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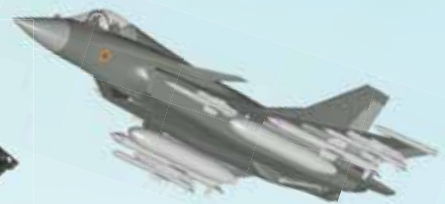


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The Vanguard of Change

India's Defence Revolution under PM Narendra Modi



Narendra Modi
Prime Minister of India

India's aerospace and defence sector has soared to new heights in the past decade, a testament to its burgeoning ambition and unwavering commitment to technological prowess. Fuelled by a fast-growing economy, a heightened sense of global awareness, and an unwavering resolve for self-reliance, the sector has witnessed an extraordinary growth under the leadership of Prime Minister Narendra Modi. Defence expenditure has witnessed a significant upsurge, fuelling defence indigenisation and dawning a renaissance in research and development. A vibrant ecosystem of startups has blossomed, brimming with innovative ideas and a thirst for technological advancement. The armed forces are undergoing a dramatic modernisation, acquiring cutting-edge platforms that redefine the nation's military might. This transformation is not merely a story of technological progress, but a narrative of a nation asserting its rightful place on the global stage, a testament to India's growing stature as a global power. Let's take a look at the incredible transformation of the defence industry.

On 15 January 2025, the Indian Navy witnessed a crescendo of its might. Three magnificent warships, born of ingenuity and forged in the fires of dedication, were inducted into its formidable fleet by Prime Minister Narendra Modi.

First, INS Surat, a guided-missile destroyer designed for multi-role operations asserting India's maritime dominance. Secondly, INS Nilgiri, the vanguard of Project 17A stealthy new frigate class, armed with cutting-edge weaponry and cloaked in an aura of invincibility, enhancing the Navy's operational flexibility. Finally, the formidable INS Vaghsheer, a Scorpene-class diesel-electric attack submarine, equipped with wire-guided torpedoes and anti-ship missiles.

This triumphant induction, a symphony of steel that reverberates across the seas, was not only India's clarion call to the world but also one of the numerous

resounding testaments to the nation's burgeoning defence prowess over the last decade.

The last 10 years under the Modi-led government has witnessed a remarkable



Rajnath Singh
Defence Minister of India

transformation in India's aerospace and defense sector, driven by a confluence of factors: a burgeoning economy, heightened geopolitical tensions, and a strong emphasis on indigenisation.

This period has seen a surge in defence expenditure, a renewed focus on research and development, and a thriving ecosystem of startups, propelling the sector towards self-reliance and global competitiveness.

Big Boost to Indigenisation

A key hallmark of the past decade has been the government's unwavering commitment to 'Make in India' and 'Atmanirbhar Bharat', aligning with PM Modi's vision of self-reliance in defence. This has translated into a significant shift towards domestic production, with a focus on reducing reliance on foreign imports. Initiatives like the 'negative import list', which restricts procurement

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Sanjay Seth

Minister of State for Defence

of certain items from abroad, have incentivised domestic manufacturers. The Defence Ministry has identified over 1,000 items, including advanced weaponry and platforms, that will no longer be imported but instead be produced domestically.

The success of this initiative is evident in projects like the Tejas Light Combat Aircraft (LCA), the Arjun Main Battle Tank, and the Akash surface-to-air missile system.

These indigenously developed systems have significantly reduced dependency on imports while showcasing India's technological prowess.

Key policy changes, such as increasing the foreign direct investment (FDI) limit in the defence sector to 74% and creating a positive indigenisation list, have boosted domestic manufacturing. This has led to the emergence of a robust domestic defence industrial base, with companies like Larsen & Toubro, Tata Advanced Systems, and Mahindra Defence playing increasingly crucial roles.

Modernisation of Armed Forces

Under PM Modi, the modernisation of the armed forces has been prioritised to address evolving security challenges. The modernisation drive saw significant investments in acquiring cutting-edge equipment across domains of all three Armed Forces. The procurement of advanced platforms such as the Rafale fighter jets, S-400 missile systems, and MH60 and Chinook helicopters has bolstered the operational capabilities of the Indian military.

This modernisation drive has stimulated demand for indigenous technologies and services, opening up a plethora of opportunities for defence firms in the private and public sectors.

The government has also focused on enhancing domestic production of critical systems. For instance, the Defence Research and Development Organisation (DRDO) has made significant strides in developing advanced systems such as the Agni and Prithvi missile series, as well as the recently tested Hypersonic Technology Demonstrator Vehicle (HSTDV).

Integration of Emerging Technologies

Recognising the importance of future warfare, India is investing heavily in emerging technologies like Artificial intelligence (AI), cyber warfare, anti-drone systems, and robotics. AI is revolutionising areas like target acquisition, situational awareness, and autonomous systems.



General Upendra Dwivedi

PVSM, AVSM
Chief of the Army Staff

The establishment of the Defence AI Council and the Innovations for Defence Excellence (iDEX) initiative has fostered collaboration between startups,



Admiral Dinesh K Tripathi

PVSM, AVSM, NM
Chief of the Naval Staff



General Anil Chauhan

PVSM, UYSM, AVSM, SM, VSM
Chief of Defence Staff

academia, and the defence sector.

