Apaches for customers around the world, including the US Army. As of September 2022, over 170 fuselages have been delivered by TBAL to Boeing customers across the world.

- Dynamatic Technologies has been manufacturing the ramp and complex aft pylon for Chinook heavy-lift helicopters. They were recently awarded a contract for manufacturing assemblies for Boeing's newest tactical fighter, F-15EX Eagle II. This is a first where aerostructures for the latest and most advanced F-15EX Eagle II will be made in India.
- Rossell Techsys manufactures wire harness and electrical panel for the AH-64 Apache, and the harness for several defence platforms including CH-47 Chinook, F-15 and F/A-18 Super Hornet. In 2022, Rossell Techsys entered into an agreement with Boeing to manufacture and supply wire harnesses for the T-7A Red Hawk platform. Rossell will be manufacturing Electrical Wiring and Interconnect System (EWIS) parts and the deliveries will continue through FY 2032, covering a total of 84 unique parts. All parts will be manufactured at Rossell's Center of Excellence (CoE) set-up exclusively for Boeing.
- Bharat Electronics Limited (BEL) manufactures IFF (Identify Friend/Foe) and speech secrecy system for the P-8I.
- SASMOS HET Technologies manufactures electrical panel assemblies for the F/A-18 Super Hornet and F-15 Strike Eagle.
- Hindustan Aeronautics Ltd (HAL) manufactures F/A-18 gun bay doors.
- Jaivel Aerospace will manufacture and supply aircraft protection system products for the Boeing T-7A Red Hawk aircraft. Working with the Boeing teams in India and the US, Jaivel Aerospace has developed entirely new capabilities for this product range, for the first time in India. These products will be manufactured at the company's manufacturing facility at Sanand Industrial Estate in Ahmedabad.

Kindly elaborate on sustainment initiatives for the C-17 and P-8I—how do they benefit from the large global fleets of these aircraft?

Boeing's integrated logistics support, delivered through Boeing Defence India (BDI), provides holistic lifecycle solutions for defence customers in India, enabling the highest state of fleet-readiness at the lowest possible cost. We are working with the IAF and the Indian Navy (IN) to provide operational capability and readiness for the P-8Is, C-17s, Apaches, Chinooks and Head of State aircraft through sustenance contracts. Ensuring mission readiness of our customers and providing them seamless services and support on our platforms is an imperative for Boeing. Likewise, we also help train the Indian Air Force and the Indian Navy crew.

Boeing supports the IAF C-17 fleet under the Globemaster Integrated Support Program (GISP) that maintains high mission-capability rates, by providing them access to an extensive support network for parts availability and economies of scale. The C-17 fleet has maintained high serviceability rates since its induction. Boeing is responsible for maintenance, field support services, modifications and upgrades, technical manual support and logistics engineering services.

India's P-8I fleet is also supported through Boeing's services business by providing spares, ground support equipment, and field service representative support. Boeing's integrated logistics support has enabled the highest state of fleet readiness at the lowest possible costs. Since induction, the Indian Navy P-8I fleet has surpassed 35,000 flight hours. Boeing's training and support package for the P-8I promises to increase proficiency in a shorter time, while reducing the on-aircraft training time resulting in increased aircraft availability for mission tasking. A 60,000 sq. ft. Training Support and Data Handling Centre has been set up at INS Rajali, Arakkonam (the base for P8I fleet), with a secondary centre at Naval Institute of Aeronautical Technology (NIAT), Kochi. Both centres were recently handed over to the Indian Navy and are operational now. The indigenous, ground-based training will allow the Indian Navy crew to increase mission proficiency in a shorter time while reducing the on-aircraft training time resulting in increased aircraft availability for mission tasking.

AH-64D Apache

Can you elaborate on the BIRDS initiative?

In 2021, we launched the Boeing India Repair Development and Sustainment (BIRDS) Hub. BIRDS is an initiative to bring together ecosystem partners to shape India as a strategic destination for aerospace engineering, maintenance, repair and sustainment services. This is a one-of-its-kind initiative that seeks to provide customers with best-in-class solutions, efficient turnaround times, and optimal economical value, all available in-country. Under this program, we have by now signed strategic partnerships with leading indigenous players like Horizon Aerospace, Air Works, and AI Engineering Services Limited (AIESL). An important aspect of the hub is training programmes to increase skilled manpower by developing sub-tier suppliers and medium, small and micro enterprises (MSMEs) to build high quality MRO capabilities in India.

Our programmes have skilled more than 3,700 frontline aerospace manufacturing workers and aircraft maintenance engineers. We bring specific trainings to their employees as required per the scope of work. One such example is Air Works in Hosur who we work with for the heavy checks on the P-8I fleet. They have successfully concluded Phase 32 maintenance checks on six P-8I long-range maritime patrol and anti-submarine warfare aircraft operated by the Indian Navy (IN) so far. Three of them were in heavy maintenance checks concurrently, demonstrating a maturity and scale at par with developed global MRO hubs. Likewise, we are constantly on the lookout to do more here like we recently expanded to wheels and brakes with Horizon Aerospace and have recently certified AIESL for P-8I landing gear, slats and powerplant overhaul.

Partnership is Boeing's key to success, and we believe it makes more sense to partner with local MROs that are already established and have great capabilities. II

By India, For India

Boeing Highlights its Commitment for India at DefExpo 2022

BOEING WILL FEATURE ITS RANGE of advanced defense capabilities at DefExpo 2022 and highlight the company's commitment to India's *Aatmanirbhar* Bharat vision, having recently announced a potential economic impact of $3.6 billion over 10 years to the Indian economy with the F/A-18 Super Hornet as India's carrier-based fighter and continued investments in manufacturing, engineering & technology transfer, sustainment, training and skilling and infrastructure. The economic impact would be over and above Boeing's current offset obligations and plans in the country.

Boeing India's exhibit at with the theme 'By India, For India' will highlight strategic investments the company has made in India's aerospace and defense ecosystem to build services local infrastructure, capabilities, workforce development and partnerships, while harnessing the strength of Indian talent and its large and growing network of more than 300 supplier partners.

"India's defence sector is poised for growth and offers significant opportunities for Boeing with our proven portfolio of products and services, offering unmatched operational capabilities to India's defence forces across the entire mission spectrum and through their product lifecycle," said Salil Gupte, president, Boeing India. "Boeing is committed to supporting and enabling this progress with a vision to be to bring the best of Boeing to India and take the best of India to the world."

At DefExpo, Boeing will highlight existing defense programs with the Indian Navy and Indian Air Force such as the C-17, P-8I, AH-64E Apache, and CH-47F Chinook, and outline sustainment, training and performance-based logistics solutions for India's armed forces to support the lifecycle of their fleets and increase mission readiness. Also showcased at the show will be advanced capabilities of the F/A-18 Super Hornet Block III and F-15EX.

- Spotlight on advanced defense platforms contributing to India's defense readiness with P-8I, AH-64 Apache, CH-47 Chinook, C-17
- The F/A-18 Super Hornet Block III simulator to feature at show
- Services business significant driver of defense growth in India

"Boeing continues to partner closely with customers and local industry to support the defense modernization of India's armed forces," said Alain Garcia, vice president, Boeing Defense, Space & Security in India. "With our keen focus on sustaining, training, localization and partnerships, we are committed to support India's existing and future defense requirements. We look forward to being at DefExpo and advancing those discussions."

Boeing will showcase the advanced multi-role capabilities of the F/A-18 Super Hornet Block III as the best choice to meet the Indian Navy's carrier-borne fighter jet requirement and highlight the industrialization benefits of Boeing's offer. Visitors will be able to fly the Boeing F/A-18 Super Hornet Block III on a simulator and learn more about its ability to conduct a wide range of missions, carrier-based aviation, and superior capabilities.

India presently operates 11 C-17s, 22 AH-64 Apaches (with six more on order), 15 CH-47 Chinooks, 12 P-8Is, three VVIP aircraft and two Head of State aircraft. In addition, Boeing is steadily increasing its sourcing from India and expanding its supplier network. Its contributions towards Make in India, and investments aim to fully harness India's manufacturing capability, talent, innovation and productivity.

Boeing's advanced aircraft and services play an important role in the mission-readiness for the Indian Air Force and Indian Navy. Boeing has strengthened its supply chain with more than 300 local companies in India and a joint venture to manufacture fuselages for Apache helicopters. Annual sourcing from India stands at $1 billion. Boeing currently employs close to 4,000 people in India, and more than 7,000 people work with its supply chain partners. Boeing serves communities and citizenship programs to inspire change and make an impact on more than 500,000 lives in India. For more information, visit www.boeing.co.in ||

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The facility houses critical technologies, clean temperature-controlled rooms, modern tools and testing equipment that meets European quality standards. With this LTMMSL has placed itself at the forefront for achieving its mission.

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Army variant of ALH Dhruv

House in Disorder

Systemic limitations are stymieing defence exports

SMRUTI DESHPANDE

WITH INDIA DEPENDING ON foreign firms for its high-end design and development of products, coupled with indigenisation largely depending on DPSUs, there is a gap in terms of research and development based on Indian needs. When it comes to exports, the gap is felt even more because this limits customising of weapon systems to the buyer's needs.

Partner, aerospace and defence, government & public services, KPMG in India, Abhishek Verma says, "Since development of defence technology needs long term investment, its obsolescence is high with low economies of scale. Hence, from a policy perspective, the process of maximising indigenous production without well-supported R&D may not bring tangible results. Towards this, the government is encouraging private participation in defence R&D and has earmarked 25 per cent of R&D budget for private industry, start-ups and academia. From a product point of view, there is a gap with respect to demand and supply. To overcome this challenge, the government has initiated various measures to understand the global market so as to target specific countries with relevant products."

Speaking about how to overcome these challenges to export, Verma adds, "We need to identify markets which would be most attractive keeping in mind our current development capabilities. The key to penetrating the export market is to be flexible to tailor our products to suit the customer's requirements. Recent policy changes announced by the government give a boost to private industry participation which will go a long way in ensuring that India achieves the target of exporting defence products worth INR 35,000 crores by 2025."

