

NATIONAL SECURITY AND AEROSPACE NEWSMAGAZINE

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Big Show, Bigger Chaos

To become the show of Prime Minister Narendra Modi's vision, Aero India needs to move out of the air force station

GHAZALA WAHAB | YELAHANKA

AERO INDIA 2025 IS THE BIGGEST edition of the show until now. It is evident in the number of exhibition halls, Indian exhibitors, visitors and the overall mismanagement. Defence minister Rajnath Singh likened the show to the Mahakumbh currently ongoing in Prayagraj. He was right. In terms of chaos--induced mostly to accommodate the VIP visitors--, and breakdown of facilities, it is quite similar.

But perhaps, here the problem is more fundamental—the location. Air Force Station Yelahanka is simply not big or equipped enough to hold the show of the size of Aero India. If Aero India has to be not only the biggest, but among the better shows in Asia, then it needs a professional venue. Here are four reasons why Aero India needs to exit Air Force Station Yelahanka.

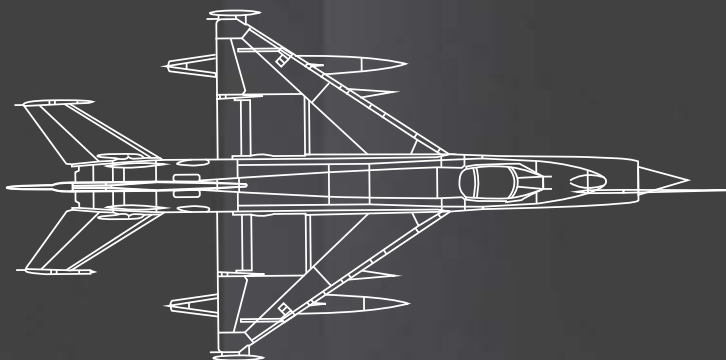
Nature of the Show: Aero India is a commercial exhibition in which aerospace industry from around the world comes to engage with the Indian industry. No doubt, until now this engagement was meant to serve the Indian armed forces

alone, hence they were among the larger stakeholders of Aero India. However, now as India aspires to become an arms seller instead of being a mere buyer, it needs to reorient the show in the manner that attracts potential global customers. The old attitude that we have the biggest market so the world would come to us no matter what needs to change.

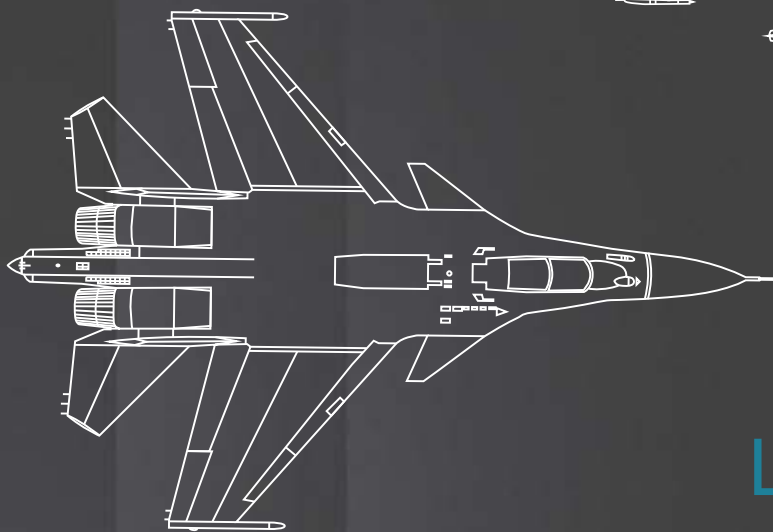
Security: With the airshow venue being a defence establishment, the Indian Air Force (IAF) doubles down on its security during Aero India because it brings foreigners inside the station. The security drill starts right from the perimeter gates. And because this is India, where rules are meant to be adjusted according to the requirements of the powerful, the security drills also become shapeshifting creatures.

For instance, on February 10, when the defence minister, deputy chief minister of Karnataka and the entire ministry of defence had converged at Aero India, the vehicles were allowed inside the peripheral gates without any checking, but were held up before the internal gates leading to the fairgrounds, causing a cascading

3rd generation



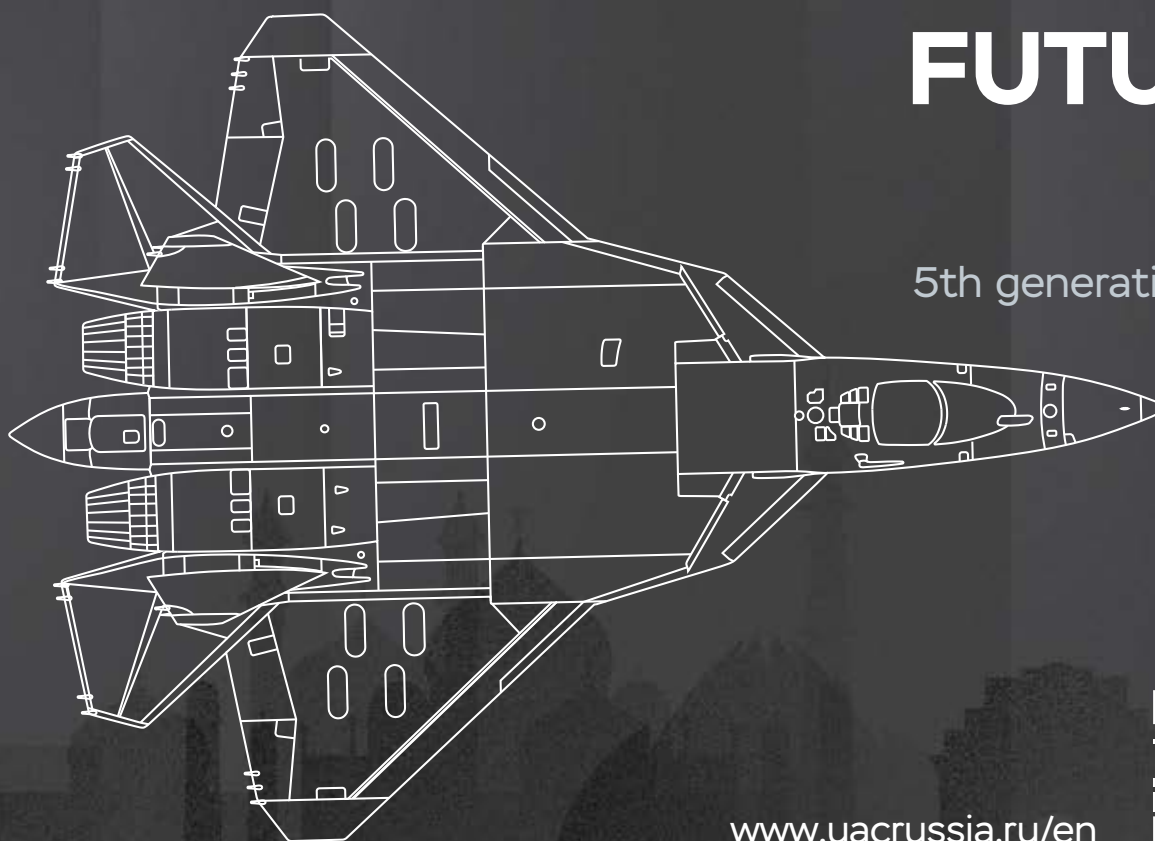
4th generation



LONG HISTORY

WITH A BRIGHT FUTURE

5th generation



EDITOR	Ghazala Wahab
ROVING EDITOR	Pravin Sawhney
SPECIAL PHOTOGRAPHER	Amin War
IT MANAGER & COORDINATOR	Saroja Kumar Sahoo
MANAGER SUBSCRIPTIONS & MARKETING	Sweetly Singh Dhariwal
ASST. MANAGER PRODUCTION	Uday Haldhar
DESIGN CONSULTANT	Black Innovation
PUBLISHER AND PRINTER	Pravin Sawhney

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Contact Ghulam Mohiudeen

Modern Book Depot, SadarBazar, Agra Cantt, Uttar Pradesh
T 0562-2225695

EDITORIAL OFFICE

FORCE

ARROWHEAD MEDIA PVT LTD

E-19, Sector 3, Noida 201 301, Uttar Pradesh, India

T +91.120.4278691 / 92 / 93

F +91.120.4278692

E writeback@forceindia.net

Printed at Design To prints,

D-123 1st floor sector -10

Noida 201301

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RNI No. Deleng/2003/12712

ISSN 0972-9453 Force

hold-up for nearly half a kilometre forcing people to exit their cars and walk. The hold up was so bad that people were still trying to reach the inauguration venue well after the defence minister's speech. Worse, the handheld scanners were not available at all access gates. So, while some frisked the visitors, others did not.

On February 11, the situation changed.

Vehicles were being stopped at the perimeter gate itself. Some were not allowed to enter despite the access sticker on the vehicle because the duty policeman only knew

how to wave the car forward and not read the sticker. Once again there was a hold-up at the gate with arguing drivers and screaming policemen turning the station periphery into a battleground.

Space: This also goes back to the venue. Since the IAF can spare only this much area for the airshow, to accommodate nearly 900 exhibitors, 80 per cent of them Indian, new halls were created in the existing space making the layout extremely cramped. Also, this did not leave any space for building conference halls and briefing rooms. As a result, concurrent events, for instance, CEOs' round table, were held in city hotels. This meant that the big bosses had to first struggle to get inside the show to mark their presence at the inauguration and thereafter struggle to reach Bengaluru to attend the conferences in the early afternoon, curtailing their first day at the show. Given that most CEOs attend the show only on the first or the first two days, this ate into their time at the show. The space crunch also meant that most eating places, the VIP lounges and the food courts, were pitched well away from the main venue, forcing people to walk unnecessary distances in the heat. It's not just an inconvenience, but a waste of time.

Facilities: Toilets, toilets, toilets. And back to the venue. Unlike convention centres, say like Bharat Mandapam in Delhi's Pragati Maidan, air force station has no in-built facilities. And despite the present edition being the 15th air show (30 years, since it's a biennial event), the air force station has not bothered to build any permanent facilities, because, well it is not an exhibition centre. So, everything is temporary and portable. Fair enough.

But the biggest mystery of Aero India is that it has two halls dedicated entirely to made in India high technology, such as un-

manned systems, yet it has been unable to figure out how to build portable toilets in which water runs in the taps and not form puddles on the floor. By noon of the first day of the show, most toilets collapsed in the collective heap of incompetence. The remaining few had long queues outside. One lady exhibitor, while offering me a glass of water declined one proffered to her by the server.

"No, no water for me. Otherwise, I will have to go hunting for a clean toilet." Seriously, finding clean toilets at an international show should be the least of the worries of the exhibitors.



The Last Word

Finally, a word about mismanagement. Despite 30 years of organising defence exhibitions, the ministry of defence has still not got the hang of it. For example, treating all small exhibitors equally may be a fair practice, but it is not a reasonable approach. The media which pays to participate in the show and brings out daily specials needs to be distinguished from other exhibitors, because in a way, they are also service providers. They add to the experience of the show for the exhibitors. Hence, one, they should be allotted stands (for which they pay in any case) in a centralised area which makes it convenient for them to access the whole exhibition; and two, they should be facilitated in bringing in their show dailies every morning, instead of being thwarted, as is happening this time.

Moreover, paying media should be distinguished from those who do not pay. Publications who bypass both rules and dignity need to be called out and penalised. At Aero India 2025, as in the previous editions, a magazine called Chanakya Aerospace and Defence is bringing out show dailies without paying to become a media partner. This is not only unfair towards the paying media partners but also raises questions about MoD's ability to enforce its rules.