The rise of unmanned aerial vehicles (UAVs) has necessitated the development of counter-drone technologies to mitigate emerging threats. Anti-drone technology has gained prominence in safeguarding critical assets. Indian companies have developed indigenous solutions to detect and neutralise rogue drones, a capability demonstrated during high-profile events. Cyberwarfare has become a critical domain, necessitating investments in cybersecurity and electronic warfare capabilities. Many Indian companies, both startups and major defence giants, are currently investing more money and time in cybersecurity and related fields.

Rise of the Startup Ecosystem

Startups have become key players in India's defence ecosystem. Over 100 startups are currently engaged in developing advanced technologies, ranging from drones and sensors to AI-driven systems. The past decade has witnessed a surge in the number of defence and aerospace startups in India. These startups are contributing innovative solutions in areas like robotics, unmanned systems, Artificial Intelligence, and space technology.

The Defence India Startup Challenge, launched under the iDEX initiative, has provided a platform for these innovators to collaborate with the armed forces and other stakeholders. It has provided a significant boost to the startup ecosystem by fostering innovation and encouraging private sector participation in defence research and development.

Growing Defence Exports

Continuous efforts to increase defence



Air Chief Marshal AP Singh
PVSM, AVSM
Chief of the Air Staff

exports in order to achieve the collective goal of global peace and prosperity, in line with the 'Make in India, Make for the World' vision, bore fruit as many countries showed keen interest in Indian platforms, resulting in record defence exports.

India's defence exports have seen a dramatic rise over the last 10 years. Defence exports have touched Rs 21,083 crore in the FY 2023-24, a growth of 32.5% over the last fiscal year. The private sector and the defence public sector undertakings (DPSUs) contributed around 60% and 40%, respectively, in exports from India, up from just `1,500 crores in 2014. The government has actively promoted defence exports, providing necessary support and incentives to Indian companies. This has not only generated revenue but also enhanced India's global standing as a credible defence exporter.

This growth underscores the increasing global demand for Indian-made systems such as the BrahMos missile, artillery systems, and surveillance equipment. Agreements with countries like the Philippines, Vietnam, and Armenia highlight India's growing role as a reliable defence exporter.

Challenges and the Road Ahead

The Indian aerospace and defence sectors have soared to new heights under the guidance of Prime Minister Narendra Modi. However, it faces a unique set of challenges that require careful navigation. Long gestation periods for complex defence projects, a main issue within the industry, can impede rapid modernisation. The intricate labyrinth of supply chains, often involving multiple domestic and foreign vendors, can introduce delays and vulnerabilities.

Furthermore, a dearth of cutting-edge testing facilities within the country necessitates reliance on foreign infrastructure, potentially hindering the pace of innovation and increasing costs. Addressing these challenges requires a multi-pronged approach. Streamlining procurement processes, reducing bureaucratic bottlenecks, and fostering greater transparency in decision-making are crucial steps. Investing heavily

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in research and development infrastructure is paramount. This includes establishing world-class testing facilities for aircraft, missiles, and other critical systems within the country.

Simultaneously, nurturing a skilled workforce with expertise in cutting-edge technologies like artificial intelligence, cyber security, and advanced materials is essential.

Furthermore, fostering stronger public-private partnerships is vital. Encouraging greater private sector participation in defence research and development through initiatives like 'Make in India' is crucial. However, this requires creating an environment conducive to private sector investment, including simplifying regulations, providing access to critical technologies, and ensuring a level playing field for both public and private sector entities.

The focus of the MoD has been to increase the country's defence

exports to friendly nations to achieve the collective goal of global peace and prosperity.

However, there is a lot of ground yet to be covered in terms of the development of new products and the scale of production. There is a paradigm shift in India's defence exports but a quantum jump in the exports is only possible if Indian industry is ready to export large weapon systems and platforms.

Overcoming these challenges necessitates a long-term vision and a commitment to continuous improvement. By fostering a robust ecosystem of innovation, embracing cutting-edge technologies, and nurturing a skilled workforce, India can overcome these hurdles and solidify its position as a global leader in the aerospace and defence sector. This journey demands a steadfast commitment to excellence, a spirit of collaboration, and a relentless pursuit of technological advancement. ■

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Kiran Kumar
VP & Business Head
EWIS Division, HTL Ltd

HTL offers an extensive portfolio of advanced solutions, including Electrical Wiring Interconnect Systems (EWIS), Electrical Panel Assemblies (EPA), Automated Test Equipment (ATE), Installation & Integration including Product Lifetime Support to Defence PSUs, Private OEMs and Global Aerospace & Defence Corporations from its state-of-the-art facility located in Hosur, Tamil Nadu in the southern part of India.

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HTL takes great pride in being a key driver behind India's leading Aerospace Programs. We continue to provide critical components like Electrical Wiring Interconnect Systems (EWIS) for Sukhoi Fighter Aircraft, cockpit harnesses, and link looms for the Jaguar Darin-III Fighter Aircraft, and Automatic Harness Test Equipment for Light Combat Aircraft (LCA), all while ensuring the utmost precision & reliability in each product supplied.

HTL also has established itself as a vital contributor to land defence systems by supplying a wide range of cable harnesses and electro-mechanical units. Key contributions include the supply of cable assemblies for Arjun MBT, BMP-II, T-72, T-90 Battle Tanks, commander thermal imaging sights onboard battle tanks, Akash Army Launchers (AAL), Dhanush Gun Systems, Towed Gun Systems (TGS), and power distribution units (PDUs) for Close-In Weapon Systems (CIWS).