High Cost: Indian platforms have a cost problem. The prices, in comparison with similar platforms abroad, are often higher. One of the key reasons for this is the amount of imported content that these platforms have. This naturally adds to the cost of the product, making indigenously produced goods expensive even for the country's own forces. The other factor that makes the product expensive is the time it takes to build. With India continuing to rely on imported military hardware, not just the cost of buying it, but also assembling it adds to the price of the product. In a number of cases, weapon systems designed and manufactured by foreign firms in India have proven cheaper than the ones made by Indian companies.

A case in point is HAL's LCA *Tejas* Mk1A, single-engine, delta wing, multi-role light fighter designed by the Aeronautical Development Agency (ADA) and Hindustan Aeronautics Limited (HAL) for the Indian Air Force and In-

Azadi Ka Amrit Mahotsav

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dian Navy. Even as the fighter is indigenously designed, developed and produced, the fix here is that a lot of major and minor components that went into its making came off the shelf from suppliers abroad, including the F404 engines, Israeli sensors and electronics at international prices, which are the major and most costly parts of the jet. This jet, as compared to the Russian and the US fighters of this category, is costlier. And from fund-starved Services' point of view, not worth the value for money.

The other factor that adds to cost is the time it takes to develop indigenous systems. The longer it stays on the production line, the more its costs. The LCA programme development has already cost India over Rs 10,000 crore. While the government may subsidise the price to the Indian military, it cannot do so for export customers. For instance, the IAF signed a deal to procure 83 LCA Tejas Mk1A for USD 80 million apiece. However, it's export variant is being marketed at USD 200 million each. As a number of reports point out, this makes Tejas costlier than even Lockheed Martin's F-35A and Russia's Su-57. Even the Su-30 MKI that is made by HAL in Nashik, is sold at a cost of about Rs 415 crore (USD 55 million). The Swedish Gripen was offered to India at Rs 455 crore (USD 60 million) and F-16 at Rs 380 crore (USD 50 million). Worldwide, indigenous systems cost lesser than the imported ones, unlike in India.

The Private Sector: In almost all seminars, government spokespersons speak about the need for smaller and private industries to participate. With the growth of start-ups in the defence sector, the government will have to trust them enough to give them a level playing field, of course, with some amount of hand holding.

For India to grab opportunities in 'friendly foreign countries', the DPSUs will have to share the space with the private sector. For instance, HAL has a monopoly when it comes to manufacturing aircraft within the country. The need to diversify becomes important in order to encourage competition, helping bring down the cost. This will also take some burden off production lines. Hopefully, if India succeeds in gathering trust in the international market and orders come flowing in, this will prove to be crucial. Undermining private players only means restricting ideas. As is known, when it comes to Indian DPSUs, there has not been an absence of quality check/control and productivity. In case of HAL, the DPSU has been setting up several assembly lines with state-of-the-art technology, however, HAL alone in no way can be expected to fulfil the demand of the Indian forces and also take up exports. Diversifying will only help an ecosystem that will support exports.

On a side note, regarding the need for private players to come in, Admiral Arun Prakash wrote in the *Economic Times*, "It is a sad irony that focus on the public sector has led us to overlook the crucial role played by pioneering private entrepreneurs, epitomised by individuals such as Seth Walchand Hirachand and two Danish engineers, Holck-Larsen and Kristian Toubro, in laying a sound industrial foundation for India. While the former established Walchandnagar Industries in 1908, Hindustan Aircraft in 1939 and the Scindia Shipyard in 1941, the Danish duo set up L&T in 1938. Despite nationalisation and other headwinds, private entrepreneurs such as these have made crucial, early contributions to India's DIB."

End-User Restrictions: Since India purchases a lot of strategic or sensitive components from different countries, many of its systems come with end-user restrictions, which come in the way of export of the finished product. For example, BrahMos missile needed clearance from both the Russian as well as the Indian government before it could be exported. The list of potential customers had to be cleared by both nations.

A CLAWS report by Sushil Chander published in 2019 states, 'Export of weapons and equipment also brings with it a tremendous amount of responsibility in terms of end use by the importer. Ensuring adequate control is one of the requirements to fulfil responsibility. The defence exports must pass through extensive scrutiny and well-laid-out detailed procedures need to be in place to monitor exports. The Indian Government has amply demonstrated that it has a policy of responsibly controlling export of sensitive goods.'

In case of sensitive items developed indigenously, the Defence Export Steer-

BrahMos launch from INS Kolkata


LCA Tejas

ing Committee (DESC), set up by the present government, takes appropriate decisions regarding exportability of items with/without modification or degradation. The export of sensitive items is considered on a case-to-case basis and no-objection certificate (NOC) issued with the approval of the defence minister based on recommendation of the DESC, the paper informs.

After-Sales Service: A lot of investment and expertise goes into providing through life support to the sold platform. Few companies in the private and the public sector can undertake these. Since the industry is yet to get there and exports have only just begun, this area needs a lot of attention. Building of trust among customers can only be done through assurance of after sales service.

Financing: Identifying one of the key issues in delays, Lead, International Engagements, Society of Indian Defence Manufacturers, Avnish Patnaik says, "Finance is an issue. The policy of financing has to be aligned. To have substantial growth in the next few years, the policy work needs to focus on how financing can be given to Indian exporters. In the defence industry, once you get an order, you go to the bank for financial assistance for production. In the defence orders, there is a strict timeline on execution. Many times, the issue that the Indian exporters face is the delay in processing of finance from our banks. This is one area where work is ongoing. There are elements of EXIM bank and RBI which need to be worked out."

He adds, "In terms of products, it's well known that whenever we go to foreign markets, we are competing against foreign firms. It's not easy to enter into one market and sell your products when there is an established base. In the foreign markets, companies get asked whether their product has been bought by their own armed forces or not, which is why the government has been working on the Certification Policy, where items are certified for exports. The government has also introduced the export promotion scheme which defence attaches are using for undertaking promotional activities. The industry is in a nascent stage, but we are growing quickly. Through the government and our diplomatic mission, we can improve our take in the international market. Second is, when you have to do international transactions, usually foreign governments ask for a bank which is located in their country to work with. The partnering of the Indian bank with the international bank is time consuming. This is one issue that needs to be resolved."

Offset Threshold Limit: The government has increased the offset threshold limit. Earlier, if a project was Rs 300 crores or above, a certain percentage had to be invested in Indian companies. This threshold has now gone up to Rs 2,000 crores. So now, only if the project is worth the latter, offsets are mandatory. Offsets are considered as exports. Since not many offsets are coming, the Indian companies are finding it hard to underline the export bottom line.

Other Concerns

According to some industry insiders, the government of India has also restricted the technology that can be offered to foreign buyers. For instance, in terms of radars or secure communication equipment, the government mandates that the exportable equipment be different from the one supplied to Indian armed forces. Creating these differentials are both time and cost consuming.

Moreover, unlike many other countries, Indian government has put a cap on the commissions that can be paid to defence agents. In a highly competitive defence market, this puts Indian companies at a disadvantage.

Many in the industry feel that the government needs to create an export-focused department within the ministry that could help build on successful exports. This will help Indian industry better identify export opportunities. A June 2020 KPMG report titled 'Defence Exports: Untapped Potential' makes the case for such a dedicated department. The department would 'need to identify existing opportunities, create new horizons, facilitate G2G deals, establish lineages with domestic industry, handhold potential suppliers and establish partnerships', the report said. The report recommends a first step of setting up an exclusive 'defence export help desk'. On the basis of inputs from the helpdesk, Indian companies could work with government machinery to realise exports.

While these are all facilitators to defence exports, the key lies in the technology and its competitive pricing. After all, when the packaging is opened, what matters is the product. II

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'The Navy Has Promulgated a Policy on Data Governance and Management including a Common Data Framework'

— Chief of Navy Staff, Admiral Radhakrishnan Hari Kumar PVSM, AVSM, VSM, ADC

The navy was exploring various possibilities with respect to autonomous systems/ platforms and AI-driven technologies, including Big Data Analytics (BDA). What distance have you covered and what does the road ahead look like?

Indian Navy is a technology intensive force which has invested significant efforts to remain abreast of technological developments. Towards this end, IN endeavours are founded in the MoD's AI Task Force Report of 2018, in partnership with industry, academia and DRDO/ R&D laboratories.

The release of Unmanned Systems Roadmap is a key enabler towards this end. This roadmap provides a clear plan for induction of autonomous systems, including indigenous developments.

Data is an important starting point for AI driven technologies. Towards this end, the navy has promulgated a Policy on Data Governance and Management including a Common Data Framework in May this year. This policy sets into motion enterprise level Data Unification and Analytics in all spheres of its activities for creating trusted data sets, which can be used for both analytics and AI/ ML.

We have made considerable progress with respect to digitisation and new technologies. We are in the process of releasing our Digital Vision 2.0.

While the RFP for P-75(I) programme has been issued, analysts believe that it is the case of too little too late. The technology would be obsolete by the time it is inducted, hence navy should instead invest in nuclear-powered submarines. What do you think about this?

Submarine construction is a complex activity, wherein the equipment envisaged for induction on-board are selected considering the present technology, availability of product support and feasibility of up-gradation in future. Thereafter, regular upgrades or replacement of the equipment is undertaken as part of obsolescence management to remain abreast of developments and emerging technologies.

The Technical Requirements for Project-75(I) have been prepared taking all the above factors into consideration. The Navy is also cognisant of the rapid pace of technological development in these niche fields and would ensure that the most suitable technology would be inducted on-board its submarines.

With regard to nuclear-powered submarines, I believe that both conventional and nuclear propulsion have their own specific advantages, delivering unique capabilities that allow for specific operational outcomes. The Indian Navy requires a balanced mix of conventional and nuclear-powered submarines to protect India's national interests in the maritime domain.

How does the navy envisage Maritime Theatre Command (MTC)? There is speculation that while Western Naval Command and Eastern Naval Command will merge as one Command, what will happen to the Andaman & Nicobar Command?

The Services are progressing their respective studies on theaterisation in parallel, under the aegis of Headquarters Integrated Defence Staff. The navy envisages that the Maritime

Submarine construction is a complex activity, wherein the equipment envisaged for induction on-board are selected considering the present technology, availability of product support and feasibility of up-gradation in future... The Technical Requirements for Project-75(I) have been prepared taking all the above factors into consideration

The three service chiefs laying wreath

Theatre Commander will be responsible for application of military power in the maritime domain. A study to formulate organisational and operational contours for implementation of MTC is in progress. The study group has members from all Services and will clearly define the nuances of organisation and function.