Aero India, after all, is not just a meeting place for buyers and sellers. It is an experience for everyone who comes here. About time MoD understands that it's the experience which creates a reputation. So, invest in Aero City, and shift the show there. The airstrip should not be a problem, because as the deputy chief minister D.K. Shivakumar said on February 10, in Bengaluru both the IAF and the civilian population share it as a mark of civil-military fusion. ■

Historic Partnership: BEL IAI Aerosystems Begins Operations to Support India's Defence Forces

Heralding a new chapter in Indo-Israeli defence and security cooperation, BEL IAI Aerosystems (BIA), a landmark joint venture (JV) between Bharat Electronics Limited (BEL) and Israel Aerospace Industries (IAI) announced the commencement of its operations at the BEL stall at Aero India 2025.

The JV is a significant step towards strengthening international collaboration, paving the way for a robust strategic partnership envisaged to provide a single point of contact for extending long-term product support services for India's defence forces.

Incorporated on September 25, 2024, BIA is uniquely positioned as the exclusive support entity for post-warranty maintenance of India's defence systems. This initiative leverages manufacturing capabilities and technological innovations, fostering India's self-reliance in sync with the 'Make in India' vision even while delivering world-class solutions.

Beyond post-warranty maintenance, this collaboration will also lead to the transfer of advanced technological capabilities to India, enabling the development of local expertise in critical defence systems. By establishing a dedicated support infrastructure, the JV will empower India to operate, maintain, and enhance its defence systems independently. The venture's long-term impact extends to creating job opportunities, upskilling the local workforce, and

contributing to the growth of India's defence manufacturing ecosystem.

Boaz Levy, President & CEO of Israel Aerospace Industries, said: "This collaboration is a historic milestone as it marks the first-ever joint company established by leading defence firms of Israel and India. It reflects the robust and flourishing relationship between the two nations, and we are excited about the significant contributions this venture will bring to India's defence capabilities."

Manoj Jain, CMD, BEL, said: "The launch of BEL IAI Aerosystems ushers in a paradigm shift in providing seamless product and life cycle support for MRSAM/LRSAM systems supplied to the tri-services. The JVC reflects the strategic partnership between India and Israel and the commitment of BEL and IAI to jointly provide state-of-the-art weapon systems and life cycle support for the Indian defence forces."

Oded Jacobowitz, VP & General Manager, Air & Missile Défense Systems at IAI, said: "This joint venture is a testament to the deep partnership between IAI and BEL. By combining IAI's cutting-edge technology with BEL's extended expertise, we are laying the foundation for long-term success and a stronger, self-reliant defence ecosystem in India." ||

Defence Minister Lauds Aero A2Z for Introducing 'Make in India' Radar Systems



Aero A2Z Services Private Limited, an Indian aerospace and defence company, introduced a range of tactical and medium range innovative and battle proven radar systems at Aero India 2025. These software-based radars are battle proven. They are developed in collaboration with DRS Rada Technologies, a world leader in radar technologies.

Amidst the fast changing landscape of modern warfare and advanced security threats, Aero A2Z's offerings aim to elevate the level of the Indian defence industry by aligning

to the 'Make in India' initiative. Furthermore, these have a special focus on identifying two key differentiators -- technological leadership and combat proven prowess. The new age products by Aero A2Z are tested in real world scenarios and equipped with software defined architecture with AI-driven solutions which are ready to be adapted to meet all the requirements of the Indian armed forces.

The defence minister Rajnath Singh complimented the Aero A2Z team led by Vikas Batra, director, Aero A2Z and Alon Amitay, VP, business development, DRS Rada technologies for upholding the 'Make in India' vision through the strategic business collaboration.

The radar applications introduced include very short to medium range detect and track systems, counter-unmanned aerial systems (C-UAS), fire control (FC) systems, counter rocket, artillery and mortar (C-RAM), including automatic sense and warn (AS&W), active protection systems (APS) and force protection.

Batra, while sharing his vision, said, "Bringing in the best of global expertise from giants like DRS Rada who have established their efficacy in Israel and US markets, Aero A2Z is committed to local manufacturing of advanced solution that address modern warfare and new age security threats. Over the past four years, we have a robust supply chain and are now setting up a state-of-the-art facility near Gurugram that will be operational within the next few months and will cater to the burgeoning demand for our services." ||



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Thales and BDL Agree on Initial Supply of Man Portable Air Defence Systems to India



Thales and Bharat Dynamics Limited (BDL) signed an initial supply of Laser Beam Riding Man Portable Air Defence systems (LBRM) in response to a requirement made by the Indian government to support India's air defence capabilities.

This initial supply of High Velocity Missiles (STARStreak) and launchers will be delivered in 2025 and represents the first time that India has received this latest very short range air defence (VSHORAD) capability. This step confirms the foundation of a long-term collaboration and manufacturing partnership between Thales and BDL. In the spirit of the 'Make in India' initiative, this partnership will serve the current and future requirements of the Indian ministry of defence.

Thales, together with BDL, is committed to the transfer of technology (ToT) of battle proven capabilities to India to equip the Indian Armed Forces.

This agreement will improve India's air defence capabilities to enable them to enhance their national security with a highly accurate and countermeasure-resistant up-to-date technology. LBRM, manufactured up to 60% in India, are short-range, man-portable, air-defence systems and optimised to provide defence against air threats.

This contract represents the first major agreement since the establishment of the United Kingdom's Defence Partnership-India, a bespoke programme office, breaking down barriers to trade and offering government-to-government contracting, where appropriate, further solidifying the defence and security relationship between the two nations. This contract also reflects Thales' long-term partnership of 70+ years with India, serving as a testimony to its continued growth.

A production partnership with India will also increase UK production at the Thales Belfast site, where LBRM is designed.

Lord Vernon Coaker, minister of state for defence, said: "This exciting collaboration is just one of the ways that we are growing our defence relationship and partnership with India. While supporting India's air defence capability and global security, this agreement also demonstrates defence as an engine for growth and delivers on the government's Plan for Change."

Pascale Sourisse, President & CEO, Thales International, said, "This is a momentous occasion for all the stakeholders involved in the development of LBRM Air Defence solutions. It signifies the beginning of an exciting chapter in our collaboration with BDL, contributing to the Aatmanirbhar Bharat vision."

Cmde A Madhavarao (retd), chairman and managing director, Bharat Dynamics Limited, echoed the same sentiment, "We are pleased to take our collaboration with Thales to this next significant step, enhancing our contribution to the defence ecosystem and our ability to support existing and future LBRM Air Defence customers."

Thales is a world leader in the provision of Air Defence solutions and in particular of complex weapon systems and has been a trusted partner of forces for more than 60 years.

Present in India since 1953, Thales has been playing an essential role in India's growth story by sharing its technologies and expertise in defence, aerospace and cyber and digital markets.

BDL has been in the forefront of defence technology to manufacture state-of-the-art, cost-effective missile systems, underwater weapons and allied defence equipment to the Indian armed forces. ■

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Pride of India

HAL's LUH to take centre stage, CATS Warrior star of India pavilion



HAL WILL SHOWCASE ITS indigenous products and technologies centred on the theme 'Innovate. Collaborate. Lead' at Aero India 2025 at air force station Yelahanka.

"HAL's indigenously designed and developed Light Utility Helicopter (LUH) will be at the centre stage. Various innovative products conceived and developed by HAL R&D divisions in the area of avionics, mechanical systems, engines and aerospace for manned and unmanned aircraft will also be the highlight at HAL stall", says CMD, HAL, Dr D.K. Sunil.

HAL's major attraction at its indoor pavilion (HALL-E) will be the LUH, Hindustan Turbo Trainer (HTT)-40 Simulator, scaled models of LCA Mk1A fighter, LCA Mk1 Trainer, Hindustan Jet Trainer (HJT)-36, HTT-40, LCH and ALH Mk IV. The scaled models of Hindustan 228 and its amphibian variant will also be displayed in this area.

The outdoor display adjacent to HAL stall will feature LCA Mk 1A and HJT 36, HTT-40, LCA Mk 1 Trainer, Hindustan 228, Do-228 and LUH will be on static display.

The flying display will witness unique LCA Mk 1A formation, HJT 36, HTT-40 and LUH.

The central theme of the India Pavilion is Flight of Self Reliance. A functional full-scale engineering demonstrator of Combat Air Teaming System (CATS) Warrior will be the highlight of the India Pavilion along



with Advanced Light Helicopter Next Generation (ALH NG) and RUAV. ALH NG will be placed in front of the India Pavilion to signify HAL's entry into civil aviation. For the first time, a 1:1 model of Advanced Medium Combat Aircraft (AMCA) will also be placed at the Pavilion. There will also be sections for new technologies and future marquee products.

HAL's indoor pavilion will showcase state-of-the-art avionics systems like mission management system, digital map generator, data lite-communication system, IFF & CIT, indigenous communication complex with audio management system, audio warning system, SCDLU, radio control panels etc. Also, the advanced flight control

actuators and electro-mechanical systems like active side stick control will also be displayed.

Static models of actual HTSE-1200 and GTEG-60 engines will be showcased displaying their technological challenges and innovation. An exclusive aerospace corner with scaled models of cryogenic engine CE-20, GSLV Mk III and Chandrayaan-3 will showcase HAL's capabilities and role in the aerospace industry.

HAL will promote indigenously-built platforms to visiting defence delegations and hold business meetings with OEMs and customers besides signing agreements and contracts with its business partners for various projects. ||



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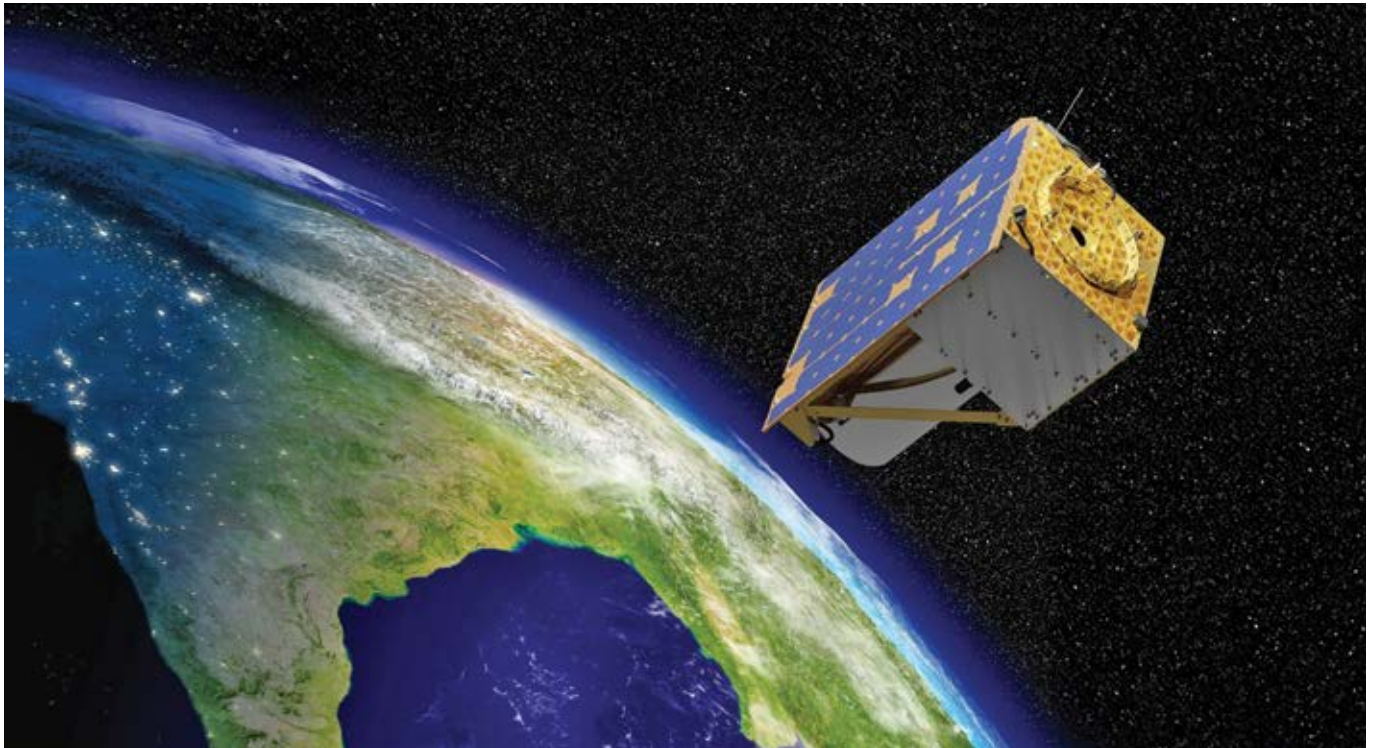
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Space No Barrier

Thales Alenia Space and NIBE sign a satellite supply contract for NIBE's Earth observation constellation project



THALES ALENIA SPACE, THE JOINT venture between Thales (67 per cent) and Leonardo (33 per cent), has signed a contract with NIBE Space (a subsidiary of NIBE Limited) concerning the supply of a high-resolution optical satellite, marking the first step in NIBE's Earth Observation constellation project. This initial contract aims to establish the first operational Earth observation's capabilities for

NIBE in India by 2025.