HTL's cable assemblies also play an essential part in surveillance systems such as Arudhra, Rohini, Indra, Identification Friend or Foe (IFF), and Low-Level Light Weight Radars, supporting the defence preparedness of the Indian Armed Forces. Additionally, by supplying cable assemblies for Super Rapid Gun Mounts (SRGMs) aboard stealth warships like INS Shivalik, Sahyadri, and Satpura, along with developing OFC for Marine Platforms, HTL ensures that its products deliver long-lasting performance becoming a trusted partner in naval defense systems.

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The Road Ahead

HTL with its infrastructural and technical capabilities & project execution competencies is geared up to work with Global OEMs as a trusted long term partner in their India Specific Programs for Electrical Wiring Interconnect Solutions. HTL is also committed on tapping on to the Build-to-Print EWIS requirements as arising of Tier 1 Indian Companies who are engaged in JVs/MoUs with Global Aerospace & Defence Majors.

At HTL, we are committed to delivering complete EWIS solutions that support all our customer needs over the entire life cycle of their programs making us the strategic partner of choice for Defence PSUs & Aerospace & Defence OEMs worldwide providing best value, quality parts and on-time delivery from India, for India, and for the world.



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The company diversified into the Aerospace & Defence Wire Harness Business in the year 2020. Today, HTL is an AS9100D accredited company offering Build to Print services for Electrical Wiring Interconnect Systems, Electro-mechanical systems, Electronic sub-systems, and Installation & Integration including Product Lifetime Support for leading Defence PSUs and Global Aerospace & Defence OEMs from its state-of-the-art facility located in Hosur, Tamil Nadu.

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Boeing: Unleashing the Future of Flight



With over 80 years of experience in India, Boeing has been instrumental in shaping the country's aerospace and defence landscape. "We are collaborating closely with Indian stakeholders across the public and private sectors to deliver advanced capabilities in aviation and defence," says Salil Gupte, President, Boeing India and South Asia. In an interview with Aeromag, he discusses Boeing's significant contributions to India's aerospace and defence ambitions, what the company has in store for Aero India 2025 etc.

Salil Gupte
President, Boeing India and South Asia

Can you provide an overview of Boeing's presence in India across defence and civil aviation?

Boeing's vision has always been to bring the best of Boeing to India and take the best of India to the world. With over 80 years in India, Boeing has been integral to the growth of the country's commercial aviation sector and the modernization of its defence forces, building trust and reliability among local stakeholders. Our long-standing presence and continuous engagement have positioned us as the mainstay of India's growing commercial aviation sector.

We have strong partnerships with Indian carriers such as Akasa Air, Air India, and SpiceJet. Air India's historic order for up to 290 Boeing jets and the Akasa Air order of 226 737 MAX airplanes speak to Boeing's increasing presence and participation in India's aviation growth. Boeing also offers comprehensive lifecycle support services, such as pilot and technician training and digital solutions, to optimize airline operations.

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.

We are collaborating closely with Indian stakeholders across the public and private sectors to deliver advanced capabilities in aviation and defence. In 2024, Boeing executed pivotal programs such as the Air Cargo Symposium, Pilot Roundtable, and Executive Development Programs. These initiatives involved collaboration with airline customers, regulatory bodies like the Directorate General of Civil Aviation (DGCA) and Ministry of Civil Aviation (MoCA), the Airports Authority of India (AAI), and aviation startups, aiming to enhance various facets of India's aviation sector.

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 localized 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 modernization.

Can you discuss the trajectory of India's aircraft component manufacturing sector? How has this evolution impacted Boeing's operations, and what key factors have driven this growth?

Boeing's partnerships in India are deeply collaborative and designed to drive long-term growth for both our global operations and India's aerospace ecosystem. With over \$1.25 billion in annual sourcing, 70% of this sourced from manufacturing, and collaborations with 300+ supplier partners, including over 25% being Micro, Small & Medium Enterprises (MSMEs), Boeing stands out

for its commitment to integrating local expertise into our global supply chain.

We also have a dedicated and fast-growing supply chain team based in India that focuses on developing new suppliers, including MSMEs.

This effort has been pivotal in the growth of our network, which is propelled by significant advancements in quality and capability along the value curve. Our suppliers are transitioning from simple assemblies to more complex ones, including advanced materials like composites and thermoplastics, and employing technologies such as full-size determinant assembly (FSDA) and robotics.

Today, India's aerospace and defence sector is experiencing a burgeoning growth that is attracting diverse talent. The country's traditional strengths in engineering, extending beyond software to encompass broader engineering disciplines, have converged with a substantial improvement in manufacturing quality over the past decade. This combination of engineering excellence and enhanced manufacturing capabilities presents a remarkable opportunity for industrial companies to invest in India.

Additionally, initiatives like "Make in India," financial incentives, and infrastructure development, have created a conducive environment for growth. With over eight decades of presence in

India, Boeing's investments over time, reflect our confidence in the country's potential. Boeing will continue to invest in local manufacturing, co-production, co-development, skill enhancement, and innovation initiatives to support the growth of the overall aerospace, defence and commercial aviation ecosystem.

What are the key partnerships that support Boeing's skill development and women's empowerment initiatives?

Boeing continues to invest in helping build a highly skilled and efficient workforce that contributes to both the growth of the aerospace and defence sector and the country's economic progress. At Boeing, we have been working with our partners on various skill development programs that span the breadth of the aerospace industry.

Through programs such as "Kaushal," a Boeing India Supply Chain initiative for skill development, Boeing partners with the industry to train people from disadvantaged backgrounds, including women and those differently abled, to become part of the mainstream aerospace manufacturing industry.