Given the delicate balance that the navy must strike between budgetary allocations and capability-building, what are your procurement priorities in the short, medium and long term?

Combat readiness is our *raison d'etre*, and potent and precise ordnance delivery on target is its sole measure, these drive our modernisation plans. Accordingly, modernisation of the Indian Navy is being progressed as per a comprehensive plan and efforts are under-way to achieve the requisite force levels within a reasonable time frame and available fiscal envelope.

Today the Indian Navy is a balanced, modern, contemporary multi-dimensional force capable of undertaking a wide gamut of operations in the Indian Ocean Region and beyond. It includes more than 130 ships and submarines and over 230 aircraft.

Since platform acquisition has a long gestation period, what kind of force multipliers are you focussing on for more 'bang for your buck'?

The navy is being modernised to create capabilities for accomplishing a range of missions across the entire spectrum of threats and challenges. One of the many initiatives for optimisation is Manned-Unmanned Teaming (MUMT), which involves exploiting niche technology and optimising manpower. Towards this end, the present force levels are being augmented/ modernised according to a laid down long term plan. Modernisation of the navy is being driven by undiluted focus on acquiring combat ready ships, submarines, aircraft and support infrastructure as well as various niche technologies and unmanned solutions including AI and BDA.

How does China's Belt and Road Initiative (BRI) affect Indian Navy's outreach in the IOR as the Preferred Security Partner?

China's search for energy and mineral resources, and newer markets for finished goods has led to a steady increase in her engagement with littorals of the Indian Ocean. This engagement frequently manifests itself in the form of Chinese involvement and assistance in infrastructural projects in these countries. China has also been increasing its presence in the IOR through frequent deployments of PLA (Navy) ships and submarines.

China seems to be focused on rapidly developing naval capabilities, not only in terms of platforms but also in furthering their reach through development of bases to operate from. The commissioning of the Chinese Military Base at Djibouti in 2017 has enabled the PLA (Navy) to enhance its reach and sustenance in the Indian Ocean. With involvement of China in the development of Gwadar port in Pakistan, we can expect an increase in deployment of PLA (Navy) units in the IOR in future.

The ties between India and IOR littorals have developed over centuries of trading, and people to people links. Further, the vastness of the IOR, and realisation that no one nation can tackle non-traditional threats alone, clearly underpin the necessity of a collaborative approach to maritime security. Owing to the central geographic location of India, its inclusive world view and initiatives to contribute to regional maritime security, India is seen as the 'Preferred Security Partner' in the region.

The Indian Navy is seized of the security implications of these developments and maintains a close watch on them. We are constantly fine-tuning our concept of operations and acquisition plans to cater to the developing scenario. The operational outcomes evolving from our strategic imperatives in the IOR are factored in our planning to ensure that the Indian Navy remains poised to deter and counter threats to national interests in the maritime domain. II

Unmanned Edge

Time for Indian armed forces to understand the criticality of loitering munitions and kamikaze drones

ATUL CHANDRA

MILITARY TECHNOLOGY HAS advanced by leaps and bounds since the late 2000's bringing about with it an age of disruption, with the emergence of relatively inexpensive and low-cost precision Loitering Munitions (LM) and suicide drones allowing pin-point engagement of targets in a manner simply not possible before.

While such weapons remain susceptible to enemy air defences when operating in highly contested environments, there is no doubt that they will play in an important role in any future conflict.

Investments in these drone-based weapons has allowed countries like China, Turkey and Israel to leapfrog western competition which still remains focussed on larger and more expensive conventional missile armament delivered from combat aircraft. Despite its impressive and growing indigenous capability in the development of missile armament, India is yet to announce any major indigenous LM or suicide drone projects. This is a matter of concern as both China and Turkey, who are close military allies with Pakistan are now far advanced with their own home-grown programmes for loitering munitions and suicide drones.

Outsourcing Capability

The inability of the large Indian defence industrial complex comprising the Defence Research & Development Organisation (DRDO), Ordnance Factory Board (OFB) and defence public sector undertakings (DPSU) such as HAL, BEL, etc to develop indigenous LM and suicide drones is puzzling.

This is even more puzzling when one considers indigenous programmes for manufacture of advanced fighters, ballistic missiles, cruise missiles, aircraft carriers and nuclear submarines, all of which are far more expensive and technologically more complex. At the very least, India's close defence partnership with Israel should have resulted in a decision to manufacture significant quantities of LMs under license, while indigenous efforts came to fruition. At present, apart from smaller procurements of imported LM such as the Israel Aerospace Industries' Harpy and Harop, there does not appear to be a concerted effort to induct larger quantities of such drone-based munitions for the armed and paramilitary forces.

In 2020, several joint ventures (JV) were announced for manufacture of LM in India, but formal contracts are yet to be announced. Among the promising JVs for manufacture of loitering munitions in India, include the ALPHA-ELSEC between Bengaluru based Alpha Design Technologies Pvt Ltd (ADTL) and Elbit Systems for the SkyStriker and the Avision JV between Aditya Precitech and UVision Air for manufacture Precision Attack Loitering Munition (PALM) Hero Systems.

SkyStriker is a fully autonomous LM which can undertake long-range precise tactical strikes providing direct-fire aerial-precision capabilities to manoeuvrable troops and Special Forces. Either of its two warhead options of 5kg or 10kg can be installed inside the fuselage and the LM's electric propulsion delivers a low acoustic signature. Elbit touts speed as one of the major advantages of the SkyStriker munition, which takes only 6.5 minutes to travel a distance of 20km at maximum speed. Loiter time with the 5kg warhead is claimed to be two hours, reducing to one hour with the larger payload. Endurance is reduced by 15 minutes at maximum speed of 100 knots. The LM can withstand a maximum wind velocity of 40 knots on the strike leg of the mission and it can dive speeds of 300knots before impacting the target.

Avision will undertake design, development manufacture and maintenance support for all PALM Hero series products for the Indian market and Aditya Precitech already has extensive experience in the defence domain due to its partnership with the DRDO on various projects. UVision had earlier in 2019 announced that its Hero-30 and the Hero-400EC lethal loitering systems had been demonstrated to a strategic customer in Asia.

The Hero-400EC features a multi-purpose warhead and extended-range, while the Hero-30 is a high-precision, light-weight man-pack portable LM. During the demonstrations, UVision had demonstrated the precision target strikes of the LM's along with tracking and lock-on capabilities of the system on a vehicle in various operational scenarios along with its mission-abort capabilities and parachute recovery.

Asymmetric Capability

The People's Liberation Army (PLA) is also accelerating procurement of loitering munitions and suicide drones, with Chinese arms companies already developing several types of suicide drones, including the CH-901 and WS-43. The 9kg CH-901 can stay in the air for two hours with an operational radius of 15km. The 1.2m long loitering munition can attain a top speed of 150 kmph.

The WS-43 on the other hand has a range of 60km and loiter time of 30 min-

utes but is deployed from rocket launcher. China has also gained precious operational experience in operating and deploying weapons from large Unmanned Aerial Vehicles (UAV), such as its Wing Loong Medium Altitude Long Endurance (MALE) drones. Wing Loong drones have been exported to more than a dozen countries, with the MALE UAV costing a million dollars apiece, going up to three million dollars with the associated ground control equipment. The creation of the entire armed Unmanned Aerial System (UAS) ecosystem with China presents it with a major asymmetric advantage against India, which has to import the bulk of its requirements in this arena.

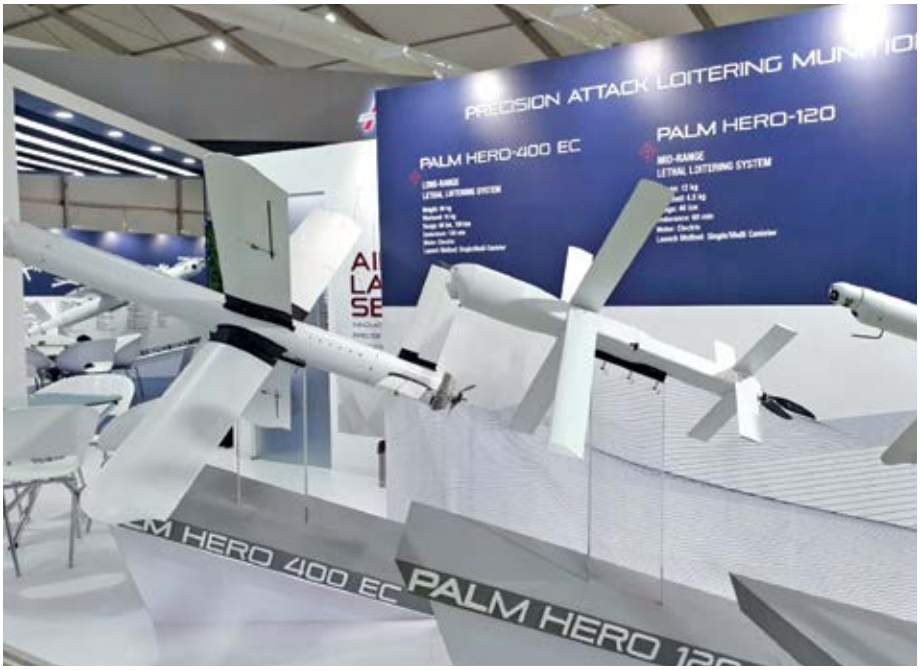
Turkey continues to make dramatic advances in drone technologies and drone weaponry. Turkish defence firm Roketsan's light-weight precision weapon MAM-L and KGK-SİHA-82 and TEBER-82 munitions have been seen fitted on Turkish Aerospace built Aksungur MALE drones. The Aksungur UAV recently struck a target 30km away with the 340kg KGK-SİHA-82 munition in its first launch of the weapon. Turkey is already introducing indigenously developed suicide drones into service such as STM's 'Kargu' Rotary-wing UAV attack drones or its new 'Alpagu' loitering munitions. These new generation weapons are also attracting export orders and Turkey's Presidency of Defence Industries (SSB) announced the first foreign order for the Kargu Rotary Wing UAV Attack drone in July.