This achievement reinforces the partnership initiated in 2024 between Thales Alenia Space and NIBE, for the deployment of India's first private Earth Observation constellation.

The contract was signed on February 6 in Pune during a ceremony in the presence of chief minister of Maharashtra Devendra Fadnavis. Black-Sky also signed a service agreement

for subscription-based imagery and analytics to deliver space-based monitoring services supporting NIBE's various Indian customers.

"I am extremely pleased that Thales Alenia Space will contribute to developing sovereign Earth Observation capabilities in India," said CEO of Thales Alenia Space, Hervé Derrey. "Supporting the deployment of India's first private Earth observation constellation means a lot to our company as this is Thales Alenia Space's first cooperation on an Indian space programme. I would like to thank NIBE for putting its trust in our company. We look forward to making available our long-standing expertise and industrial capabilities in optical and radar sensors and start a promising Space cooperation with India."

"We are proud to see our partnership with Thales Alenia Space take another concrete step forward with the signing of the contract for a high-resolution optical satellite. This is part of our larger national endeavour, aligned with the *Aatmanirbhar* Bharat vision, to bolster India's position as a leader in space technology and applications," said chairman & managing director of NIBE Limited, Ganesh Nibe. "With Thales Alenia Space's vast global expertise and experience, we look forward to taking India's space capabilities to newer heights." ||

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EMPOWERING THE NATION'S DEFENCE FORCES



In National Interest

Critical to maintain the momentum to sustain the military industrial ecosystem

The rapidly evolving global politico-strategic environment and the manner in which security challenges are now crystallising before our nation necessitated urgent transformational reforms in our defence industrial edifice. The ministry of defence (MoD) public policy documents has only of late started referring to the concept of defence industrial ecosystem (DIE).

The chapter on 'Revitalising Defence Industrial Ecosystem through Strategic Partnerships' in defence production policy 2016 was the first ever official reference of the DIE and it laid the onus of building an extensive DIE on 'strategic partners' in the private sector without defining the contours or metrics of the DIE. The defence production policy 2018 also aimed at creating a tiered defence industrial ecosystem and the innovation for defence excellence (iDex) scheme launched by the MoD in April 2018 as well as the setting up of defence innovation hubs nationwide were efforts towards this end. However, nowhere has the ecosystem been defined.

What is an Ecosystem?

Biologically, an ecosystem is a geographic area where plants, animals and other organisms, along with weather and landscape, work together to form a self-sustaining whole. An effective DIE similarly has different entities which come together in meaningful ways to solve shared challenges and meet common objectives. It enables a cumulative network effect for participants and creates greater value than the sum of the parts, driving higher performance and exponential results, through collaboration and co-evolving, leveraging everyone's collective wisdom.

Such an ecosystem would be driven by a convener, who would have the ability to influence all the participants and create a facilitating environment, within which all can flourish. The ecosystem's composition and the interactive processes within it are influenced by various internal and external factors and connections, which are constantly evolving and drive significant momentum for innovation and reform. At its core, the DIE encompasses a range of stakeholders, including governmental, commercial, fi-



nancial, legal, cultural, ethical, scientific and technological entities.

On a global scale, the ecosystem is intertwined with processes of globalization and internationalization, as investment decisions and collaborations span beyond national borders. Regionally, the DIE is shaped by shifts in geopolitical dynamics, strategic partnerships and security concerns, which inform policy development. Nationally, discourse between government and society revolves around critical public issues such as budget allocations and national security. Moreover, sovereignty and autonomy are closely tied to the structure and operations of the defence industry base (DIB) within the broader national industrial landscape. Locally, the relationship between society and the defence industry manifests through workforce provision and employment generation.

The government plays multifaceted roles within the ecosystem as an end-user, regulator, sponsor, developer and facilitator. Meanwhile, industry participants, organized in a hierarchical

structure, include 'primes' or system integrators, SMEs operating under framework agreements and educational institutions such as universities and colleges, which contribute human resources, knowledge, skills and research expertise. Research councils collaborate with universities for funded research, supported financially by both government and industry. Additionally, industry organizations and associations offer consultancy and support to manufacturers.

Indian Defence Industrial Ecosystem

The need to clearly define and establish a defence ecosystem with a clear holistic strategy, a well-defined roadmap, clear-cut responsibility and accountability, is thus the need of the hour. The government has drawn various action plans to strengthen the country's defence ecosystem. Indian industry, both public and private, is encouraged to participate in design, development and manufacture of defence systems under 'Make Procedure' prescribed in Defence

Acquisition Policy-2020 and simplified, wherein provisions to provide financial assistance for prototype development are also incorporated. Over 104 projects have been approved with sanction for 36 projects issued. 18 major platforms have been identified for design and development under various routes and five positive lists of replacement units, subsystems and components which are not allowed to be imported anymore but are to be indigenised. To enable this a portal called sirjandefence.gov in has been created to enable DPSUs/ Services interface with industry and 5,582 items indigenised for INR 3931 crores.

A green channel policy for procurement of defence stores and spares has been launched for awarding green channel status to firms having pre-defined financial and quality credentials. Grant of green channel certificate provides waiver of pre-dispatch inspection and acceptance of stores under supplier's guarantee/ warranty against the contracts concluded by various procurement agencies under ministry of defence. Exports have risen from INR 1,522 crores to over INR 21,083 crores in 2023-2024, with the

private sector contributing up to 60 per cent. Two Defence Industrial Corridors (DICs)—Uttar Pradesh Defence Industrial Corridor (UPDIC) and Tamil Nadu Defence Industrial Corridor (TNDIC)—have been set up aimed at attracting investment for defence industries, developing the domestic supply chain and strengthening the defence manufacturing ecosystem in the country.

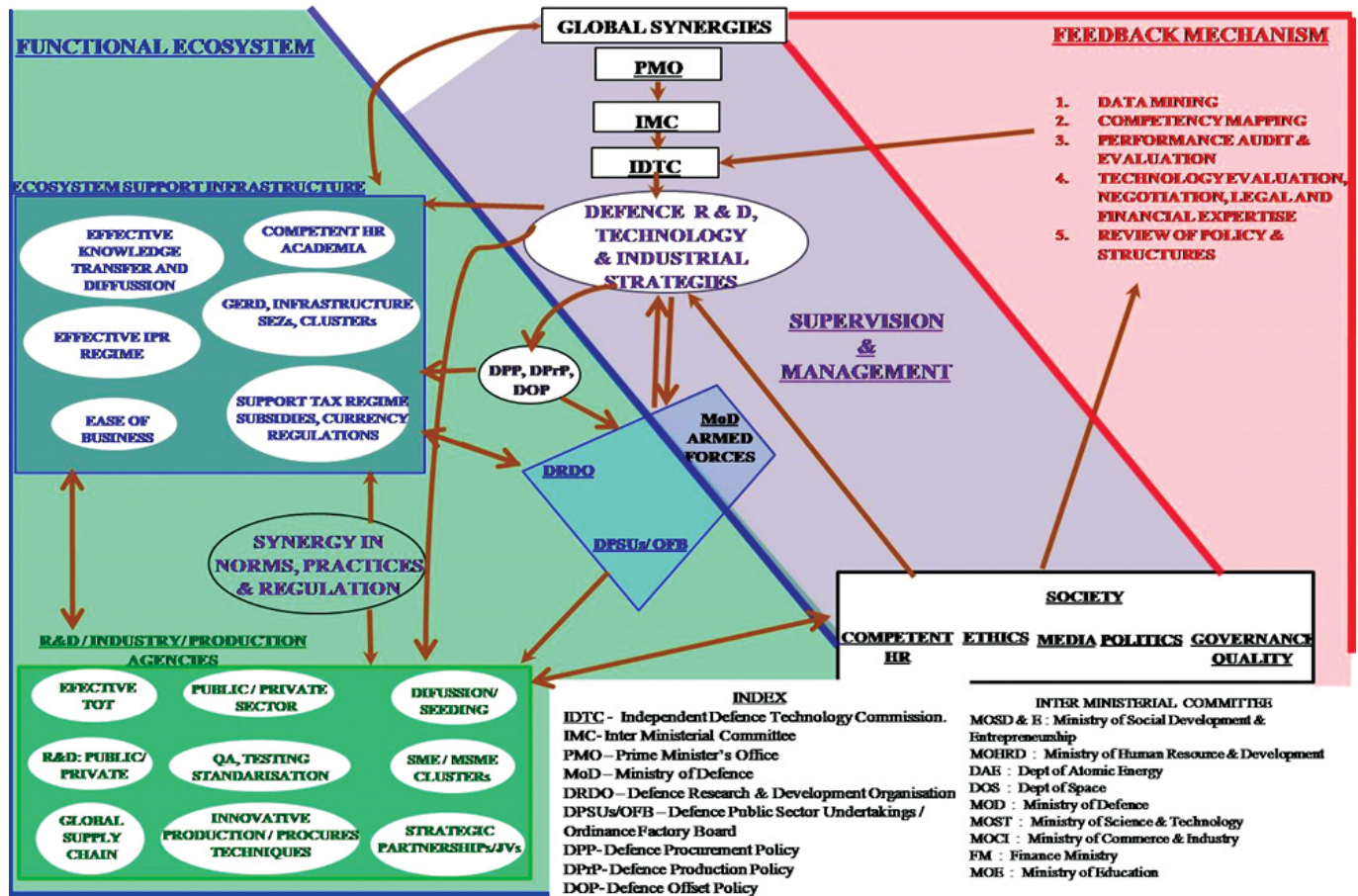
Defence testing infrastructure scheme has been launched to boost domestic defence and aerospace manufacturing with the primary aim to set up green-field defence testing infrastructure as a common test facility for government assistance to promote indigenous defence production with special focus on participation of micro, small and medium enterprises (MSMEs) and start-ups by bridging gaps in defence testing infrastructure in the country.

iDEX has been launched to bring start-ups and MSMEs to innovate, develop technologies and solve problems related to defence and aerospace, aimed at creation of an ecosystem to foster innovation and technology development in defence and aerospace, research and development (R&D) insti-

tutes and academia and provide them grants/ funding and other support to carry out R&D which has potential for future adoption for Indian defence and aerospace needs. DSPUs are having tie-ups with various centres of excellence/ academic institutes like Indian Institutes of Technology (IITs), Indian Institute of Science (IISc), Indian Institutes of Management (IIMs) etc. for various developmental projects.