Last year, Boeing announced a \$100 million investment in infrastructure and training programs in India to meet the rising demand for pilots driven by India's growing aviation sector. Additionally, in line with the Honorable Prime Minister's vision, Boeing launched the Boeing Sukanya Program aimed at further fostering women's participation in the aviation sector.

The Accelerated Apprenticeship Program seeks to increase the employment prospects of aircraft maintenance engineers. In collaboration with AI Engineering Services Limited and the Ministry of Civil Aviation, Boeing has established a state-of-the-art training center in Mumbai that offers





a customized curriculum designed by Boeing experts, as well as access to advanced training aids. The first and second cohorts of graduates from the program, who completed their studies in 2019 and 2021 respectively, have been successfully absorbed by prominent Indian airlines.

In 2022, Boeing collaborated with Indira Gandhi Rashtriya Uran Akademi (IGRUA), a premier flight training organization under the Indian Ministry of Civil Aviation (MoCA), for opportunities to enhance safety and quality in early career flight training. It is an important step in advancing aviation training in the country through collaboration with flight training and development organizations to enhance capabilities and safety.

Boeing has partnered with Air India, Tata, Micro, Small, and Medium Enterprises (MSMEs) like Rossell Techsys, SASMOS, Jaivel and other industrial partners like Indo MIM, Lakshmi Machine Works, Air Works, and Wipro to offer training opportunities to pilots, aircraft maintenance engineers, technicians, and frontline factory workers throughout India. To date, nearly 4,000 workers have benefited from these initiatives.

We also organize the annual Boeing-IIT National Aeromodeling Competition at engineering colleges, offering participants training to help them design and build airplane models, encouraging careers in aerospace. Through the Boeing University Innovation Leadership Development (BUILD) program, we partner with incubators, including IITs and IISc Bangalore, to mentor

university graduates and early-stage startups, providing visibility to investors. Furthermore, Boeing partners with not-for-profits like Learning Links Foundation (LLF) to help create a skilled and employable workforce for the aerospace manufacturing sector.

Boeing has been leading the conversation on sustainability in aviation at the global level. Can you highlight what are you doing in India in this space?

In 2021, Boeing committed to deliver its commercial airplanes capable and certified to fly on 100% SAF by 2030. As part of this endeavor, Boeing India announced at WINGS 2022 that it will work together with SpiceJet, and CSIR-IIP to explore opportunities for using SAF in the Indian aviation industry, in support of the organizations' commitment to help reduce carbon emissions and to support the Indian Government's environmental goals.

The collaboration with SpiceJet and CSIR-IIP is aimed at leveraging SAF supply from CSIR-IIP and its production partners and licensees to help SpiceJet decarbonize its fleet. This initiative builds on Boeing's long-term industry leadership and investment to develop SAF around the world in partnership with airlines, fuel companies, governments and research institutions, to expand SAF supply and reduce its cost. Boeing is presently helping review and support the certification process for SAF samples being developed by CSIR-IIP.

As a member of this World Economic Forum's (WEF) Clean Skies for

Tomorrow initiative, Boeing contributed to the first report WEF "Deploying Sustainable Aviation Fuels at Scale in India" in 2021 as a starting point for public-private taskforce to design an implementable policy framework for decarbonizing aviation in India. Boeing continues to support the 2nd edition of the annual report as well. Through this initiative, WEF has convened an Indian SAF community of private and public institutions with the shared vision of transporting 100 million domestic passengers in India on SAF by 2030 on a 10% blend (360,000 metric tons). India's total expected domestic need for jet fuel is estimated to be approximately 8 million tons by 2030, flying an estimated 190 million domestic passengers a year.

What is the focus for Boeing at Aero India 2025?

We are excited to be at Aero India 2025 and will continue to highlight Boeing's investments in India to build an integrated aerospace ecosystem. Our focus will be on demonstrating how Boeing is fostering collaboration across civil aviation, defence, urban air mobility, and MRO sectors to drive innovation, optimize resources, and expand manufacturing capabilities. By strengthening these connections, we aim to position India as a global aerospace hub, addressing both military and civilian aviation needs with cutting-edge technologies and solutions. Through this integrated approach, we are committed to supporting India's growth and competitiveness in the global aerospace market.

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HAL: Fortifying India's Aerospace Legacy



Hindustan Aeronautics Limited (HAL) has been crucial in advancing India's defence self-reliance and enhancing national security. With a focus on indigenization and innovation, HAL remains at the forefront of India's aerospace growth. "HAL will continue to play the pivotal role in defence with new projects on card like AMCA, LCA-Mk-II, IMRH & TEDBF, and future orders of ALH, LCH, LUH etc," says Dr D K Sunil, CMD, HAL. In an interview with Aeromag, he discusses HAL's key contributions, ongoing projects, and its participation at Aero India.

Dr D K Sunil
Chairman and Managing Director, HAL

HAL is a premier aeronautical complex in Asia and India's first Maharatna Defence Public Sector Undertaking. Could you talk about the significance of HAL in Indian defence and civil arena?

Hindustan Aeronautics Limited (HAL) plays a pivotal role in India's defence preparedness. As India's premier aeronautical complex and the first Maharatna Defence PSU, HAL is responsible for the design, development, manufacture, and overhaul of a wide range of aircraft, helicopters, engines, avionics, and systems critical to the armed forces.