Over 500 Kargu suicide drones are to be delivered to the Turkish armed forces as per an announcement made by STM last year and they are also being supplied to Turkey's police and security forces. Deliveries of Alpagu loitering munitions, which can be launched from armed unmanned aerial platforms, started last year to the Turkish armed forces. An export order for Alpagu is yet to be announced though. STM is also planning larger Alpagu variants which will weigh more than 10kg and be faster, have longer range and carry a heavier warhead. Loitering munitions dive down on their targets to deliver pinpoint damage to high-value, important targets.

According to STM, Alpagu will also make use of Artificial Intelligence (AI) and image-processing capabilities, providing it with swarm attack capability. Efforts are also already underway to streamline and improve swarm algorithms to perform different tasks for the Turkish armed forces. Turkey is also undertaking the KERKES project to enable the drone swarm to function smoothly in any environment. STM has stated that it plans to offer full swarming abilities on Kargu drones by 2022-23 with efforts underway to streamline and improve swarm algorithms to perform different tasks. The availability of swarm attack capabilities will deliver a major boost in capability for the Turkish armed forces.

The Kargu suicide drone can carry one or three kilogram warheads and engage targets at a claimed Circular Error Probable (CEP) of six metre. The attack drone has a range of between 5-10 km in line of sight mode with an endurance of 30 minutes and can be used as a suicide drone or as a loitering munition system. Operating mission altitude is claimed to be 500m. Kargu suicide drones deliver a vital battlefield capability as they can swiftly engage time sensitive targets with their ability to detect static or mobile targets and then strike at them in day or night conditions. The drones are operated with a man-in-the-loop via the Mobile Ground Control Station and also undertake tactical ISR missions in addition to providing ground troops with precision strike capabilties.

Kargu drones undertake fully autonomous navigation due to STM's unique flight control system and it can be operated as part of a swarm of up to 20 platforms or as a single platform. Alpagu loitering munitions are built using a lightweight structure with low radar cross-section and weigh less than two kg. Despite their light weight which allows them to be easily transported and used by a single soldier, they feature sufficient explosive power to neutralise the intended target. II



***CLOCKWISE FROM TOP** PALM; A CH-901 suicide drone developed by China is on display at an exhibition. Photo Screenshot from China Central Television; Elbit Systems SkyStriker*

BRAHMOS to Power UP Defence Corridor

With investments worth crores, the corridor is set to transform the state

BRAHMOS from Autonomous Launcher

A FORCE REPORT

ON 26 DECEMBER 2021, DEFENCE minister Rajnath Singh laid the foundation stone for a BrahMos Production facility on 200 acres of land in the Uttar Pradesh Defence Corridor on the Lucknow-Kanpur highway.

BrahMos Supersonic Cruise Missile has been designed, developed and produced by BrahMos Aerospace, a joint venture of DRDO and NPOM, Government of Russia. It is based on the technology of Russia's P-800 Oniks cruise missile.

As per a press statement from UPEIDA, "About 500 engineers and technical people will get direct employment in the BrahMos Production Centre which will be built by investing Rs 300 crores on the land to be allotted for making BrahMos missiles at Lucknow node."

Further, it stated, "Apart from this, about 5000 people will get indirect employment and ten thousand people will get work through the production centre. The work of setting up the BrahMos Production Centre is likely to start soon. Research and development work will also be done in these centres. More than 100 BrahMos missiles are planned to be built in the next three years. Due to the BrahMos Production Centre, many other well-known companies working in the defence sector in the UP-Defence Corridor will come to the state."

In the last three years, the defence corridor has received investment proposals from 55 big companies. Of these, Encore Research Lab LLP and Allen & Alvan Private Limited are investing Rs 550 crore and Rs 30.75 crore, respectively, to set up their plants in the Aligarh node of the Defence Corridor to make drones for the Indian Army and the security forces at large. The Uttar Pradesh Expressways Industrial Development Authority (UPEIDA) has already allotted 10 hectares of land to Encore Research Lab LLP Company and to Allen & Alvan Pvt Ltd and the companies will start construction of their units soon.

Altogether 29 companies have submitted their proposals to the government for setting up their units in Aligarh node and have requested for allotment of land for the same. A total of 11, eight, and six defence manufacturing companies sought land from the government to set up their factories in Lucknow, Kanpur and Jhansi nodes respectively.

UPEIDA has so far allotted 55.4 hectares of land to 19 international companies in the Aligarh node. Some of the 19 companies include Anchor Research Lab LLP,

which will invest Rs 550 crore and has been allotted 10 hectares of land by the UPEIDA. These companies will invest Rs 1245.75 crore to make defence equipment.

Similarly, 10 hectares of land has also been allotted to Sadicate Innovation International, which is investing Rs 150 crore. Jai Sai Anu Overseas, which will set up its unit at the cost of Rs 100 crore, has been given 4.5 hectares of land. Similarly, Milkar Defence Pvt Ltd has been allotted four hectares of land to set up its unit at the cost of Rs 98.25 crore. Tractrix Auto Dynamics, which is investing Rs 40 crore, has been allotted two hectares to set up its factory.

Nitya Creation India, PBM Insolation Pvt Ltd, Deep Explo Equipment Pvt Ltd, Veriwin Defense Pvt Ltd. Advance Fire & Safety, Crimson Energy Exports, P-2 Logitech and Cobra Industries have also been provided land for setting up factories.

The companies are likely to start construction of their factories soon. Officials say that the land allotment work has been completed in the Aligarh node. At present, four lane road is being constructed in Aligarh node at a cost of Rs 10.21 crore. Besides, construction of a powerhouse and a boundary wall is underway. Soon the companies that have got the land will start the construction of the factory.

Domestic and foreign companies related to defence products signed memoranda of understanding (MoUs) worth Rs 50,000 crore for investment in the Corridor during the Defence Expo held in Lucknow in 2020.

Sadicate Innovation International, which will set up its factory over 10 hectares of land at the cost of Rs 150 crore. Jai Sai Anu Overseas will build its factory spread over 4.5 hectares of land at an estimated cost of Rs 100 crore.

According to the officials, the land allotment work has been completed in Aligarh node. Most of the MoUs have been signed for Aligarh's Andla area, located on Khair Road. Defence-manufacturing companies have also shown interest in investing in the Lucknow node of the corridor.

The announcement for the creation of a Defence Corridor in UP was made during the Investors' Summit in January 2018. The proposed nodes within the corridor include Lucknow, Kanpur, Chitrakoot, Jhansi, Agra and Aligarh.

Subsequently, domestic and foreign companies dealing in defence products signed MoUs worth Rs 50,000 crore for investment in the corridor during the Defence Expo held in Lucknow in February 2020. ||

NEWS

Rafael Acquires Newcastle-Based Pearson Engineering as Part of its Strategic Expansion in the UK

Rafael Advanced Defense Systems Ltd. has completed the acquisition of Pearson Engineering Ltd. (PER). The acquisition was executed under a stock purchase agreement (SPA), transferring 100 per cent of the ownership. The acquisition includes PER's subsidiary company Responsive Engineering Ltd.

"This acquisition is part of RAFAEL's continued strategic investments, with the purpose of transferring cutting-edge, state-of-the-art technologies, products and systems into the United Kingdom, in support of UK national security and prosperity," says RAFAEL's President and CEO, M.G (ret.) Yoav Har Even.

Even added that until recently, most of RAFAEL's operations in the UK were in partnership with UK prime contractors, with the majority of workshare manufactured in Israel. He said, "Pearson and Responsive Engineering's activity is supported by an outstanding legacy of excellence in innovation. By acquiring this company, we will be able to enhance and expand PER's manufacturing capabilities in the UK, thus strengthening our UK supply chain to better support our customers, especially the UK MOD and British armed forces. This will lead to a significant increase in the number of jobs in Newcastle and will build strong links with academic institutions throughout the UK and specifically in North East England."

"Pearson Engineering is immensely proud of its life-saving combat engineering systems, which are used by land forces worldwide. This acquisition will not only allow us to enhance our existing product portfolio but will enable the development of innovative, class-leading productsand capabilities. RAFAEL's ambition for Pearson and Responsive brings valuable growth and stability, for our employees, our trusted supply partners in the region and the wider community in the North East. It will undoubtedly create more jobs and generate exciting career opportunities within both companies," says Pearson Engineering Managing Director, Craig Priday.

EVP, GM Land and Naval Division for RAFAEL, Dr. Ran Gozali said that both RAFAEL and Pearson have an outstanding legacy in force protection capabilities.

Gozali added, "RAFAEL's reactive armour, fitted to most UK-armoured vehicles in Iraq, saved the lives of many British soldiers. The UK MOD Challenger 3 programme is another point of synergy. Pearson and Responsive are manufacturing the tank's turret structures and, supported by RAFAEL, Pearson will be able to locally manufacture and integrate the TROPHY active protection system, providing the highest level of protection to the crew. This is a great example of RAFAEL's commitment to deliver additional cutting-edge technologies and capabilities to Pearson Engineering, to support current and future UK MOD needs." ||

***ABOVE AND BOTTOM** Helina-ATGM; SPIKE LR ATGM*

Guided Strike

The Indian Army must transition to latest ATGMS

ATUL CHANDRA

DESPITE NEARLY A DECADE OF effort, the Indian Army still faces a shortfall in modern anti-tank guided missiles (ATGM). Plans to modernise the army and equip more than 380 infantry battalions and over 40 mechanised infantry units with modern ATGMs have not fructified.

In 2018 the army faced a shortfall of approximately 68,000 ATGMs and apart from second generation ATGMs such as the Milan-2T and Konkurs-M, produced under license in India and emergency procurements of Rafael Spike ATGMs, there appears to be no formal procurement process under-way for induction of large numbers of 4th or 5th generation ATGMs. The Indian Army inducted its first 4th generation ATGM in the Israeli Spike Long Range (LR) a few years ago, which were purchased as part of a Rs280 crore deal. The ministry of defence (MoD) had scrapped a November 2017 deal worth USD1billion to procure 5,500 missiles in favour of indigenous alternatives.

The outdated 2nd generation ATGMs such as the Milan-2T and Konkurs-M are manufactured by Bharat Dynamics Limited (BDL) under license from their respective original equipment manufacturers (OEM). The ageing Milan-2T and Konkurs-M ATGMs are unlikely to be effective against modern armour and infantry fighting vehicles (IFV) and main battle tanks (MBT) equipped with the latest active protection systems (APS).