The Defence Research and Development Organisation (DRDO) has laid down a procedure by which its developed technologies are transferred to industries by entering into Licensing Agreement for Transfer of Technology (LAToT). DRDO has evolved a new ToT policy and procedures with zero ToT fee for its industry partners, development cum production partners (DcPP)/ development partner (DP) and zero royalty for supply to Indian armed forces and government departments. Test facilities have now been opened for industries in DRDO labs. DRDO has launched the technology development fund (TDF) which provides financial support to Indian industries for the design development of innovative defence products.

CONCEPTUAL MODEL: INDIA DEFENCE ECOSYSTEM



Over 27 projects have been sanctioned with over 63 additional projects under processing. In June 2023, DRDO released 75 priority technology areas/products/systems to encourage Defence R&D in industry, that DRDO will not do.

Youth are connected as start-ups under IDEX scheme in innovation, technology development and problem solving related to defence and aerospace. Young engineers are involved through tie-ups of defence PSUs with the centres of excellence/ academic institutes for various projects that include R&D and manufacturing. DRDO has established 15 DRDO industry academia-centres of excellence (DIA-CoEs) at various IITs, IISc, central and state universities in 65 research verticals, of which six have been operationalised in 2023. DRDO industry-academia tie-ups have resulted in 867 research projects for INR 1,183.19 crores where 1,205 scholars with 1,104 faculties in 361 institutions are engaged. MoD has engaged with the ministry of education to run a collaborative programme for training of 500 PhD scholars annually. Further, the IDEX-DIO initiative has resulted in over 329 startups and MSMEs being engaged, with over 147 projects being sanctioned.

The Way Forward

Though various initiatives are underway towards the creation of a robust defence industrial ecosystem in India, there is a need to define a structure and uniform understanding within all key players about the role they play and chart out a coordinated path. Further a joint approach has to be undertaken by co-opting all security related ecosystems including space, cyber, nuclear, digital, etc. due to their inter-connections. A conceptual model which was suggested by the author in an earlier paper, can be used as the start point from which suitable options can be generated.

An independent Security Technology Commission: An over-arching strategy ratified at the highest level should be evolved by a Security Technology Commission (also referred to as IDTC in the diagram), which should report to the Prime Minister's Office (PMO) and will evolve the national R&D strategy, national science and technology security strategy and national defence industrial strategy covering all security sectors including defence, nuclear, space, cyber and information and communication technology (ICT) so as to ensure that all parts of the security ecosystem are synergised and supported simultaneously.

An Inter-Ministerial Committee (IMC): In view of the complex inter-ministerial linkages that have to be synergised for nurturing a defence and security ecosystem, an inter-ministerial committee (IMC) should be established to support the STC to facilitate coordination in implementation of its relevant policies and programs, once approved at the highest level.

Security Technology and Industrial Strategies: The formulation of these strategies is essential to guide security related technology acquisition and development in the country consistent with the national security needs for the longer term. The aim being to strengthen the DIB so that we build the capability not only to manufacture, but also develop improved and innovative technologies and systems ourselves.

Supporting Policies and Infrastructure: In order to implement the security technology and industrial strategy, transparent and fair procedures, ease of doing business, availability of capital, strengthening of broader R&D infrastructure and strengthening and empowering human resource are essential requirements. A single window concept for meeting regulatory provisions would greatly facilitate the ease of business for defence production. Strengthening elements of the technical higher education enterprise could help both by advancing scientific and technical knowledge that will support the DIB, as well as training technically skilled manpower. Given that this will require inputs, efforts and resources from many ministries, the STC will need to coordinate and ensure synergised action.

Systematic Collection of Data: Systematic and comprehensive data collection on the defence and security industrial base is essential to enable audit and mid-course correction, and attribute accountability. Similarly, data banks on global technology trends, global defence offset deals, etc. must be maintained. The format adopted by the US Bureau of Industry and Security may be a good model to learn and adapt from and the MoD needs to create a separate structure for this purpose with robust IT support.

Evaluation/ Audit Structures: The STC will require all elements which are a part to the ecosystem to be agile, flexible and open to transformational change. For this, robust evaluation and audit structures to enable detailed competency mapping, evaluating structures and procedures for reviewing organisations

and policy, and carrying out periodic performance audits will be needed. Such evaluation and audit need to be carried out by personnel who have the appropriate expertise in these areas.

Need for a SMART Manufacturing Ecosystem: While the process of building a robust defence and security ecosystem in India is underway, globally such ecosystems are evolving rapidly with advancements in technology. The development of SMART ecosystems leveraging machine learning, internet of things, data analytic tools and artificial intelligence is a phenomenon that is increasingly visible. Volkswagen Industrial Cloud established an open platform along with Amazon Web Services in 2019, which combines data from all machines, plants and systems across all 122 facilities of the group. The long-term goal is to connect 30,000 locations with over 1500 suppliers and partners globally. Similarly, the Fortive Corporation in the US created a programme called FORT with Carnegie Mellon University in 2019, to help fortify the talent pipeline. Such SMART ecosystems reach out by building enterprise architecture and curating connections strategically, helping participants to create more relationships. This increases the pace of delivery, increases revenues and reduces costs through greater efficiency. Matured SMART ecosystems typically connect everyone, enable holistic decision making, accelerate time to value and are agile.

Conclusion

While laudable efforts are underway to develop a robust defence industrial ecosystem, all sectors relating to the nation's security need to be considered co-jointly. There is a need to develop of a clear vision for the DIB, in the context of our national security needs. A clear definition of the defence industrial ecosystem and its structure needs to be promulgated. There should be concomitant focus and clarity in high-level policy. An independent knowledgeable and committed body that develops, oversees and monitors the defence industrial ecosystem enabling connectivity between all participants should be created. Relevant structures to support this process must be reorganized, eventually, leading to a SMART ecosystem and ensuring that the defence offset process and other policy tools available to the government are linked to, and help nurture, the broader defence industrial and innovation ecosystem. ||

Bestseller

DRAGON ON OUR DOORSTEP

Managing China through Military Power

A unique approach to peace to meet the challenge of a rising and belligerent China by
FORCE editors, Pravin Sawhney and Ghazala Wahab



DRAGON ON OUR DOORSTEP

MANAGING
CHINA
THROUGH
MILITARY
POWER

PRAVIN SAWHNEY
& GHAZALA WAHAB

'Partnership is Boeing's Key to Success, and We Believe it Makes More Sense to Partner with MROs That Are Already Established and Have Great Capabilities'

— Vice President, India Business Development, Boeing Defense, Space & Security, and Global Services, Alain Garcia

Boeing has been a major partner of India's aerospace sector for almost eight decades as the mainstay of the country's armed forces. Can you highlight Boeing's presence in the defence sector in India?

Boeing's commitment to India is deep and far-reaching, far ahead of any foreign OEM in the defence and aerospace sector. Our vision has always been to bring the best of Boeing to India and take the best of India to the world. Boeing has always been committed to supporting the considerable growth potential in India's aerospace and defence sector including for aircraft, infrastructure expansion, and services.

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. We are also seeing growth in our services business and, with it, growth in the value Boeing creates through product lifecycle support and training. Our team is working with the Indian Air Force and the Indian Navy to provide operational capability and readiness for the P-8Is, C-17s, Apaches, Chinooks and Head of State aircraft through sustenance contracts. Boeing Defence India (BDI), our local establishment in India, is leading our investments in services infrastructure, building of local capabilities, workforce training and partnerships right here in India that are aimed at ensuring the Indian armed forces are always mission-ready, and operate their assets at peak condition.

In 2021, we launched the Boeing India Repair Development and Sustainment (BIRDS) Hub. It 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 economic value, all available in-country. Partnership is Boeing's key to success, and we believe it makes more sense to



partner with local maintenance, repair, and overhaul (MROs) that are already established and have great capabilities. Through such partnerships, Boeing is working with customers and local industry to develop MRO facilities in the region, to support India's aspiration to become an MRO hub for the region.

Our focus on transparency, innovation, and localised solutions has built enduring relationships with customers, suppliers, and policymakers. Boeing's infrastructure, skill development and research investments have further reinforced our reputation as a reliable partner contributing to India's aviation growth and defence modernisation.

What is the response from India's armed forces to Boeing's defence platforms?

Indian defence customers continue to show confidence in Boeing's platforms, including the P-8I, AH-64 Apache, CH-47 Chinook, and C-17 Globemaster III, which are critical to their mission capability and success. These assets deliver exceptional performance, versatility, and reliability across diverse operational scenarios. Boeing's localised support, train-

ing programmes, and performance-based logistics solutions further ensure fleet readiness and mission availability. Additionally, Boeing's commitment to India's self-reliance goals, through partnerships with local industry and investments in indigenous capabilities, has reinforced its alignment with the modernisation needs of India's armed forces. This trust reflects the value Boeing delivers to its defence customers.

How does Boeing's supplier ecosystem contribute to India's defence sector?

Boeing has significantly scaled its supplier network in India, growing from USD250 million in sourcing nearly a decade ago to USD1.25 billion annually. Our network of over 300 suppliers includes MSMEs, that have scaled up over time to successfully deliver more and more complex assemblies and components. By fostering local expertise and investing in cutting-edge technologies like full-size determinant assembly and robotics, we are leveraging Indian suppliers to support global aerospace and defence requirements. This growth underscores the 'Make in India for the World' philosophy and reinforces our



long-standing partnership with India's aerospace ecosystem.

By investing in next-generation technologies like full-size determinant assembly and robotics, Boeing is helping Indian suppliers scale up and compete on a global level. This commitment to 'Make in India for the World' underscores Boeing's long-term vision of integrating India into the global aerospace supply chain.

What makes the P-8I platform a strategic asset for the Indian Navy?

The Indian variant of the P-8, known as the P-8I, is designed for long-range anti-submarine warfare (ASW), anti-surface warfare (ASuW), and intelligence, surveillance, and reconnaissance (ISR) missions. With a fleet of 12 P-8Is, the Indian Navy is significantly enhancing its ability to secure and protect its vast coastline while playing a larger role in regional maritime security. This patrol aircraft, a critical asset in the navy's fleet, has logged over 40,000 flight hours since its induction. The P-8I's ISR capabilities have also proven invaluable during disaster relief and humanitarian missions. Overall, the P-8I has provided the Indian Navy with a decisive edge in the strategically vital Indian Ocean region. With a range of over 1,200 nautical miles, the P-8I enables the Navy to conduct extensive maritime surveillance, covering areas from the East coast of Africa to the busy trade routes of the Malacca Strait.

How are the Chinook helicopters contributing to India's strategic airlift and defence modernization?

The induction of the Chinook helicopters into the Indian armed forces is a crucial step in the modernisation of India's defence capabilities. These advanced helicopters offer significant improvements in operational flexibility, especially for rapid troop movements and logistical support in remote and mountainous terrains. With a higher lift capacity, the Chinook can transport heavy and oversized loads, including artillery, ammunition, and other equipment, which is vital for supporting military operations in challenging environments.

The Chinooks with the Indian armed forces are equipped with advanced avionics, a digital cockpit, and improved communication and navigation systems, all of which enhance operational efficiency and situational awareness. The tandem rotor design ensures better stability, allowing for the transportation of heavier loads with precision. Additionally, these helicopters are capable of performing a wide range of missions, from troop deployment to humanitarian aid and disaster relief operations. The Chinook's versatility, along with its ability to operate in various conditions, significantly enhances India's airlift capabilities and strengthens the overall modernization efforts of the Indian armed forces.