HAL's contributions have significantly enhanced India's self-reliance in defence production, reducing dependence on imports and ensuring operational readiness of the armed forces. HAL has been instrumental in transforming India's defence aviation sector. From absorbing Transfer of Technology (ToT) for platforms like the MiG series, Jaguar, and Sukhoi-30 MKI, HAL has progressed to indigenous design and manufacturing. Iconic projects such as the LCA Tejas, ALH Dhruv, and LCH showcase HAL's ability to deliver

world-class products tailored to India's requirements. HAL's collaborations with global aerospace giants and its focus on exports have positioned India as a reliable partner in the global defence supply chain.

Though HAL is involved and known primarily for its defence and aerospace segment of the country, it is imperative that we must ensure the overall growth of the aerospace eco system in the country which involves civil aviation. We have developed products like Hindustan-228 for regional connectivity and are working on infrastructure development, including MRO (Maintenance, Repair, and Overhaul) facilities for civil aircraft. HAL's emphasis on Research & Development has spurred the growth of cutting-edge technologies in avionics, UAVs, and AI-based systems. Partnerships with DRDO, ISRO, academia and private industries have strengthened India's technological ecosystem, ensuring sustained progress in aerospace innovation.

HAL will continue to play the pivotal role in defence with new projects on card like AMCA, LCA-Mk-II, IMRH & TEDBF, and future orders of ALH, LCH,

LUH etc. In the civil segment, civil ALH will roll out soon and Do-228 civil version will continue to be produced. IMRH civil variant is also envisaged in future, once the helicopter starts its induction into the defence forces. We are enhancing the indigenous manufacturing content of aero engines under all categories. Ab-initio engine development programmes are also in progress at HAL namely HTFE-25 and HTSE-1200 to achieve true Aatmanirbharta in aero engines.

HAL's achievements symbolize India's growth in advanced technologies and manufacturing. HAL's journey from licensed production to indigenous design is a testament to the country's technological and industrial prowess, earning respect on the global stage.

How is HAL contributing to the indigenization efforts in the defence and aerospace sector, and what steps are being taken to establish a domestic supply chain and support India's Aatmanirbhar vision?

HAL is at the forefront of India's indigenization efforts in the defence and aerospace sector, playing a pivotal role

DESIGN & ANALYSIS

- Aero Component & Structure Design

COMPONENT TESTING & VALIDATION

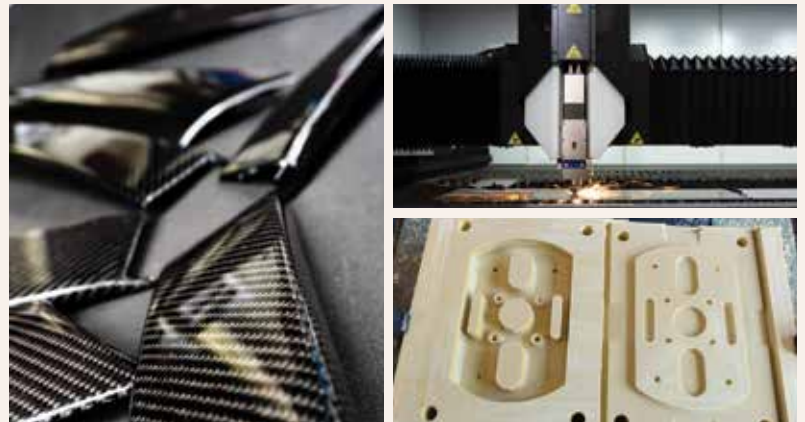
- Material Level Testing
- Component Testing

POC & PROTO DEVELOPMENT

- Precision Machining
- End to End Prototyping Support

PRODUCTION & MANUFACTURING

- Component Production



Quality and precision driven approach

Innovative material

Quick turnaround for design & development cycle

Technical partner to solve complex challenge of composite design and manufacturing

Direct-to-part Tooling for Prepregs and Autoclave Curing Patterns, Master Models



AERO COMPONENT & DESIGN

- ▶ Precision Tool Design For Mold & Patterns
- ▶ Innovative Sandwich Composite Structures
- ▶ Integrated Wing & Fuselage

COMPOSITE TESTING

DESTRUCTIVE

- ▶ Micro Sectioning
- ▶ Fatigue Test
- ▶ Stress Test

NON - DESTRUCTIVE

- ▶ Laser Scan
- ▶ Ultrasonic Testing

END TO END PROTOTYPING SUPPORT

- ▶ Design Support
- ▶ Direct To Part Tooling
- ▶ Proto-Parts Machining
- ▶ Multi Purpose Tooling Boards (Low – High Temp)

PRECISION MACHINING

- ▶ Carbon Fiber Components
- ▶ Foam Components
- ▶ Multi Texture Tooling Boards
- ▶ Billets & Blocks

COMPONENTS PRODUCTION

- ▶ Carbon Fiber Composites
- ▶ Sandwich Components
- ▶ PVC & PMI Foam Components

MATERIAL

- ▶ Carbon Fiber Sheets & Tubes
- ▶ Core Materials: PMI, PVC, EPP, Aluminium & Aramid Honeycombs
- ▶ Epoxy & MMA Structural Adhesives
- ▶ High Performance Epoxy & PU Tooling Boards

FASTER TURNAROUND TIMES

- ▶ In-House Machinery
- ▶ Experienced Manpower
- ▶ Supply Chain Management
- ▶ Customer Centric Approach For MOQ





in realizing the vision of Aatmanirbhar Bharat. As a Maharatna Defence PSU, HAL is committed to reducing reliance on imports, strengthening domestic capabilities, and fostering a robust ecosystem for defence manufacturing.