In January, Saab announced that it had received an order to supply its AT4 single-shot weapon for army and air force Special Forces (SF) units. India has also been a longstanding user of Saab's Carl-Gustaf system. The AT4 is operated by a single soldier and single-shot 84mm calibre weapon and has proven its efficacy against structures, landing craft, helicopters, armoured vehicles and personnel.

The Spike LR man-portable ATGMs have been operational with the army for a few years now. The ATGM has a dual mode seeker which allows precise engagement both during day and night and also has top attack capability to enhance its lethality against tank targets. With ranges of up to 32 km and fire-and-update capabilities, the Spike family today consists of five variants (SR, MR, LR2, ER2, NLOS). The Spike ATGM has been sold to 35 countries, with over 33,000 missiles already supplied and more than 6,000 fired in tests and in combat. Spike missiles have been integrated onto 45 different vehicular, helicopter and naval platforms and are in service with 19 NATO nations as well.

Outdated Orders

Left with no alternative, the army has entered into contracts to procure additional numbers of Milan-2T and Konkurs-M ATGMs. BDL received a Rs 3,131.82 crore contract in February for supply of Konkurs-M ATGMs for the army with deliveries to be completed by 2025. The Konkurs-M has a maximum range of 4,000m and a flight time of 19 seconds. It can be launched either from BMP-II tank or from ground launcher. BDL has augmented its manufacturing capacity to meet domestic as well as overseas demand for the Konkurs-M.

The Russian origin ATGM is being manufactured by BDL under license agreement with the Russian OEM and has been indigenised to a large extent (90 per cent) and is also being offered for export. In August 2020, the MoD announced that BDL had indigenously developed Konkurs Missile Test Equipment (KMTE) and Konkurs Launcher Test Equipment (KLTE) that would replace imported systems from Russia and save foreign exchange worth US$ 17.7 million. BDL is also setting up a new Seeker Facility Centre (SFC) for manufacture of RF seekers for missile systems. BDL will manufacture and test indigenously developed warheads for the Konkurs-M at the new SFC.

BDL also continues to produce the Milan-2T and received an order for 4,960 ATGMs for the army at a cost of Rs 1,188 crore in March last year. Deliveries were to be completed by 2024. This was a repeat order of an earlier order placed in March 2016. The army placed its first order for the Milan-2T in December 2008 for 4,100 ATGMs at a cost of Rs 567 crore. The army introduced the older Milan-2 into service in the late Seventies and it was produced in India by BDL under license since the early Eighties. The Milan-2 had a single warhead while limited capability to defeat modern tanks, while the upgraded Milan-2T had a tandem-warhead better suited to defeating modern tanks of the nine-

ties and the early 2000s. The Milan-2T is produced by BDL under license from MBDA and the tandem-warhead ATGM has a range of 1,850 metres. These missiles can be fired from ground as well as vehicle-based launchers and can be deployed in Anti-Tank Role for both offensive & defensive tasks.

Indigenous ATGMs

After decades of effort, the DRDO now has a growing portfolio of ATGMs ranging from NAG, HELINA, MPATGM, SANT and Laser Guided ATGM for MBT Arjun. However, it appears that as on date no large formal contract has been placed for procurement of any of these ATGMs for the army.

In January, the DRDO announced that it had completed flight tests of the final deliverable configuration of its Man Portable Anti-Tank Guided Missile (MPATGM). The indigenously developed anti-tank missile features an integrated thermal sight and is a low weight, fire & forget missile launched from a man-portable launcher. It has a range of 2.5km and a top-attack capability to defeat armoured vehicles. The missile has miniaturised Infra-red Imaging Seeker and advanced avionics for on-board control and guidance.

NAG and HELINA are 3rd generation ATGMs developed for use by the army's mechanized formations to engage enemy Main Battle Tanks (MBT). Final user trials for the NAG ATGM took place in October 2020. The NAG ATGM has also been integrated onto the NAG Missile Carrier (NAMICA). The NAMICA is a BMP II based system with amphibious capability. In addition to HELINA (army), DRDO is developing Dhruvastra for the air force and joint user trials were announced to be completed by the MoD in February, last year. The missiles were fired from a Dhruv MkIV 'Rudra' attack helicopter in test ranges in the desert. The missiles were fired in hover and max forward flight against realistic static and moving targets. The HELINA helicopter launched ATGM has a range of seven km. Interestingly, in the MoD release issued last year, following these trials, these 3rd generation ATGMs are touted as the being 'one of the most-advanced anti-tank weapons in the world', despite the emergence of 5th generation ATGMs on the global market.

Another weapon in development is the Stand-off Anti-Tank Missile (SANT), which is a 10km range ATGM developed for use on Indian Air Force (IAF) Mi-35 attack helicopters and features a MMW seeker. With the Mi-35s to soon be phased out, it is unsure as to what the fate of the SANT programme will be. The DRDO is also developing a laser guided Precision Guided Munition (PGM) for the MBT Arjun, which will be launched from its 120 mm rifled gun of Arjun tank to engage and defeat Explosive Reactive Armour (ERA) protected armoured targets. The tandem HEAT warhead ATGM can defeat armoured vehicles at ranges from 1.5 to 5 km.

***FOR BETTER SECURITY** MMP medium range ATGM*

5th Gen ATGM

MBDA's MMP (Missile Moyenne Portée/ medium range missile) 5th generation Anti-Tank Guided Missile has been in operational use since 2018 and the 1,000th MMP produced for the French forces was delivered in November last year. The MMP entered service with Special Forces (SF) units of all three wings of the French military in 2017, in addition to being introduced into the French Army the same year. Belgium and Sweden have also ordered the MMP, which is the latest generation anti-tank missile in service to be operationally proven in combat.

The MMP is a successor to the Milan weapons system in service in the armies since 1974. MBDA had offered India the opportunity to become a co-development partner with the Defence Research & Development Organisation (DRDO) as far back as 2015 but the offer was turned down. At the present moment, MBDA's joint venture in India, L&T MBDA is offering further development and manufacture of the MMP for India, known as ATGM5.

The MMP is a versatile missile which can engage targets up to distances of 4,000 meters. It is fitted on new French Jaguar armoured vehicles and can be fired from different platforms (armoured vehicles, light vehicles, ships or craft) in addition to being able to be carried and operated by an infantryman. The MMP uses a dual-band visible/non-cooled infra-red seeker and can engage field fortifications, armoured vehicles and MBTs equipped with the most modern reactive armour thanks to its sophisticated tandem warhead charge. Available for use as a dismounted weight, the MMP features a lightweight, easily man-portable, firing station. The MMP can be fired from confined spaces, an essential capability for combat in urban areas and offers both a 'fire and forget' capability, (which allows the operator to move to another position immediately after firing the missile) and a 'man-in-the-loop' capability (for engagements requiring a minimized risk of collateral damage), where a fibre-optic link relays the seeker's imaging back to the firing post.

As per France's 2019-2025 Military Programming Law, the total procurement of the MMP5, which was intended mainly for the army, has been increased to 1,950 missiles by 2025 instead of 1,550 originally planned. Development of an air-to-ground version of the MMP called MHT (Missile Haut de Trame/ top frame missile) was launched by the French ministry of the armed forces at the end of 2020. The long-range missile is intended to equip Tiger attack helicopters and is also being considered for integration on the European MALE Eurodrone, in addition to being fitted on land vehicles. II

Power Pack

HAL to showcase indigenous products

HINDUSTAN AERONAUTICS LIMITED is geared up to display its indigenous products at the 12th edition of DefExpo to be held at Gandhinagar, Gujarat from 18-22 October 2022.

HAL's participation will focus on technological excellence and indigenisation initiatives, under its business verticals such as fighters, trainers, transport aircraft, helicopters, engines, systems and avionics besides projecting the company's futuristic programmes.

HAL will have a dedicated 'Indigenisation Exhibition Stall' at Hall-2 for active participation and interaction of Indian industry partners. More than 200 imported items planned to be indigenised with private industries will be displayed in this stall to attract Indian industry. Twenty six already indigenised items will be displayed for understanding and encouragement of private industries. There will be one-to-one interactions and instant clarifications to the industry partners at the venue.

Dr Ajay Kumar, defence secretary, MoD will inaugurate the HAL's dedicated Indigenisation Stall on the first day of DefExpo. Launching of a document on indigenisation success stories of HAL, handing over of 'Project Sanction Orders' of Positive Indigenisation List (PIL) items to the Indian Private Partners, handing over of approvals/ clearance certificates to the industry partners for items indigenised and launch of Indigenisation—Supplier Relationship Management (ISRM) portal are planned.

HAL's Light Combat Helicopter 'Prachand' is planned to be showcased in the Outdoor Display area during the show. HAL will also exhibit the scaled models of LCA, LCH, LUH, ALH, Do-228 and HTT-40 during the show. Some of the avionics/ accessories/ components/ products such as Indigenous Engine & Flight Display Unit (EFDU), Mission Computer & Interface Computer, Digital Map Generator (DMG), FBW DAU (Fly by Wire Data Acquisition Unit), E-FDR (Enhanced Flight Data Recorder), Gunner Pilot Control Unit (GPCU), Automatic Identification System (AIS), Solid State Data and Video Recording System (SSDVRS), Full Authority Digital Engine Control System (FADEC), Integrated Control Computer (ICC), ICCATS-Jaguar, APU, GTSU-127 etc. will be on display at the HAL stall.

Further at the India Pavilion (HEC), HAL will display 29 products of which 17 are scaled models and 12 will be through display posters and product videos. Scaled models of HTT-40, ALH (WSI), IMRH, LUH and RUAV, will be showcased during the show. Other products include Main Landing and Nose Landing gears of ALH, Air Starter Turbine, AMCA, Digital TGT Amplifier (TGTA), Ring Forgings, Shape Memory Alloy Ferrule Rings, Solid State Cockpit Voice & Flight Data Recorder, HPTR BLADE-AL31FP ENGINE, Main Rotor Blade (ALH), TACAN, VOR ILS and Air to Air Heat Exchanger. HAL will hold meetings with delegations and engage in MoU signing ceremonies as part of the show. II

Dinesh Kumar Batra receiving the award from the minister of skill development & entrepreneurship, ministry of skills, employment, entrepreneurship, innovation, & ministry of tourism, government of Maharashtra, Mangal Prabhat Lodha. Accompanying him are executive director (national marketing), Manoj Kumar, GM (Finance) Damodar Bhattad and AGM (Finance) Pradeep Sethia

BEL is ET Iconic Brand of India

THERE ARE ORGANISATIONS OF repute. And there are most valuable brands, their names written in gold, in the annals of history. The iconic brand value of Navratna Defence PSU Bharat Electronics Limited (BEL), which shaped the growth of defence electronics in India, has been celebrated by the country's premium media house as 'The Economic Times—Iconic Brand of India Award 2022'. Chairman & Managing Director, and Director (Finance) & CFO, BEL, Dinesh Kumar Batra received the award on behalf of the company at the awards ceremony, organised recently in Mumbai.