How does Boeing's sustainment and training ecosystem enhance India's defence capabilities?

Boeing's sustainment and training initiatives in India are designed to ensure long-term operational efficiency, self-reliance, and fleet readiness across key defence platforms. The Boeing India Repair Development and Sustainment (BIRDS) programme plays a pivotal role in localizing sustainment solutions, strengthening India's defence industrial base by fostering partnerships with MSMEs, and developing a highly skilled workforce aligned with global aerospace standards.

A key milestone in Boeing's training initiatives is the Ashok Roy Training Simulator Complex at INS Rajali, a state-of-the-art facility that enhances pilot and crew training for the Indian Navy. By reducing dependency on live aircraft, it optimizes operational preparedness, minimizes costs, and enhances mission efficiency.

Further strengthening India's MRO ecosystem, Boeing collaborates with key industry partners such as AIESL, Air Works, and Horizon Aerospace. The successful execution of India's first in-country P-8I landing gear overhaul and Phase 32 maintenance checks on multiple aircraft highlights Boeing's commitment to bolstering in-country sustainment capabilities, ensuring higher mission availability, and enhancing India's self-sufficiency in defence logistics and lifecycle management. ||

Bursting at Seams

HAL has plenty of orders in hand, the challenge is delivering them on time



LCA Tejas is one of HAL's successful programme with orders in hand for 123 aircraft and an AON for 97 more

A FORCE REPORT

HINDUSTAN AERONAUTICS LIMITED (HAL) is leading the government's charge for *Aatmanirbharta* (self-reliance) in the aerospace and defence sector. The state-owned airframer is now contracted to deliver indigenous fighter jets, trainers and helicopters to the Indian armed forces. It is a far cry from the days when HAL was considered a 'problem child' to now being a vital cog in the modernisation of the Indian armed forces.

Few would quibble with the fact that HAL will play a key role in the modernisation of the armed forces but some may question if enough has been done to transform the state-owned enterprise into a more efficient and competitive aerospace firm capable of competing with the best in the world. This is certainly the best time for the airframer to shake off the vestiges of the past, as it has a strong orderbook in excess of INR 81,000 crore (as on 31 March 2023).

Delivering Tejas

In February 2021, the Ministry of Defence (MoD) awarded a contract worth nearly INR 48,000 crore for 83 Tejas Mk-1A fighter jets. The order for 73 Tejas Mk-1As and 10 LCA Tejas Mk-1 trainers is worth INR 45,696 crores along with INR 1,202 crores allocated for design and development and infrastructure sanctions. In November 2023, the MoD accorded its approval for the acceptance of necessity (AoN) for procure-

ment of 97 additional Tejas Mk-1As.

At the time of the February 2021 contract, it was announced that deliveries of all 83 aircraft would be completed by February 2029. HAL has a total of three production lines for the Tejas Mk-1A, two in Bengaluru and one in Nashik. Deliveries of the first three Tejas Mk-1As (one fighter and two trainers) are to take place by March this year with a production rate of 16 aircraft planned annually from 2025-2029.

But the fact of the matter is that in FY2022-23, HAL produced only 22 new aircraft and helicopters, covering LCA Tejas, Dornier Do-228, ALH Dhruv, Light Combat Helicopter (LCH) and Light Utility Helicopter (LUH).

This will be a real challenge for HAL, as the Tejas Mk-1A is far removed from the fighter aircraft it has built under license such as the SU-30 MKI, Jaguar,

Hawk, etc. Unlike these aircraft, the Tejas Mk-1A features heavy use of composites, is fitted with sophisticated avionics and sensors, and has an in-flight refuelling system. The in-service reputation of the Tejas Mk-1A will stem from the quality of aircraft produced by HAL at its factories. HAL and its supply chain will also have to meet stringent requirements for indigenous content on the Tejas Mk-1A, beginning with 50 per cent and progressively growing to reach 60 per cent by the end of the programme. This means that by 2029, approximately 250 out of the 344 systems fitted in the aircraft will be indigenous.

Challenging as these requirements are, unlike at any other time in the past, HAL today has long-term visibility for the production of an indigenous fighter, with government approval for the procurement of a total of 180 Tejas Mk-1A aircraft.

Trainer Revamp

In October 2022, HAL bagged the contract for 70 HTT-40 Basic Trainer Aircraft (BTA) valued at around INR 7,000 crores. The entire order is to be concluded by 2028 with HAL slated to deliver the first aircraft by September 2025. HAL plans to attain a peak production rate of 20 aircraft per annum. HAL chairman, C.B. Ananthkrishnan stated in May 2023 that the company would initially target deliveries of 12 aircraft per year, and then move on to 16 and finally 20 aircraft per year.

While initial aircraft production as well as further development activi-



Indian Multi Role Helicopter



ABOVE LEFT & RIGHT ALH Dhruv and Light Combat Helicopter

ties will be carried out in Bengaluru, the bulk production will be done from HAL's Nashik plant. The Defence Acquisition Council (DAC) has approved the procurement of 106 aircraft, so HAL is expected to receive orders for an additional 36 HTT-40s once deliveries of the first order are underway.

While HAL does have substantial experience in designing, developing and delivering trainer aircraft to the Indian Air Force (IAF), including the HT-2 and HPT-32, the fully aerobatic tandem seat HTT-40 is a far cry from these aircraft, featuring an air-conditioned cockpit, modern avionics, hot re-fuelling (the ability to refuel the aircraft while the engine is running), running change over (change of aircrew while the engine is running) and zero-zero ejection seats. The HTT-40 is crucial to the IAF, as it has only a 75-aircraft fleet of Swiss-built Pilatus PC-7 MKII basic trainers and needs additional aircraft urgently, which will be used for basic flight training, aerobatics, instrument flying and close formation flights with secondary roles such as navigation and night flying training.

Rotary Wing Renaissance

HAL now has a well-established military helicopter in the Dhruv, two new models in the LCH and LUH, and a new design and development underway in the Indian Multi-Role Helicopter (IMRH). At present, HAL's helicopter portfolio encompasses the three-tonne LCH, five-tonne ALH and LCH, and the IMRH will be a giant leap forward to the 13-tonne category. The naval variant of IMRH has been named as the Deck Based Multi Role Helicopter (DBMRH). The preliminary design activities are

underway, with HAL having completed Phase 1 of Wind Tunnel testing of the IMRH and Phase 2 of Wind Tunnel testing is underway.

The Dhruv ALH is expected to eventually reach the 500-helicopter order mark, while the LCH is already planned to have a production run for 170 plus helicopters. The LUH requirement is 175 helicopters, but this could easily be doubled over the course of its production run.

HAL has successfully completed the production of the first 15 LCHs (10 IAF and 5 Indian Army), which were ordered for the army and air force at a cost of INR 3,887 crores, ahead of contract schedule. The first 15 LCHs featured an indigenous content level of 45 per cent which is due to increase to 55 per cent for Series Production (SP) helicopters. HAL is now expecting a formal contract for 156 LCH for the air force and army. At a planned production rate of 30 LCHs per month, HAL would have delivered all helicopters on contract by the end of this decade.

But will this really happen? The LCH is an attack helicopter, and its production will be a real test for HAL. Producing an indigenous attack helicopter in quantity and of the required quality is something that has been achieved only by a handful of nations. As such, HAL will need to carefully manage demands for a high production rate while ensuring the helicopters built are to the specification and performance demanded by the user.

HAL is now also nearing a production order for the LUH, ending the long wait of the Indian Armed Forces for a replacement for their long-in-the-tooth Chetak and Cheetah light helicopters.

At present, HAL has a letter of intent (LOI) for 12 LUHs, with the first LUH Mk-1 built in July 2022. HAL obtained initial operational clearance (IOC) for LUH IAF version in February 2020 and for the army version, a year later in February 2021. HAL has been working on the integration of the indigenous Automatic Flight Control System (AFCS) for the LUH which was to have been completed by December 2023.

Over the next 20 years, HAL plans to produce more than 1,000 helicopters in the range of 3-15 tonnes, with a total business of over INR four lakh crores. It would not be out of place to state, that by that time the Indian Armed Forces would largely have overcome their dependency on the import of military helicopters. HAL's Greenfield Helicopter Factory, which is spread across 615 acres of land, will play a key role, as initially it is forecast to produce around 30 helicopters per year. This could later be enhanced to 60 and then 90 per year in a phased manner.

Opportunity in the Making

India's indigenous military aviation programmes have had a long and torturous history. The traditional failings of insufficient funding, low order volumes and lack of access to high technology have largely been remedied. This is possibly the most opportune moment in HAL's history, for it to emerge as an aerospace firm of international repute and not a company relegated to license-manufacture of military aircraft. By the end of this decade, we will have the answer to whether HAL was able to make the most of this opportunity, or if it let it slip. ||



The SAMYUKTA Jammer passing through Rajpath on the Republic Day Parade

Plug the Gaps

Significant vulnerabilities in India's electronic warfare capabilities

A FORCE REPORT

ELECTRONIC WARFARE (EW) IS an essential part of warfighting. Cognisant of this, India has been making efforts to plug its gaps in advanced EW systems. Electronic warfare uses the electromagnetic spectrum to intercept, jam, or disrupt enemy communications, radar systems and other electronic systems while protecting one's own. It is divided into three main components: electronic attack (EA), which disrupts enemy operations through jamming and deception; electronic protection (EP), which protects friendly systems from enemy EW activities; and electronic support (ES), which involves gathering intelligence through electronic means. While these components are fundamental to modern warfare, India's application and integration of these systems reveal both strengths and significant weaknesses.

The Defence Research and Development Organisation (DRDO) has recently developed two EW systems: Samyuk-

ta and Divya Drishti. Samyukta is a versatile EW system designed to operate in various terrains. It provides electronic intelligence (ELINT) and electronic countermeasures (ECM) capable of intercepting and jamming enemy communications and radar signals. The development of the Samyukta electronic warfare system was a collaborative effort led by the Defence Electronics Research Laboratory, Bharat Electronics Limited, Electronics Corporation of India Limited, and the Corps of Signals of the Indian Army. Private companies like Data Patterns India Ltd (Chennai), CMC and Tata Power Company Limited (Strategic Electronics Division) played significant roles. Approximately 40 companies contributed by manufacturing various components domestically. In an interview conducted by KVS Hari for the IEEE History Center on 7 January 2022, Vasudev Kalkunte Aatre discussed the challenges faced due to US sanctions following India's 1998 nuclear tests. He stated, "One of the main challenges was overcoming the

sanctions imposed by the United States after India's 1998 nuclear tests, which restricted the import of advanced electronic components."

Divya Drishti is an advanced electronic support system for real-time interception and analysis of radar emissions. It enhances situational awareness and threat detection. During recent border skirmishes, Divya Drishti monitored enemy radar activities, providing real-time data to Indian commanders. However, its effectiveness has been limited by issues related to data integration and interpretation. There have been instances where the system failed to provide timely and actionable intelligence, leading to missed opportunities and strategic setbacks.

The Indian Army has integrated EW units at both tactical and operational levels. In border areas, Samyukta systems have been deployed to counter threats from neighbouring adversaries. While these systems have been effective in some scenarios, such as intercepting and jamming communications used by insurgent groups in Jammu and Kashmir, their overall impact has been inconsistent. The insurgents have adapted to these countermeasures by shifting to alternative communication methods, highlighting the need for continuous upgrades and adaptability in EW systems.