HAL has spearheaded the development of indigenous platforms such as the Light Combat Aircraft (LCA) Tejas, Advanced Light Helicopter (ALH) Dhruv, Light Utility Helicopter (LUH), and HTT-40 trainer aircraft. Further, HAL has successfully absorbed and optimized Transfer of Technology (ToT) for several platforms, transitioning from licensed production to indigenous design, development, certification and manufacturing. By leveraging ToT and nurturing in-house R&D, HAL has ensured that critical technologies remain within India, boosting self-reliance.

Further, HAL is poised to take up optimum indigenization of all its products i.e aircraft, helicopters, engines, and accessories in the next ten years. HAL has its own indigenization cell which is constantly facilitating production divisions in mitigating obsolescence and supply chain issues. HAL also actively collaborates with over 7,500 industries including MSMEs, creating a vibrant domestic supply chain for aerospace components. Steps has been taken to ensure increased participation of Indian suppliers by providing technical support, handholding, and long-term contracts, thus effectively expanding the aerospace ecosystem in the country.

In a major initiative, HAL identified and prepared a comprehensive roadmap for indigenization of complex aircraft systems, LRUs & other critical items across its major platforms. These items

are planned to be indigenized through the participation of Indian private industries and government agencies, including academia. HAL's Make-II programme envisages the assured order quantity after successful development of items through private partners. More than 26,800 nos. of imported items that are planned to be indigenized through Make-II procedure have been uploaded in the Srijan portal



for private supplier's participation. Further, HAL has hosted more than 85 types of test facilities available at HAL for utilization by industries on payment basis on its website. These facilities are being extensively utilised by both Government organizations and Indian private companies.

HAL has conducted and participated in various vendor development programs, seminars and exhibitions at the Divisional and corporate level to sensitize Indian suppliers to opportunities available at HAL for indigenization and their enhanced participation in indigenization programs. This multifaceted engagement reinforces HAL's role as a key leader in shaping the future of aerospace manufacturing in the country.

What new products or technologies will HAL present at Aero India 2025? What are your priorities and expectations for the event?

HAL will display Dhruv NG, an indigenously developed helicopter. It is the civil variant of the Advanced Light Helicopter (ALH Mk III) used by the

Indian defence forces. The civilian version of this military helicopter is powered by the 'Shakti' engines and features a civil-certified glass cockpit. Even though the civil ALH version has been in service since 2003, Dhruv NG will be an achievement for Indian aviation in terms of updated technology.

HAL's Light Utility Helicopter (LUH) will be the part of centre theme. LUH is a new generation helicopter in the three-ton class incorporating state-of-the-art technology features like Glass cockpit with Multi-Function Displays (MFD) and powered by single Turbo Shaft engine with sufficient power margin to cater to demanding high altitude missions. The helicopter will be capable of flying at 220 Kmph with a service ceiling of 6.5 Km and a range of 350 Km with 500 kg payload.

The upgraded Tejas Mark 1A will be displayed featuring a new avionic suite centered on AESA Radar, Electronic Warfare Suite (EWS) and an externally mounted self-protection jammer (SPJ) for enhanced survivability, in-flight refuelling capability, and Onboard Oxygen Generation System (OBOGS). The variant is planned to be equipped with dual-rack pylons with weapon systems integration.

HAL will also display upgraded Intermediate Jet Trainer (IJT) with Glass Cockpit which has completed its flying trials. HAL will be displaying CATS Warrior, AMCA, Tejas MK II for Fixed wing Combat Aircraft Theme in India Pavilion.

In Aero India 2025, HAL will actively engage with international delegations to promote its platforms like the ALH Dhruv, LCA Tejas, and Do-228 for export markets and will explore collaboration with MSMEs, start-ups, and academia, and showcase how its ecosystem supports 'Make in India' and innovation. HAL will be signing MoUs with perspective partners to further explore business opportunities for co-development, and technology-sharing. HAL also looks forward to engaging with key stakeholders, including the Indian Armed Forces, international clients, and industry partners, to secure new opportunities and collaborations.

Aero India 2025, will serve as a platform to showcase HAL's ability to deliver world-class products and solutions, reaffirming India's position as a global aerospace hub. HAL expects to strengthen its presence in emerging markets through targeted interactions. ■

...To be continued in Day 2 Show Daily

IAI Integrates ADA Anti-Jamming System with M-Code GPS Receiver



Israel Aerospace Industries (IAI), a world-class aerospace and defense leader, achieved a major milestone by successfully integrating the ADA Anti Jamming system with the new M-code GPS military receiver for an international customer. This integration enables the ADA system to deal with evolving and emerging threats to GPS signals.

The ADA system, designed to protect GPS signals from RF interference, has successfully integrated with the M-Code GPS receiver, providing a powerful combination for enhanced GPS immunity. In ground tests and flight tests, the ADA system together with M-code receiver, demonstrated its effectiveness in suppressing attacks on GPS, making it a trusted choice for military users worldwide.

The ADA product portfolio, developed by IAI, is compatible with a broad range of satellite navigation systems (GNSS). Its state-of-the-art technology implements multiple mitigation methods and specialized digital signal processing algorithms. The system's versatility facilitates the integration into numerous platforms.