Guided by a farsighted vision to make India self-reliant in Defence electronics, BEL was established in 1954 under the ministry of defence, GoI. Be it Himalayan blizzards, salt-laden waters of the Arabian sea, or simmering temperatures of the Thar desert, BEL designs, manufactures and supplies state-of-the-art products and systems that are meant to excel in extremes and meet the exacting standards of the Indian armed forces. Yet another factor that has been pivotal to Brand BEL is the total trust that customers have reposed in the company.

Today, there's not an area in defence which is untouched by BEL—Radars, Missile Systems, Military Communications, Naval Systems, Electronic Warfare & Avionics, C4I Systems, Electro Optics, Tank Electronics & Gun/ Weapon System Upgrades, Electronic Fuzes, you name it, the company has made some of the most iconic products in all these areas.

But though defence is its mainstay, BEL has touched a chord with the common man through civilian products like solar traffic signals and Electronic Voting Machines (EVMs). When the country wanted its services most, BEL successful completed manufacturing of 30,000 ICU Ventilators in a record time to help the Government of India in its efforts to combat the Covid-19 pandemic.

All good brands not just grow. They evolve. BEL, too, has been constantly evolving over the last seven decades and to keep pace with the changing times, exploring diversification into allied non-defence areas. Some of the areas BEL is focussing on in non-defence include solutions for Civil Aviation sector, Anti Drone systems, Unmanned Systems, Satellite Assembly & Integration, Solar Business, Railway and Metro solutions, Software as a Service, Network & Cyber Security, Energy Storage products for Electric Vehicles (Li-ion & Fuel Cells, Charging Stations, etc), Homeland Security & Smart City businesses, a range of Medical Electronic and health care solutions, Artificial Intelligence, Composite Shelters & Masts, etc.

BEL is pursuing the cherished dream of self-reliance by espousing the Government of India's 'Make in India' initiative. Be it the efforts that the company has been putting in to engage in collaborative R&D—in addition to augmenting its own R&D set up—attempts to outsource work from Indian private industries and MSMEs, or the path breaking decision to go in for Public-Private partnerships to execute huge missile programmes, BEL is leaving no stone unturned to ensure that it is in sync with the government's larger goal of indigenisation and Atmanirbharta (self-reliance). BEL is also fast expanding its global presence, putting its best foot forward to give a thrust to exports worldwide.

The government of India's new policies for defence aims at providing a level playground for both public and private sector. But despite the opening up of defence to private companies, BEL has been growing at around 15 per cent rate, courtesy the progressive policies that it has put in place to maintain competitive edge in the changing business scenario. II

MBDA Welcomes Deepening on Polish-UK Missiles

MBDA welcomes the signing of a Polish-UK governmental agreement to co-operate on air defence missiles and outlining the scale of industrial co-operation for the NAREW ground-based air defence (GBAD) programme.

The signing at the Zamość Military Base in Poland came alongside Poland declaring the receipt of the equipment for the first Firing Unit of the Mała NAREW GBAD system, using MBDA's CAMM missile and iLaunchers.

Managing Director of MBDA UK, Chris Allam said, "To deliver Mała NAREW to Poland in such an extremely short timeframe is a remarkable achievement, and we are very proud that this has been accomplished through our very close partnership with PGZ and thanks to strong support from the UK Government. Today's governmental agreements launch the next step in Polish-UK missile co-operation and underpins the PGZ-MBDA technology transfer proposal on Narew, while also supporting Pilica+, Miecznik, Ottokar-Brzoza, and other vital projects."

MBDA is currently working with PGZ to create an enhanced sovereign missile capability in Poland backed by transfer of knowledge and technology from MBDA to Polish defence industry. This joint working is expected to provide decisive military capabilities to Poland, drive significant value for money and provide a boost to the Polish economy and generate high-skilled jobs.

The Mała NAREW system, with its integration of Polish SOŁA radar stations and C2 systems with CAMM missiles, provides an important stepping-stone to the main NAREW programme while also de-risking CAMM's use with the Pilica+ upgrade project. II

Former Air Chief Marshal RKS Bhadauria Joins the UPDIC as Chief Nodal Officer

Former Air Chief Marshal RKS Bhadauria joins the Uttar Pradesh Defence Industrial Corridor as Chief Nodal Officer.

A press statement said, "Uttar Pradesh Defence Industrial Corridor (UPDIC), an aspirational project under Uttar Pradesh Expressways Industrial Development Authority (UPEIDA) towards the Government of India's ompetus to reduce the foreign dependency of the Indian Aerospace & Defence Sector has got a visionary on board, a highly decorated Officer of Indian Air Force, Air Chief Marshal Rakesh Kumar Singh Bhadauria PVSM AVSM VM ADC(Retd)." The statement added that ACM Bhadauria's involvement will be a catalyst for the development of the UP Defence Industrial Corridor. II

Indian Navy's P8I Aircraft Participates in Exercise Kakadu

A P8I Long Range Maritime Patrol Aircraft of the Indian Navy participated in the Multinational Maritime Exercise Kakadu 2022 hosted by Royal Australian Navy in Darwin from 12 to 25 September 2022, along with INS Satpura. The exercise saw the participation of 34 aircraft from over 20 nations.

The maiden participation of the P8I provided an enhanced exposure to the aircrew, augmenting the understanding of the varied nuances of collaborative Anti-Submarine and Anti-Surface Warfare operations in a complex multi-threat scenario.

The seamless operations conducted by P8I in consonance with the exercise theme 'Partnership, Leadership, Friendship' along with USN and RAAF P8s enabled the refining of joint SOPs and enhance interoperability and reaffirm the Indian Navy's commitment to the Indo-Pacific. II

Lockheed Martin Partakes in DefExpo 2022

Lockheed Martin showcases its diverse portfolio of defence capabilities and solutions at the 12th biennial edition of DEFEXPO India 2022. The company's exhibit this year includes a broad span of advanced technologies from the Aeronautics, Rotary and Mission Systems, and Missiles and Fire Control business areas.

"Lockheed Martin is committed to assisting in the growth of India's strategic security capabilities and the advancement of its defence manufacturing ecosystem. Our joint ventures with Tata and industrial relationships with many Indian companies such as Ashok Leyland, Lakshmi Machine Works, MIDHANIi, Rossell Techsys, and SASMOS among others are a testament to the success of the government of India's mission to create 'Atmanirbhar Bharat' in the defence sector," said Chief Executive, Lockheed Martin India Pvt. Ltd, William L. Blair.

"Participating at DEFEXPO 2022 gives us the opportunity to showcase our advanced technologies and innovative capabilities directly to the largest gathering of defence and aerospace partners and our customers in India," Blair said. "We look forward to engaging with our customers and industry partners to discuss their key priorities for the advancement of India's national security, indigenous production and human capital development agendas."

Lockheed Martin says that the prime attraction at their booth this year is one of the most technologically advanced complex aerostructures— a "Made in India", fuel-carrying, 9G, 12,000 hours, interchangeable/replaceable fighter wing. This wing was manufactured at the Tata Lockheed Martin Aerostructures Limited (TLMAL) facility in Hyderabad. The TLMAL joint venture exemplifies the government of India's "Make in India" goals and serves as the single global source of C-130J empennage assemblies installed on all new Super Hercules aircraft. To date, TLMAL has manufactured and exported more than 180 C-130J empennages.

The F-21 fighter aircraft, which is on offer to the Indian Air Force (IAF) will also occupy a prominent place at Lockheed Martin's booth. The company is leveraging both 4th and 5th generation technologies to offer the best solution to meet or exceed the IAF's capability needs, provide Make in India industrial opportunities, and accelerate India-United States cooperation on advanced technologies, including but not limited to fighter aircraft. The F-21 demonstrates Lockheed Martin's commitment to delivering a technologically advanced, single-engine fighter to the IAF — For India, From India.

The Indian Navy's acquisition of MH-60R "Romeo" multi-mission helicopter is another highlight for Lockheed Martin at the show. LM says that the MH-60R is the world's most advanced maritime helicopter and brings vital anti-submarine and anti-surface warfare capabilities to the Indo-Pacific region. The U.S. Navy has already delivered the first three aircraft to the Indian Navy in 2021 and these aircraft are being utilised to train Indian pilots and crew members in California. In July-August 2022, the U.S. Navy transported to India another three helicopters, which will be initially based at Naval Air Station INS Garuda in Kochi. A total of 24 MH-60Rs will be delivered in country over the next few years.

India's workhorse, the C-130J Super Hercules airlifter, which represents a strong legacy of partnership between India and the U.S., also will be on display at the Lockheed Martin booth. The IAF uses its fleet to support a variety of missions, from cargo delivery to providing vital humanitarian aid including in the wake of the COVID-19 pandemic as well as for transportation of relief materials, equipment and personnel in the areas affected by cyclones Yaas and Tauktae.

The S-92 helicopter, best in class for safety and reliability, will also boost Lockheed Martin's presence at the show. The S-92 helicopter recently surpassed 2-million fleet flight hours which is a testament to the reliability of the multi-mission aircraft.

As part of the Javelin Joint Venture, Lockheed Martin also produces the Javelin anti-tank guided missile system.

This versatile and effective one-man-portable and platform-employed multi-target precision weapon system provides the capability to defeat a broad spectrum of close combat threats on the modern battlefield. Using fire-and-forget technology, the weapon guides itself to the target without external commands, allowing soldiers to take cover or reposition. With a range of 65 meters to 4 kilometers in most operational conditions, as well as the ability to operate through adverse weather and battlefield obscurants, Javelin can be deployed in a variety of environments and conditions.