The Indian Navy has equipped its warships with EW systems such as Ajanta and Ellora, which provide electronic surveillance and attack capabilities essential for maritime dominance. These systems monitor and intercept enemy electronic signals while jamming and deceiving enemy radar and communication systems. However, during naval exercises in the Indian Ocean, compatibility issues with allied EW systems and susceptibility to advanced countermeasures highlighted the need for better interoperability and improved capabilities.

During the Malabar 2023 joint exercise in the Indian Ocean, the emphasis was on enhancing interoperability among allied EW systems (electronic warfare systems used by the military forces of allied nations). This highlighted the ongoing need for better interoperability standards. Furthermore, there is a recognised need for improvements in the systems' range and resilience against electronic countermeasures.

The Indian Air Force employs EW pods on fighter jets, such as the SIVA pod for Suppression of Enemy Air Defences (SEAD) missions. The SIVA pod disrupts enemy radar and uses electronic deception to protect aircraft during missions.

In counter-terrorism operations, portable EW systems have been deployed to disrupt terrorist communications and remote detonation devices. In Jammu and Kashmir, these systems have blocked radio frequencies used for improvised explosive device (IED) triggers, preventing potential attacks and ensuring the safety of military and civilian personnel. Nevertheless, the insurgents' ability to adapt quickly and use alternative communica-

tion methods underscores the need for continuous improvement and innovation in EW technologies.

India has collaborated with countries including the US and Israel in joint military exercises like Exercise Blue Flag and Exercise Cope India, focusing on the interoperability of EW systems. During the Malabar naval exercises, Indian EW systems were integrated with those of US and Japanese forces, enhancing interoperability and demonstrating combined electronic warfare capabilities. Despite these exercises' successes, the need for improved interoperability and real-time data sharing remains a critical challenge.

Ongoing projects by DRDO and private sector collaborations aim to develop next-generation EW systems with integrated artificial intelligence (AI) and machine learning for adaptive threat responses. However, several challenges remain: technical and operational issues such as spectrum management, EW countermeasures and the need for continuous training and adaptation to evolving threats pose significant hurdles. The rapid pace of technological advancement requires constant updates and modifications to existing systems to maintain their effectiveness. Ensuring that Indian EW systems can seamlessly integrate with those of allied forces is crucial for effective joint operations. This requires developing standardised communication protocols and systems that can work across different platforms and environments. The convergence of cyber warfare and electronic warfare is being explored to counter sophisticated threats in the digital domain. However, this integration poses significant technical chal-

lenges and requires robust cybersecurity measures to protect EW systems from cyberattacks.

India's main adversary China has developed advanced EW systems, including the Hongqi-10 (HQ-10) short-range surface-to-air missile system equipped with electronic warfare capabilities. It disrupts enemy radar and communication systems with high-precision targeting, enhancing its effectiveness in countering aerial threats. The integration of radar, communication interceptors and jamming systems allows for real-time adjustments, making the HQ-10 a formidable component of China's defence strategy. These pods provide both offensive and defensive capabilities, allowing the bomber to carry out complex electronic warfare operations.

China's focus on integrating EW capabilities with cyber warfare has resulted in sophisticated systems that can disrupt and deceive enemy electronic systems while protecting their own. For instance, the People's Liberation Army's Electronic Countermeasures Regiment is equipped with systems capable of jamming and deceiving satellite communications, a capability that India has yet to match fully. These units use advanced jamming equipment and deceptive signal transmitters to interfere with enemy satellite communications and send misleading signals. This capability was particularly evident during the military operations and standoffs in Eastern Ladakh, providing China with a significant strategic advantage through the disruption of critical satellite data.

China aims to integrate cyber warfare with electronic warfare to create comprehensive and coordinated attacks. This approach allows for the simultaneous targeting of electronic systems and cyberinfrastructure, disrupting multiple layers of enemy operations. The combination of cyber and electronic warfare capabilities provides China with a significant edge, enabling multi-layered disruption and enhanced overall warfare effectiveness.

China's investment in research and development (R&D) for EW systems is substantial, with dedicated institutions and significant funding. The development of systems like the H-6 bomber equipped with advanced EW pods underscores China's commitment to maintaining a technological edge. In contrast, India's R&D efforts, while notable, suffer from bureaucratic delays and budget constraints, limiting the pace and scope of advancements. ||



A truck-mounted part of Himshakti Integrated EW System (IEWs) developed by BEL



VEM TECHNOLOGIES Contributing Towards Nation's Athmanirbharatha in Aerospace & Defence

VEM Technologies is one of the top renowned companies in India dealing with Defence, Aeronautics and Space programmes by design, development, manufacturing the systems.

VEM was founded in the year 1988 with an aim to be a "Lockheed Martin of India". VEM's Mission is to consistently meet and excel customer requirements in providing superior products through pro-active interactions and timely solutions. VEM is progressively working to realise its mission.

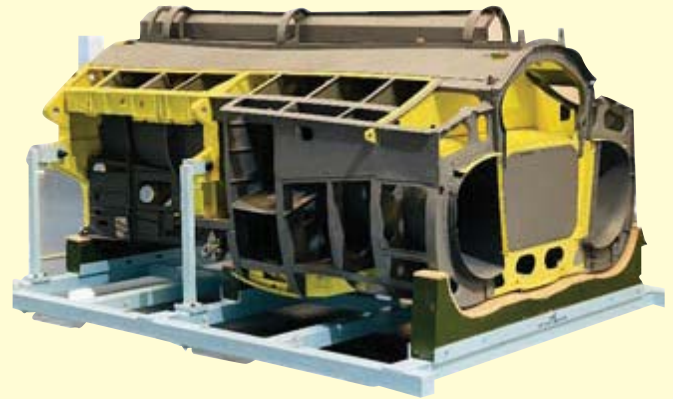
The core strength of VEM is its highly committed work force. VEM is motivated and guided by its values, employees' health and morale, safety and integrity, trust, respect, team spirit, intuitiveness and innovation.

Mr. Venkata Raju, the founder,

Chairman and Managing Director is committed to make VEM as a Systems Integrator and support the country's armed forces to achieve its aim to be self-reliant by way of indigenising the range of hi-tech and hi-performance weapon systems.

VEM has been into the design, develop and manufacturing the systems and sub-systems for the nose to tail of most of the Indian Missiles by working for DRDO and subsequently being one of the prominent production partners for Defence Public Sector Units.

VEM's strong Research and Development and Design and Engineering capabilities enabled VEM to come out with its own 100%



Centre Fuselage for
LCA Tejas Mk-1

Indigenous Anti-Tank Guided Missile which is currently at the fag end of completion of field trails. Parallely, VEM is working on the range of tactical missile systems, Ajita, Vismai to cater to land and air version missile requirements for the armed forces. Vidhwansh is one such lethal weapon system being developed by VEM to meet the Long Range Guided Rocket requirements. Anti-Drones with soft and hard kill capable weapon system is in development and will be offered to the Indian Armed Forces soon.

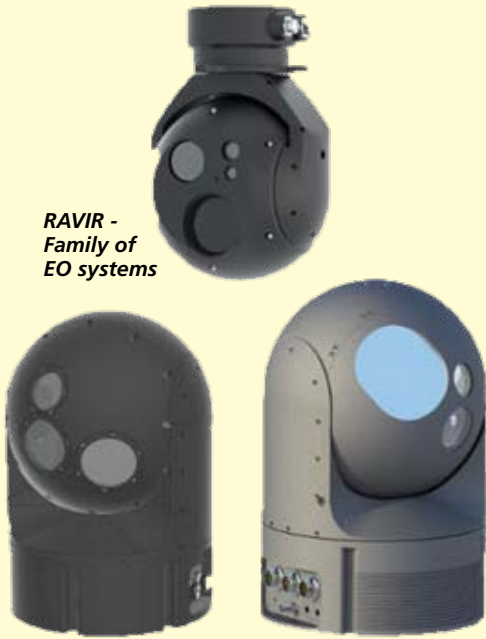
As part of its capacity and capability augmentation, VEM is building the "Integrated Defence Systems Facility" near Hyderabad in a sprawling 511 acres of land. IDS is one of its kind of facility in the Private Defence Industries as it has all the state-of-the-art facilities that would meet end to end weap-



Advanced Medium
Combat Aircraft (AMCA)

Shri. Krishna Rajendra Neeli Offg. PD (AMCA), ADA; Shri K.S Nagesh, Associate PD (AMCA), ADA; Shri V Venkata Raju, CMD-VEM; Shri. H Balaji, Sc-'F', DPD, ADA

**RAVIR -
Family of
EO systems**



on systems integrations apart from Aero structures, UAS and Anti-Drones, Radars, Sensors etc. It will cater to the requirements of NADCAP approved Electro-Plating and Heat treatment to ensure the critical processes are carried out in house to ensure the quality all through. IDS is also intended to cater to Assembly Integration and Testing of Space programmes also.

VEM is an established Aeronautics company dealing with Fighters, LCA Mk-1 where it is currently supplying the Centre Fuselage and beginning to supply the Gener-

**Infrared
Search and
Track Electro
Optical
System for Su
30 MKI (IRST)**

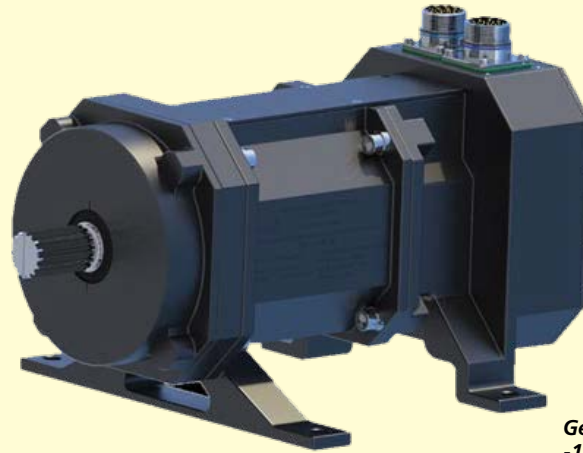


ators soon. Pylon Assembly and Fuel drop tanks are in the development and will commence the supplies upon complying with the qualification parameters.

VEM is the proud partner in Advanced Fighter Aircraft programme and privileged to associate in the manufacturing all the modules based on Composite and Metallic aero structures and carried out the assembly and integration of the 1:1 AMCA Model at VEM which is in display in Aero India 2025.

Infra-Red Search and Tracker System is one such hi-tech system which is at the functional model level and will be getting through the qualification parameters. Post successful qualifications and on-board trials, VEM's IRST will be part of Indian Fighters' programmes.

Similarly, VEM is actively contributing to the Indigenisation of several on-board import substi-



Generators for LCA Mk-1 and for AMCA

tute systems, Helmet Mounting systems, IRSS, Actuation systems, EO Systems, Vibration control systems etc. Qualified to bid the end-to-end structural assemblies for the HAL Helicopter programmes and VEM is confident to raise the levels to be one of the top production partners of HAL-Helicop-

ters division supplying the most complex and critical to technologies.

Mr. Venkata Raju says that "We are focusing on becoming a systems company. Our

self-sustained "IDDm"

defence programmes, our upcoming "Integrated Defence Systems facilities and are all our actions are in line with realising our vision to be a leading global player by innovating sustainable advanced technologies, systems and services to support our customers' mission.

VEM is at the threshold of Transforming its organisation to a Systems integrator and offering the range of systems for Defence and Aeronautics segment both at domestic and international markets. ||



**5 KVA
Generator**

Airbus and HENSOLDT Equip German Airborne Weapon Systems EW Centre



Airbus Defence and Space, in close collaboration with HENSOLDT has equipped the 'German Airborne Weapon Systems Electronic Warfare Centre' with new up-to-date software and hardware to provide a streamlined, service-oriented approach to improve the support of mission-specific 'Electronic Warfare Mission Data' for the aircraft operated by the

German Armed Forces. This joint effort ensures that weapon systems are tailored to each mission and maintain the readiness of the 'German Airborne Weapon Systems Electronic Warfare Center' in face of current and future threats.