IAI has over 20 years of proven experience in supplying a wide range of GNSS Anti-Jam solutions for the most demanding requirements and vast experience in integrating immune navigation solutions into airborne (manned and UAV), surface, maritime and guided munitions.

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ideaForge: Forging Ahead in UAV Technology



ideaForge is a vertically integrated company with a dedicated in-house product development centre, enabling the design, development, engineering, and manufacturing of indigenous unmanned aerial vehicles (UAVs). "At ideaForge, our leadership in the Indian UAV market is driven by innovation, quality, and indigenization," says Ankit Mehta, CEO of ideaForge, in an interview with Aeromag where he talks about the company's operations and its presence at Aero India 2025.

Ankit Mehta
CEO, ideaForge

ideaForge has become a leader in the Indian UAV market. What do you think has been the key to your success?

Our core philosophy revolves around delivering exceptional performance, unwavering reliability, and advanced autonomy to achieve best outcomes for our users. We design UAVs that thrive in the harshest conditions, from the scorching heat of the Thar desert to the extreme colds of Siachen Glacier. Moreover, we are deeply committed to the adoption of this technology and customer success, offering comprehensive support to ensure our technology is both highly effective and user-friendly.

From developing India's first proprietary autopilot system in 2007 to achieving 90% localization of critical sub-systems, ideaForge has built a robust in-house technology stack. This further includes in-house UAV payloads, advanced communication systems, and secure, reliable drone solutions for defence, industrial, and disaster response applications. At ideaForge, our leadership in the Indian UAV market is driven by innovation, quality, and indigenization. Surpassing 600,000 successful UAV flights, with one of our drones taking off every three minutes, underscores the trust in our technology and our alignment with India's vision of becoming a global drone hub by 2030.

ideaForge was the first company in India to develop VTOL UAVs. Can you share some of the developments or new products that ideaForge is currently working on to advance UAV technology?

At ideaForge, we are committed to advancing UAV technology to meet the growing demands of defence, security, and industrial sectors. Building on our legacy as pioneers in VTOL UAV technology, we are excited to share some of the key developments that futureproof the forces making them resilient and enhance their operational capabilities. We are for the first time showcasing these in Aero India 2025.

1. NETRA 5: Designed for enduring missions, the NETRA 5 offers advanced collision avoidance and smart autonomy features, ensuring exceptional performance in challenging conditions. With a range of up to 15 km and a take-off weight of less than 8 kg, it excels in mission-critical applications, providing relentless surveillance even in GNSS-denied environments.

2. SWITCH V2: The SWITCH V2 combines the versatility of VTOL agility with the endurance of fixed-wing flight. With a flight time of up to 150 minutes and a range of over 20 km, this drone is engineered for rapid deployment in high elevations, extreme weather, and difficult terrains, making it ideal for defence and industrial use.

3. Tactical Drone: This hybrid VTOL

system is designed for Intelligence, Surveillance, Target Acquisition, and Reconnaissance (ISTAR), fire correction, and border management. Its load carrying capabilities in GPS-denied environments, along with a flight time of up to 360 minutes and an operational range of over 80 km, ensure it serves as a force multiplier for armed forces, internal security units, and first responders.

4. Logistics Platform: A high-altitude, all-terrain autonomous VTOL-FW hybrid aircraft that is robust and dependable for a wide range of mission profiles. Capable of carrying payloads ranging from 50 kg to 200 kg, it is quick to deploy and can easily reach places which are otherwise difficult to access. It can operate in extreme environments - be it snowy mountains at 6,500 meters altitude or windy seas, ensuring quick turnarounds and autonomous operation for cargo, medical evacuation, or manned missions.

Can you share some information on ideaForge's EAP and CAP program?

The Early Access Program (EAP) by ideaForge is a step towards our commitment to strengthen collaboration and enable an innovation-led Uncrewed Aerial Vehicle (UAV) ecosystem. This program allows innovation-minded partners and organizations to enjoy exclusive access to our latest advancements in UAV technology.

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Weight (kg)	28	45	60
Operating pressure (bar)	2.06	1.72	1.37
Burst pressure (bar)	5.50	3.40	2.75

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(CAP) is designed for forward-thinking partners, organizations, and government bodies to co-create the next generation of drones. Under this program, you get a platform to shape aerial innovations tailored to specific needs, including applications such as medevac, mapping, high-altitude logistics, marine logistics, and refrigerated cargo.

With the growing demand for UAVs, how does ideaForge plan to scale its operations? Could you also elaborate on your export strategy and international market presence?

As India moves toward realising the Hon'ble Prime Minister's vision of becoming a Global Manufacturing Hub by 2047, ideaForge is positioned for significant growth, focusing on defence and civil sectors. We are advancing unmanned logistics and mobility solutions, collaborating with government and enterprise partners to enhance ISR capabilities and planning to introduce larger platforms for logistics and mobility needs in the near future. Additionally, the recent launch of our FLYGHT model has marked our entry into the Drones-as-a-Service (DaaS) market, enabling

enterprises to seamlessly integrate UAV technology into their operations. This expansion helps us meet the evolving needs of customers in both India and global markets. In 2024, we significantly expanded our presence in the United States by establishing a subsidiary. This move allows us to directly engage with customers in a market with rising demand for secure, high-performance UAVs. Our commitment to sourcing critical subsystems from non-controversial regions further strengthens our position as a trusted alternative.