Lockheed Martin continues to build upon more than seven decades of association and three decades of partnerships with India by nurturing and expanding collaborations with local industry to support the foundation of the indigenous defence manufacturing ecosystem. The company's present and future programmes in India range from transport, maritime, and fighter aircraft, to sea and land-based air and missile defence projects, as well as capabilities in civil sectors including new and renewable energy. II

Honeywell, HAL to Manufacture High-Power Turbogenerators

Honeywell has signed a memorandum of understanding (MoU) with Hindustan Aeronautics Limited (HAL) to jointly manufacture high-power, high-voltage turbogenerators.

Honeywell will provide its 1-megawatt electric machine, to be utilised as a generator, that will enable a turbogenerator which can power hybrid-electric aircraft, including traditional airframes, unmanned aircraft, and urban air mobility vehicles. This generator, which can also efficiently run as a 1-megawatt motor, can be seamlessly integrated with new and existing gas turbine engines to create highly power-dense turbogenerators.

Speaking on the announcement, President, Honeywell India, Rajesh Rege said, "In continuance with our commitment to deliver world-class, industry-leading technologies to India, we are delighted to partner with HAL once again. This MoU builds on a four-decade-long partnership with the country's aeronautics leader and is an affirmation of our Make in India vision."

Former chairman, and managing director, HAL, R. Madhavan said, "This MoU is intended to allow both parties to jointly develop a business plan which outlines the market potential, investment, returns and partnership model. Once the business plan's viability is established, we will enter into contract arrangements. Going ahead, we hope to work with Honeywell to develop several new, India-specific applications."

Traditionally, aircraft use fuel-burning engines to mechanically turn rotors, propellers, or fans. Many new designs, however, use a distributed electric propulsion architecture, in which many electric motors can be tilted or turned off for vertical take-off and horizontal flight. A Honeywell turbogenerator can provide electric power for multiple electric motors anywhere on an aircraft.

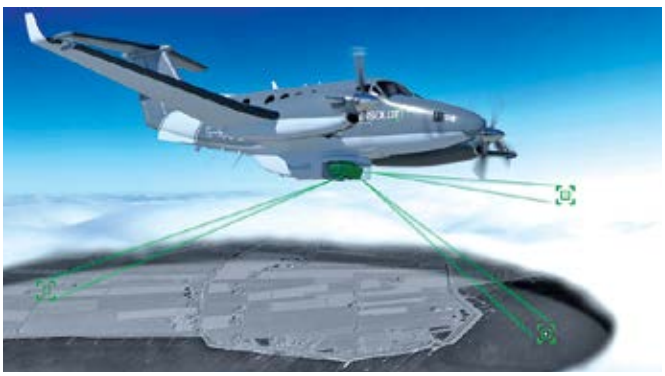
The Honeywell turbogenerator can run on aviation biofuel, including green jet fuel as well as conventional jet fuel and diesel. It can be used to operate high-power electric motors, charge batteries, and can satisfy missions from heavy-lift cargo drones to air taxis, or commuter aircraft.

The MoU was exchanged between senior director OE Sales, Honeywell Defense & Space, Eric Walters and executive director (E & IMGT), HAL, B. Krishna Kumar in the presence of R. Madhavan and CEO (BC), HAL, M.K. Mishra. II

HENSOLDT's Latest Airborne Surveillance Radar Saves Sailor's Life

HENSOLDT's latest airborne radar, the PrecISR1000 multi-mission surveillance radar, confirmed its outstanding all-weather surveillance capabilities in a life-or-death rescue operation.

During a transatlantic sailing race, a ten-meter racing yacht had lost power due to strong winds and heavy seas. Unable to steer the vessel or lower the sail, the sailor was drifting in the Atlantic Ocean without communications or a working emergency beacon to give his location. A full sensor equipped fixed wing search & rescue aircraft on duty was unable to find the missing yacht in the 40,000 square mile search area – an area bigger than the German federal states Baden-Württemberg and Saarland together or an area like Iceland. With the search area increasing by the hour, the official authorities reached out to their industry partners for help.



Being in the region for trials and measurements, the HENSOLDT PrecISR1000 radar onboard a twin-engine fixed-wing ISR aircraft detected the missing yacht at a range of 66 km on its first pass through that sector of the search area, using its outstanding maritime modes, whilst flying at 5000 ft in thick cloud.

The radar was operated by very experienced, ex-military, ISR system operators from Meta Mission Data, who have helped to optimise the sensor to achieve its cutting-edge levels of detection in both maritime and land surveillance operations.

There were several other boats detected in the search sector, but these were immediately discounted by correlation with the onboard maritime Automatic Identification System (AIS), allowing the operator onboard to direct the search & rescue aircraft straight to the missing yacht and to descend below the cloud to get visual confirmation and precise location for the rescue services. A lifeboat reached the vessel about 3 hours after initial radar detection and found the sailor onboard, who despite being tired from his ordeal, was physically well.

"We are glad that we could support a successful search & rescue operation with our latest radar product", said Sales Director Airborne ISR Radars at HENSOLDT, Pierre Marquis. "The operation was an excellent example of the benefits of fixed-wing airborne Intelligence Surveillance & Reconnaissance (ISR) using the latest sensor technology for all-weather detection and target designation."

India Leads in Adoption and Usage of Multi-Factor Authentication

With the past two years resulting in a permanently altered working environment across the world, changes in security were both necessary and notable. Controlling access to applications, data, and systems is an increasingly important aspect of securing any environment and protecting it against both internal and external threats.

After two years of the pandemic, confidence in addressing certain security risks and threats arising from hybrid and remote work has improved among businesses and organizations around the world and in India. When it comes to secure access to applications, data, and systems, 84 percent IT professionals worldwide this year said they have some degree of confidence in their current user access security systems to enable remote work securely and easily, compared to 56 percent in 2021. In addition, 60 percent said this year they were highly confident compared to just 22 percent last year.

These are among some of the key findings from the 2022 Thales Access Management Index, a global survey of 2,600 IT decision makers, conducted by 451 Research, part of S&P Global Market Intelligence. Firms Gaining Confidence Addressing Security of Remote Work.

Overall, the report findings suggest that firms remain concerned about the security risks of remote work, but those concerns seem to be less severe. At the same time, firms are also growing more confident in the ability of authentication and access management systems to manage those risks. Only 31 percent of IT professionals surveyed globally reported having "very high" concerns about the security risks and threats of remote work in 2022, down from 39 percent in 2021, while those who said they were "somewhat concerned" – the most popular response – increased from 43 percent to 48 percent in 2022.

Multi-Factor Authentication on the Rise, India stands ahead.

While multi-factor authentication (MFA) usage remains most prevalent for remote workers (68 percent) and privileged users (52 percent) globally, the report shows that MFA adoption is on the rise for internal and non-IT staff with MFA adoption increased to 40 percent compared to 34 percent in 2021.

Contrary to the gradual growth in widespread MFA adoption by businesses at the global level with just over half (56 percent) of the organizations adopting MFA in 2022, India, Singapore, and the United Arab Emirates (UAE) all saw notable increases in MFA adoption in 2022. Notably, India obtained both the highest percentage increase of MFA adoption and the highest overall percentage of MFA usage, up 19 percentage points to 66 percent this year. India is followed by Singapore with a 17-percentage-point increase in adoption to 64 percent, and UAE with a 10-percentage-point increase, to 65 percent. Lingering Effects of Pandemic Drive Interest in Access Management, MFA and ZTNA.

The survey inquired about the direct impacts that the pandemic and remote work had on deployment plans for new access security technologies. Responses revealed a

six-percentage-point global increase in plans to deploy stand-alone MFA, up from 31 percent in 2021. The pandemic also impacted plans to deploy cloud-based access management, selected by 45 percent of respondents worldwide compared to 41 percent in 2021. These two increases illustrate respondents' growing awareness that threats come from all angles, and that proper authentication and management of access and privileges is necessary for an adequate security foundation. Last year, Zero Trust Network Access/Software-Defined Perimeter (ZTNA)/(SDP) was the top choice, selected by 44 percent of respondents globally. In 2022, ZTNA was the second choice at 42 percent.

Principal Analyst at 451 Research, Garrett Bekker said, "Just as the threat landscape has evolved, the tools and methods to handle that landscape have, too. However, even with innovative tools and boosted confidence levels, security plans and approaches still need to adapt to the ever-changing threat environment. A greater shift towards a Zero Trust model would certainly place access management in a central role in corporate security strategies, with a related reliance on MFA as a critical supporting enabler."

Vice President and Country Director, India at Thales, Ashish Saraf comments: "The past few years have been paradigm changing with new priorities and strategies to protect access to data, applications, and systems. New threats, risks, and vulnerabilities as well as evolving business requirements underscore the need for robust Access Management, Multi Factor Authentication, and a drive towards Zero Trust Network Access. The strong growth in adoption of Multi Factor Authentication in India points towards rising awareness and a commitment towards ensuring high levels of security in enterprise environments" II

FDI in Defence

Despite the intent, government policies still inhibit effective joint ventures

WITH A VIEW TO SPEEDILY END DEPENDENCE ON import for its defence needs, government of India, in the year 2001, opened up defence manufacturing to the private sector. Previously, private sector participation in defence had been widely viewed as a transgression of national security. Initially, FDI in defence of up to 26 per cent was allowed under the automatic route. Later, in 2015-16 this cap was raised to 49 per cent.

In March 2018, government of India (GoI) released a draft Defence Production Policy (DProP 2018). It targeted the creation of an industry-friendly business ecosystem to promote domestic production of defence equipment by the public sector, the private sector and MSMEs.

The provisions of the DProP 2018 aimed to enable India graduate from being among the largest importer of arms in the world to being self-reliant in its defence needs. Some of the enabling provisions and incentives that were proposed included:

- Rationalising the taxation system to support domestic defence manufacturing.
- Streamlining the defence offsets policy to enable speedy execution of offset contracts.
- Enhancing the FDI cap from 49 per cent to 74 per cent under the automatic route for certain niche technologies.
- Setting up of an Aeronautical University in a 50:50 cost sharing partnership between Hindustan Aeronautics Ltd (HAL) and GoI to address the issue of skill shortage.
- Setting up of a corpus of Rs 1,000 Crore (USD 140M) to fund start-ups to meet specific defence R&D objectives.
- Easing and speeding up of the industrial licensing process.