The agreement starts in January 2025 and includes mission-critical software solutions. The highly integrated system will offer an increased amount of automation and allows reduced response times to the end user. Airbus' state-of-the-art operating systems will enhance usability while integrating future-proof technology compatible with advanced weapon systems. It not only paves the way for future integration with additional platforms, but also increases mission effectiveness and enables efficient mission preparation and conduction seamlessly. HENSOLDT provides essential IT services and deployable hardware for mobile operations, including server hardware and workstation computers for personnel.

The collaboration between Airbus and HENSOLDT marks a significant step in strengthening Germany's defence capabilities, ensuring mission effectiveness and readiness in a complex and technology-driven defence environment. ||

LM's SPY-7 Radar for Spain's F-110 Frigate Successfully Tracks Airborne Objects

In partnership with Navantia, Spain's national defence and shipbuilding company, Lockheed Martin has successfully demonstrated the first live track for the Spain F-110 Multi-Mission Frigate's AN/SPY-7(V)2 radar. The tracking event was conducted at Lockheed Martin's Aegis SCOMBA Integration Center (ASIC) in Moorestown, New Jersey.

"During the milestone event, the SPY-7 radar system's tactical hardware and software accurately tracked airborne objects, which confirms the system's maturity and readiness for comprehensive performance testing," said vice president of Multi-Domain Combat Solutions at Lockheed Martin, Chandra Marshall. "Lockheed Martin has rapidly scaled and advanced its naval radar technology and solutions to meet the evolving needs of Spain, ensuring strategic advantage."

"This achievement marks a critical milestone in the F-110 Programme and showcases the progress made, ensuring that the programme is on track to meet its scheduled commissioning date for the first frigate in 2028", said F-110 programme director at Navantia, Carlos Lopez.

In the coming months, Lockheed Martin will conduct thorough testing of all components of the SPY-7 radar system and Aegis tactical equipment, ensuring that Spain receives a fully integrated and calibrated system. Formal delivery of the SPY-7 radar is scheduled for 2026, representing a key milestone for the construction of the vessel and her Combat System Light-off.

The F-110 frigate is scheduled to join the Spanish Navy's fleet, with the first two ships currently under construction. Lockheed Martin and Navantia are collaborating on the integration of the Aegis and SCOMBA Combat System tactical computer programmes, which will be tested at the ASIC and Spanish Navy's land-based test site (CIST) in Rota naval base, Spain. ||



Rolls-Royce to Double Its Sourcing in India by 2030

Rolls-Royce is reinforcing its commitment to India, signalling its intent to double its supply chain sourcing from the country over the next five years. As a strong proponent of the 'Make in India' programme, Rolls-Royce sources a wide range of high-precision parts and engine components for its civil aerospace, defence and power systems businesses from numerous Indian partners, and has long-term plans to grow India's participation in its global supply chain.

With plans to grow its presence and participation in India's defence sector, Rolls-Royce will now increase its sourcing of complex parts for advanced aerospace engines, naval propulsion systems, diesel engines and gas turbine engines. This strategic move also aligns with Indian defence minister Rajnath Singh's call for greater integration of Indian companies into global supply chains.

Speaking about the company's plans, Nicola Grady-Smith, chief transformation officer, Rolls-Royce said, "India is fast emerging as a preferred hub for global sourcing, and we are looking to broaden our partnerships here to support both our business growth and the government of India's vision to 'Make in India for the world'. Over the years, Rolls-Royce has helped bolster in-country manufacturing capabilities to meet the highest global

quality standards. The focus is now on strengthening relationships with both existing and potential future Indian suppliers, to help develop capabilities to manufacture complex engine components locally for global markets."

At Asia's largest aerospace and defence exhibition, Aero India 2025, Alex Zino, executive VP for business development and future programmes for Rolls-Royce (Defence) spoke about the announcement. He said, "India plays a significant role in our long-term strategy, both as a sourcing hub and a strategic partner in advancing defence technologies. We are committed to serving the needs of India's armed forces, and remain focused on participating in co-development opportunities for critical combat engine technologies."

Following a legacy of successful technology transfer for licensed production of various engines in the defence domain, Rolls-Royce has established an ecosystem of strategic partnerships, skilled talent, engineering and digital capabilities, service delivery, supply chain and manufacturing in India.

The company has strong joint ventures with Hindustan Aeronautics Limited (HAL) and Force Motors, as well as long-standing relationships with Tata, Bharat Forge, Godrej & Boyce and others, for manufacturing and sourcing complex parts for its businesses. ||

KSSL and L3Harris Sign MoU to Collaborate on Advanced Technology in India

Kalyani Strategic Systems Limited (KSSL), a wholly owned subsidiary of Bharat Forge Limited and L3Harris Technologies signed a Memorandum of Understanding (MoU) for wider collaboration in supporting advanced defence and security equipment in India.

Under the two-year agreement, both companies will work in close collaboration to provide solutions for mutually agreed opportunities in command, control, communications, intelligence, surveillance and reconnaissance (C4ISR) technologies. The MoU provides L3Harris with a strong, local partner to support tactical communications network development in India, extending an existing global install footprint of more than 1 million fielded radios across the US Department of Defense and allied inventories.

"This MoU sets the stage for future partnerships and opportunities in India, where the combined strengths of L3Harris and KSSL can contribute to bolster national security for the country," said Dave Johnson, vice president, International, L3Harris. "We are excited to move forward and increase our delivery speed in advanced tactical radios and equipment to the Indian armed forces."

The US-India Defense Industrial Cooperation encourages both parties' support of advanced defence technologies, capabilities and equipment. The MoU is designed to foster collaboration in defence technologies, with a framework for innovation that benefits both L3Harris and KSSL.

"This collaboration unlocks new strategic capabilities and will lead to harnessing new opportunities for quick delivery of sophisticated defence products to the Indian armed forces," said Neelesh Tungar, president & CEO, KSSL. "Aligned

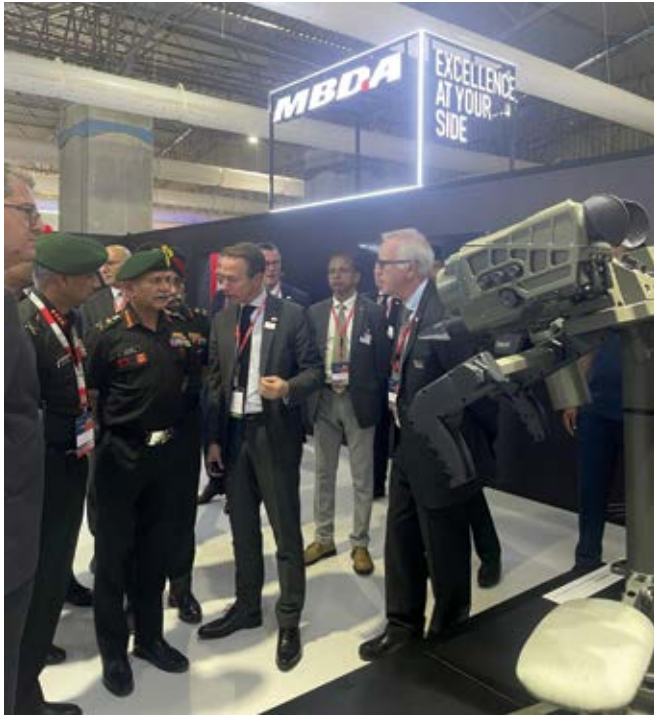


with the evolving doctrines and emerging warfare paradigms, this collaboration between KSSL and L3Harris is aimed at serving future strategic requirements, including joint and integrated ISR capabilities."

While focusing on the Indian market, the collaboration also seeks to establish robust and resilient supply chains outside India for global obligations.

L3Harris has operated in India for more than 21 years, with facilities in New Delhi and Bengaluru. In addition to providing the Indian armed forces with sophisticated tactical radios and manned airborne electro-optic/infrared systems, the company provides Futuristic Telecommunications Infrastructure for all Indian airports in partnership with the Airport Authority of India (AAI). ||

Who's Who at Aero India



Chief of the Army Staff, Gen. Upendra Dwivedi at the MBDA booth on Day-2 of Aero India 2025 being briefed on Mistral, VSHORAD & ATGM-5



CEO, United Aircraft Corporation, manufacturer of Su-57, Vadim Badekha says that while there have been no formal talks on Su-57 with India, UAC is willing to manufacture the fighter in India under Aatmanirbhar Bharat. It is also willing to share Su-57's AI-41 engine tech with India. It has also offered to upgrade the present Su-30MKI engine to Su-57 level and share all Su-57 technology with India. Moreover, UAC is willing to help in India's AMCA programme



Bharat Electronics Limited and Safran Electronics & Defense, France, announced the signing of a partnership on February 11 to create a joint venture for the manufacturing, customisation, sale and maintenance of HAMMER (Highly Agile Modular Munition Extended Range) Smart Precision Guided Air-to-Ground Weapon in India



President and CEO, Thales international, Pascale Sourisse met Chief of Air Staff, Air Chief Marshal A.P. Singh on the sidelines of CEO's round table at Aero India 2025. Thales is committed to the Aatmanirbhar Bharat vision and will continue to offer a wide range of capabilities to help India's armed forces achieve and sustain operational superiority



Chief of Defence Staff Gen. Anil Chauhan visited BAE System team at the UK Pavilion



Head of Airbus Helicopters, India and South Asia, Sunny Guglani presenting a model of the H-125 to managing director, Himalayan Heli Services Limited, T. Wangchuk Shamsu and executive director, Himalayan Heli Services, Harshvardhan Sharma along with head of civil sales, Airbus Helicopters, India and South Asia, Gaurav Adhikari. Himalayan Heli Services have ordered two H-125 helicopters



Vice Chief of the Army Staff, Lieutenant General N. S. Raja Subramani at the MBDA booth on Day-2 of Aero India 2025

Rafael and Centum Electronics Sign Teaming Agreement to Enhance Intelligence Capabilities for India

Rafael Advanced Defense Systems Ltd. (Rafael) and Centum Electronics signed a Teaming Agreement (TA) to collaborate on advancing the fields of Spectrum Dominance, Spectrum Situational Awareness, and AI-based Intelligence Suite/Decision Support Systems for the Indian armed forces. This partnership expands the ongoing collaboration between the two companies in the electronic warfare (EW) domain and contributes to India's Atmanirbhar Bharat initiative, which focuses on indigenous manufacturing and the transfer of critical technologies.

Yoav Tourgeman, CEO of Rafael, emphasized the strategic importance of the collaboration. He said, "We are honoured to expand our partnership with Centum Electronics. This agreement reflects our continued commitment to supporting India's defence ecosystem with



state-of-the-art technology while fostering local capabilities in alignment with the Atmanirbhar Bharat vision, in close cooperation with our partners at Centum."

Apparao Mallavarapu, chairman and managing director of Centum Electronics, highlighted the significance of the partnership. He said, "Signing this Teaming Agreement with Rafael marks a significant milestone in our journey to enhance India's defence capabilities. Our collaboration not only strengthens our position in the domain but also reinforces our commitment to delivering innovative solutions that support India's Atmanirbhar Bharat initiative. We look forward to leveraging our collective expertise to develop advanced technologies that enhance the operational effectiveness of the Indian armed forces." II

HENSOLDT Strengthening India's Airborne Sensor Capabilities for a Self-Reliant Future

As India advances its Make in India and Atmanirbhar Bharat initiatives, HENSOLDT is committed to being a trusted technology partner in shaping the future of Indian aerospace and defence. The company's expertise in radar, electronic warfare, electro-optics, and situational awareness solutions aligns with India's vision for self-reliance. It will bring cutting-edge airborne sensor technologies to support the Indian military.