In mid-December 2019, at the 2+2 dialogue held in Washington, the Industrial Security Annex (ISA) to the India-US General Security of Military Information Agreement (GSOMIA) was signed. The ISA provides the framework for exchange and protection of classified military information between the US and Indian defence industries. The ISA, it is expected, will open the door to greater cooperation between US defence firms and firms in the Indian private sector.

In mid-May 2020, the GoI announced the formal coming into force of one of the key proposals of DProP 2018—enhancement of the FDI cap from 49 per cent to 74 per cent under the automatic route for certain niche technologies (FDI up to 100 per cent may also be permitted with GoI approval).

The GoI's efforts, over the last two decades, to enhance private sector participation in defence manufacturing through the measures enumerated above, are motivated by three principal reasons:

- The less than satisfactory performance of the state-owned enterprises in fulfilling the requirements of the armed forces—despite the extended, virtually monopolistic run given to them.
- In the relatively short time since 2001, when defence manufacturing was opened up, the private sector has proved itself capable of assimilating and managing the technologies.
- Defence manufacturing requires large investments.

The private sector has demonstrated its ability to raise large sums of capital and to make substantial investments in essential assets, resources, acquisitions, joint ventures (JVs) and other capabilities required to undertake de-

fence production.

However, despite the many policy initiatives, the expectations of attracting large scale FDI in defence have been belied. Very little FDI has been channelled by foreign defence companies for forming JVs with Indian defence firms.

The actual FDI inflow into the defence sector, currently, stands at just Rs 77.72 crores (USD 12.34 million) for the period from April 2000 to September 2021 (www.dipp.gov.in). The total FDI in defence, in the two decades since April 2000 amounts to less than 0.002 per cent of the total FDI inflow into India in the same period.

The Roadblocks

Clearly, the mere raising of FDI limits will not suffice to attract FDI into India's defence sector. Concern around long-term financial viability is the principal roadblock stopping FDI inflow into the Indian defence industry. There are other concerns too.

FDI approval is contingent upon the investee company complying with stipulations on how it can structure its operations. The FDI policy, requires the investee company to be structured such that it is self-sufficient in the design, development, manufacture, and life-time support of the product that it proposes to manufacture in India. The investing/ investee firms, would like to be given a free hand to choose a structure for their operations that places them in the best position to attain their business goals.

Such provisions, although well-intentioned, introduce policy ambiguities, are difficult to implement, and only serve to scare away potential investments (the assessment of 'indigenous content', in defence equipment manufactured in India, continues to be a subject of long-standing contention).

Generally, nations seek to attract FDI in the defence sector with a view to acquire high-end technologies. Interestingly, very often it is not the investing company that refuses to transfer high-end technology, but it is the government that stops the transfer, a phenomenon unique to the defence industry.

Given these roadblocks, FDI is likely to flow into the Indian defence industry only if the investing firms can see a clear and assured route to sustained profitability, which is feasible only through a mechanism of guaranteed minimum order quantity. Having to balance the need of attracting FDIand the need to protect the business interests of domestic defence firms, makes giving such an assurance difficult for the government of any host country.

Additionally, procurement procedures for defence equipment stipulate that Indian firms with FDI greater than 49 per cent will be ineligible to bid for 'Make' projects. Similarly, firms with FDI exceeding 49 per cent are, by the extant defence procurement regulations, ineligible to be considered for selection as Strategic Partners (SPs) in high-value projects under the strategic partnership (SP) scheme.

Further, in August 2020, the GoI announced a 'negative list' of defence equipment whose procurement through import is to be banned in a phased manner. This 'negative list' adds to the list of uncertainties that foreign firms need to contend with, while contemplating investments in India's defence sector.

Besides not being able to bid for equipment in the 'negative' list, it is highly likely that there will be emergent situations, when firms in which a controlling stake is held by foreign entities will be barred from bidding by the GoI.

Given these roadblocks, the GoI could nevertheless intervene on a case-to-case basis, to facilitate FDI while also protecting the interests of the domestic defence firms. Such subjective interventions, however, invariably tend to be messy, give rise to uncertainties, and create suspicions around the 'fairness' of the procurement process. An alternative solution would be for the GoI to issue a 'positive' list of equipment—in consultation with Indian defence firms—for the supply of which, FDI of more than 49 per cent would not be a disqualification.

However, any such 'positive' list of equipment is likely to consist only of minor equipment. Participation by foreign firms in the supply of such minor equipment, as prime vendors, through majority stake in an Indian firm will only enable the infusion of insignificant amounts of FDI. Equally importantly, permitting FDI participation by foreign firms only in the supply of low-value items will not further the stated aim for allowing FDI in Indian defence—acquisition of niche technologies/ technical capabilities.

The low inflow of FDI into the defence sector could therefore largely be attributed to:

- Apprehensions around guaranteed and sustained support to make the investments/ JVs financially viable.
- The onerous and somewhat ambiguous policy provisions which lend themselves to unfavourable/ multiple interpretations.
- Fear of award of contracts by the GoI through nomination to the DPSUs/ OFs owing to domestic political compulsions.

Looking Ahead

The institutional and structural causes that have impeded India's march to self-reliance in defence are well known and have been extensively written about. In the short-term, collaborative arrangements with global arms majors for technology transfers/ joint development projects/ licensed production arrangements etc., are inescapable for India to leapfrog the existing capability divide.

However, in the longer term, if India is serious about attaining self-reliance in its defence needs and then catching up and competing with nations that have established capabilities in the design, development & manufacture of defence equipment, the GoI and the private sector need to:

- Increase investment in R&D
- Initiate necessary measures to increase researcher density.
- Shift R&D focus from the current emphasis on applied research to a focus on basic research.
- Create a wider defence manufacturing eco-system together with the MSMEs (the automobile sector presents a good example to emulate).

The revised FDI provisions for the defence industry, the draft DProP-2018 and the various other 'Make in India' policies have succeeded in creating an air of optimism and expectation in the private sector. The private sector currently contributes a minuscule share of India's total defence production output (a substantial portion is still garnered by the DPSUs). If India is to realise its self-reliance goals in defence equipment, the Indian private sector, the DPSUs and the MSMEs will need to work in concert.

The aims of the most well-intentioned policies come to nought, if they are not implemented meticulously. Poor implementation of policies has been a weakness of India's institutions across several industry sectors. The GoI will require to play an enabling role to capitalise on the mood of optimism that has been created. II

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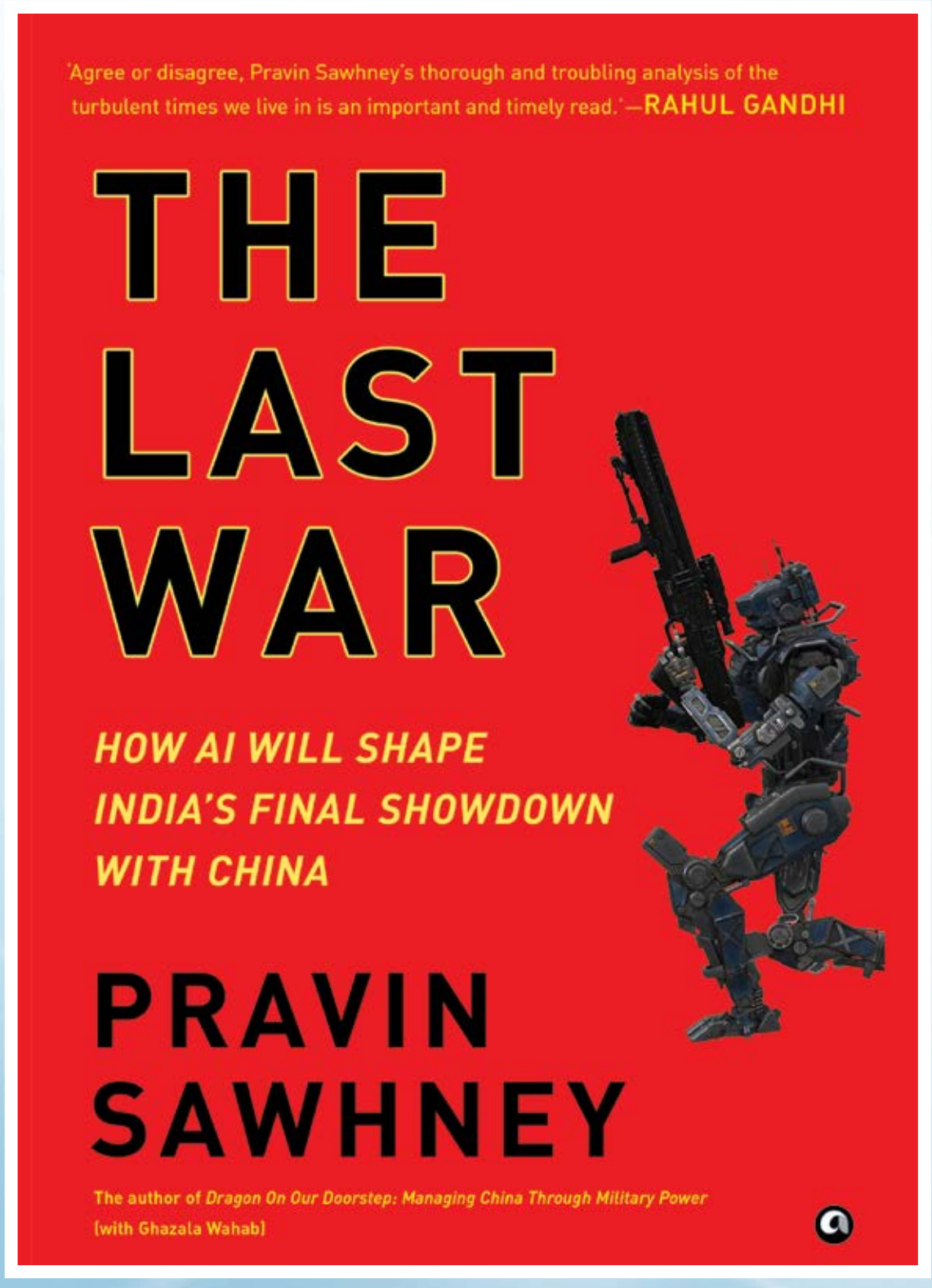

In the stores

The book describes the future warfare in frightening details