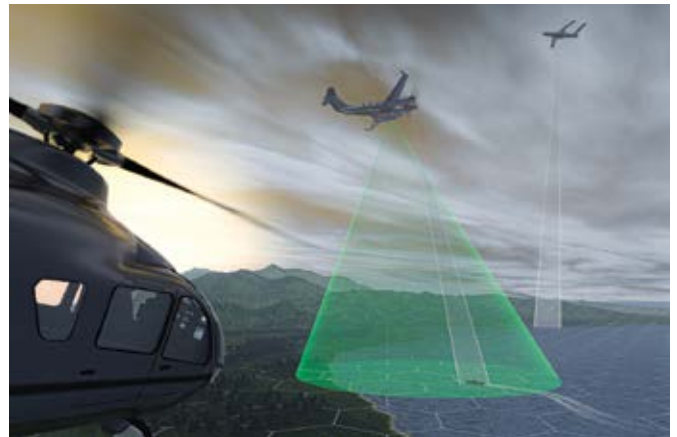
Aero India 2025 provides an excellent platform for HENSOLDT to reaffirm its dedication to India's defence modernisation, forging deeper partnerships with the Indian armed forces and the defence industry.

HENSOLDT will showcase next-generation airborne sensor solutions tailored for India's defence forces, including:

- **Advanced AESA Radar and ISR Systems:** Enabling superior airborne surveillance, early warning, and target tracking for fighter aircraft, unmanned aerial vehicles (UAVs) and airborne early warning platforms.
- **Electronic Warfare and Self-Protection Systems:** Enhancing the survivability of combat aircraft with missile warning systems, radar warning receivers and electronic countermeasures.
- **Electro-Optical and Infrared (EO/IR) Solutions:** Providing long-range target detection, tracking and intelligence gathering for aerial platforms.
- **AI-Powered Data Fusion and Multi-Sensor Integration:** Strengthening real-time threat analysis, mission planning and battlefield awareness for the Indian armed forces.

HENSOLDT is not just supplying technology to India; it is committed to developing localised solutions, transferring critical technologies and fostering strategic industrial partnerships to drive India's defence self-sufficiency.

It also recognises that India's defence modernisation is not just about acquiring world-class systems, but also about developing local expertise, production capabilities and



long-term self-reliance. The company actively collaborates with Indian defence manufacturers, research institutions, and armed forces to establish localised production and system integration for advanced sensor technologies; enhance indigenous capabilities in airborne surveillance and situational awareness solutions and foster technology transfer and co-development partnerships to create next-generation airborne sensor systems in India.

Through these efforts, HENSOLDT ensures that India benefits from cutting-edge technology while also developing domestic defence manufacturing expertise.

As a trusted partner of the German government, HENSOLDT is at the forefront of expanding Indo-German defence ties. Germany's growing engagement in the Indo-Pacific, coupled with India's increasing demand for advanced defence electronics, presents a unique opportunity to deepen technology collaboration and operational cooperation. II

Israel Aerospace Industries Showcases Cutting Edge Defence Technologies at Aero India 2025

Israel Aerospace Industries (IAI), a world-class aerospace and defence leader, will showcase its latest advancements in defence technology at Aero India 2025, demonstrating its commitment to India as a strategic partner and a key market in the defence sector. The company's presence at the exhibition highlights its nearly 40 years of collaboration with India and its dedication to strengthening defence cooperation between the two nations.

Over the past year, IAI has made several additional investments in the Indian market, including with its subsidiary AeroSpace Services India (ASI); its partnership with IIT Delhi, demonstrating its commitment to the next generation in India; the launch of its NeuSPHERE Innovation Acceleration Program, enabling collaboration with Indian deep-tech start-ups and most recently, the opening of its new HELA Systems facility in Hyderabad, enhancing localized Maintenance, Repair, and Overhaul (MRO) capabilities for advanced radar systems and reducing turnaround times for India's defence forces. These reflect IAI's ongoing commitment to India's self-reliance goals under the 'Make in India' vision.

At Aero India 2025, IAI will exhibit a diverse portfolio of state-of-the-art defence solutions tailored to meet the evolving challenges of modern warfare. Among the key systems on display are:

- OptSAR 550 – A dual-payload electro-optical and synthetic aperture radar (EO/SAR) tactical observation system designed for real-time intelligence and reconnaissance missions
- MCS – A cost-effective digital communication satellite offering robust and secure connectivity for military and government operations
- Heron TP – A multi-role, medium-altitude long-endurance (MALE) remotely piloted aerial system (RPAS) providing superior intelligence, surveillance, and reconnaissance (ISR) capabilities



- B767 FRA – A strategic flight refueler aircraft capable of extending the operational range of combat aircraft and enhancing air superiority
 - APUS – A long-endurance quadcopter designed for persistent surveillance, border security, and tactical reconnaissance missions
 - MRSAM – An integrated air and missile defense system providing advanced protection against aerial threats, including missiles, aircraft, and UAVs
 - Oron Aircraft (ELI-3150) – A multi-mission airborne reconnaissance and surveillance system designed for persistent intelligence gathering and situational awareness
 - Eitam Aircraft (ELW-2085) – A conformal airborne early warning and control (AEW&C) system equipped with state-of-the-art radar and battle management capabilities
- Boaz Levy, President & CEO of IAI, said: "India is a long-term strategic partner for Israel Aerospace Industries, and our presence at Aero India 2025 emphasizes our dedication to strengthen this relationship. IAI is proud to partner with India's defence forces, offering state-of-the-art solutions tailored to meet their operational needs. We are committed to further collaboration with the Indian defense industry and government agencies to further enhance its technological security capabilities." ||

GE Aerospace Signs Contract with IAF for T700 Engine Sustainment Solution

GE Aerospace signed a five-year Performance Based Logistics (PBL) contract with the Indian Air Force (IAF) to provide a comprehensive sustainment solution for the T700-GE-701D engines powering the IAF's fleet of AH-64E-I Apache helicopters.

Under this contract, GE Aerospace will be responsible for the Maintenance, Repair, and Overhaul (MRO) of the T700 engines as well as flight line parts to ensure engine availability to the IAF. The PBL solution is designed to streamline engine sustainment operations, improve turnaround times, and enhance the availability and operational readiness of the Apache fleet.

"We are honoured to continue our partnership with the IAF through this PBL contract, which underscores our commitment to deliver reliable and innovative sustain-

ment solutions for critical defence platforms," said Young-je Kim, vice president and general manager, Asia Pacific, Defense & Systems for GE Aerospace. "This agreement demonstrates GE Aerospace's focus on supporting the IAF's operational needs and mission readiness by ensuring the T700 engines are maintained at the highest level of performance."

The T700/CT7 family of turboshaft and turboprop engines powers 15 types of military and civilian helicopters and fixed-wing aircraft with more than 130 customers in over 50 countries. More than 25,000 T700/CT7 engines have been delivered and approximately 130 million total flight hours accumulated. The T700/CT7 design has proven itself in the harshest environments, logging millions of flight hours in hot-harsh combat zones like Iraq and Afghanistan. ||

BEL Signs MoU with Raddef Pvt Ltd



Defence PSU Bharat Electronics Ltd (BEL) and Raddef Pvt Ltd, Bengaluru, have signed a memorandum of understanding (MoU) for the joint development, marketing, manufacturing and sales of indigenous Coastal Surveillance Radar (CSR).

The objective of the agreement, announced at Aero India 2025, is to co-operate and support indigenous development and manufacturing of subsystems required for the realisation of equipment/systems in the field of coastal surveillance equipment for defence applications.

BEL, a navratna PSU under the ministry of defence, government of India, enjoys leadership position in the defence / strategic electronics market in India. BEL is a multi-product, multi-technology, multi-unit conglomerate which boasts of over 600 products in the areas of radars and fire control systems, weapon systems, communication and network centric systems, among others.

Some of the areas BEL is focusing as part of its diversification efforts include solutions for civil aviation, unmanned systems, railway and metro systems, network and cyber security, smart city solutions, space electronics, arms and ammunition and seekers, medical electronics and Artificial Intelligence.

Raddef Pvt Ltd designs, develops and manufactures a wide variety of sub-systems for RF and Microwave systems and components for the applications in defence, aerospace, meteorology and communication. Applications include radar, satellite communications, radio communications, telemetry applications, missile guidance systems, mobile radio base stations and air traffic control and communications. The company has been working on the development of various types of radars which typically spans ground, air and coastal domains. ||

Chipsan Aviation to Enhance Connectivity in India with Airbus H160 Helicopters

Chipsan Aviation, India's leading non-scheduled air operator, has outlined its plans to deploy Airbus H160 helicopters for multi-mission roles in India. The company is going to add two more H160 helicopters to its fleet within the year.

Chipsan Aviation leased two H160 helicopters in 2024 from GD Helicopter Finance and took delivery of the first one in December 2024, making it the first Indian operator to have leased the aircraft type. Designed as a multi-role helicopter, capable of performing a wide-range of missions, these H160s will be deployed by the company for commercial air transportation, supporting connectivity and economic activity across the country. The helicopters will be used for connecting Lakshadweep Islands with the mainland and for offshore energy missions in India.

Sunil Narayanan and Daisy Cherian, founders of Chipsan Aviation Pvt. Ltd, said, "We are proud to be the first operator in India who brought H145 for commercial operations. We feel responsible for bringing the most sophisticated H160 for the first time in India for commercial operations. The first two H160s are mainly for the VIP plus corporate requirements. However, Chipsan aims to connect Lakshadweep Island with the mainland with the future inductions this year itself."

Sunny Guglani, head of Airbus Helicopters in India and South Asia, said, "We are honoured that Chipsan Aviation has once again put their trust in Airbus for enhancing helicopter operations in the country. These helicopters mark a significant milestone in their expansion journey as they become the first operator to lease the H160 in India. The H160 is Airbus' next-generation helicopter and is already in



service in many configurations around the world."

The H160 is a multi-role helicopter ideal for carrying out a variety of missions, including offshore transportation for the energy industry, private and business aviation, emergency medical services, commercial passenger transport, and public services such as search and rescue and law enforcement. With its exceptional range, speed, and efficiency, the H160 offers a superior level of performance and flexibility to operators.

Chipsan Aviation currently operates a fleet of six Airbus helicopters that includes two H145, two H135, and two H130 helicopters, from Cochin, Bangalore, Mumbai, and its headquarters in Delhi. ||

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‘Intelligence supremacy will be the core of future warfare. Big data, which is equal to intelligence superiority, should be considered a product, like hardware and software. It will be a mix of cognitive and operational dynamics’

‘The operational importance of the virtual battlespace has been lost on the Indian military which continues to assess land, air, and sea as the only warfighting domains. It does not consider cyber, outer space, near space, and EMS as war domains, but as force multipliers for the fighting domains’

‘In a war with India, the People’s Liberation Army will exercise total war control by dominating cyberspace, electromagnetic space, and outer space domains. It will, therefore, exert control over war aims, war concepts, speed, tempo, intensity, and outcome. This involves seizing the initiative, paralysing the enemy, dominating the escalation ladder, and laying grounds for war termination on one’s own terms’

‘China’s Belt and Road Initiative trajectory is aligned with the arrival of the third and fourth industrial revolutions. The third industrial revolution was the digital revolution—with computer hardware, software, and networks as its fundamental components. The fourth industrial revolution is about the interaction between the physical, digital, and biological domains with AI and Big Data’



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