The U.S. is a key focus for our global expansion strategy, and this presence provides a strong foundation for growth in sectors like defence, law enforcement, logistics, and enterprise applications. With this expansion, ideaForge is poised to meet the increasing global demand for reliable, secure UAV solutions and solidify our leadership in UAV technology.

Could you talk about your participation in the Aero India 2025 and what key innovations or products the company plans to showcase?

At Aero India 2025, we are excited to showcase our cutting-edge UAV

solutions, including the NETRA 5, SWITCH V2, Tactical Drone, and Logistics Platform. Each of these products represents our commitment to advancing UAV technology for critical defence and civilian applications. The NETRA 5 is built for reliability and autonomy, ensuring seamless surveillance in challenging environments. The SWITCH V2 merges the versatility of VTOL with the endurance of fixed-wing flight, making it ideal for rapid deployment in diverse terrains. Our Tactical Drone is designed for complex missions, offering exceptional performance in GPS-denied areas, crucial for defence and internal security operations. Finally, the Logistics Platform is a high-altitude, all-terrain drone capable of autonomous operation in extreme conditions, ideal for logistics, medevac, and mission-critical deliveries.

These innovations are the culmination of insights on the role of technology in future warfare and conflicts based on the learnings from current geopolitical conflicts around the world. At ideaForge, we remain focused on delivering solutions that drive national security, infrastructure development, and technological excellence.

DRDO: Propelling India's Defence Ambitions



The Defence Research and Development Organisation (DRDO) is playing a crucial role in India's ambition to become a global aerospace and defence manufacturing hub. By partnering with academia, industry, MSMEs, and start-ups, DRDO is enhancing capabilities in cutting-edge technologies and promoting self-reliance in defence. "DRDO's TAPAS BH can significantly boost India's defence surveillance, reconnaissance, and intelligence-gathering capabilities," says Dr Samir V Kamat, Secretary DDR&D and Chairman DRDO, highlighting the organisation's advancements in UAV technology. In an interview with Aeromag, he discusses DRDO's pivotal role in strengthening India's aerospace and defence sectors.

Dr Samir V Kamat
Secretary DDR&D and Chairman DRDO

How does DRDO envision contributing to India's ambitious goal of becoming a global aerospace and defence manufacturing hub?

DRDO is partnering with all stakeholders of defence ecosystem including academia, industry, MSMEs, start-ups and Services in developing state-of-the-art defence systems. The TDF scheme is encouraging the participation of public/private industries, especially start-ups

and MSMEs, to create an ecosystem aimed at enhancing the capabilities in cutting-edge technology and promoting 'Aatmanirbharta' in defence. To integrate academia and industry into defence R&D, DRDO promulgated the Long Term Directed Research Policy of Ministry of Defence. Under this policy, DIA-CoEs pursue focused directed research for developing futuristic defence technologies. Aligned with the 'Aatmanirbhar Bharat'

initiative, these centres leverage the expertise of faculty and researchers of the institute in collaboration with DRDO laboratories and Indian industries to meet national security needs.

Standard Operating Procedure (SOP) has been promulgated to assist Indian Industry to export products developed with DRDO support. An export compendium, comprising of DRDO products having potential of export, has also been prepared along with details of manufacturing industries. of the DRDO for self-reliance and exports in Defence sector, including the Aerospace sector.



India's missile technology is now among the most advanced globally. What are the latest developments in missile systems, such as hypersonic weapons, and how does DRDO plan to stay ahead of evolving global threats?

Recently, Defence Research & Development Laboratory (DRDL), our Hyderabad-based laboratory has taken the initiative in developing a long-duration Scramjet powered Hypersonic technology. This had demonstrated a cutting-edge



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Active Cooled Scramjet Combustor ground test for 120 seconds for the first time in India. The successful ground test marks a crucial milestone in developing next-generation hypersonic missiles, demonstrating its potential for operational use in Hypersonic vehicles, like successful ignition and stable combustion. The indigenous development of endothermic scramjet fuel, the first time in India, jointly by DRDL and Industry was central to this breakthrough. The fuel offers dual benefits of significant cooling improvement and ease of ignition. The team developed a special manufacturing process to achieve stringent fuel requirements of DRDL at Industrial scale. The successful Scramjet Engine Ground Test is a crucial milestone in the development of next-generation hypersonic missiles.

In November 2024, DRDO had conducted a successful flight-trial of India's first long-range hypersonic missile off the coast of Odisha. This hypersonic missile is designed to carry various payloads for ranges greater than 1,500 kms for the Armed Forces. This was a historic flight-trial, which put India in the group of select nations having capabilities of such critical and advanced military technologies.

Unmanned systems and drones are increasingly dominating modern warfare. How is DRDO advancing in this field, especially in the areas of swarm drones and counter-drone systems?

DRDO's TAPAS BH can significantly boost India's defence surveillance, reconnaissance, and intelligence-gathering capabilities. By operating at medium altitudes for extended periods, these UAVs provide critical information and situational

awareness that can shape defence strategies and responses.

DRDO has developed a comprehensive integrated anti-drone system D4, which comprises detection, identification, and neutralization of a drone. In D4, detection and identification of drones is achieved by combination of inputs from Radar, RF detection system and electro optic identification system. A very powerful neutralisation system incapacitates drones by Soft Kill using RF Jamming, GNSS Jamming and GPS spoofing techniques, and Hard Kill with high energy Directed Laser weapon. Laser Directed Energy Weapons (LDEWs) are a class of futuristic cutting edge technology weapons that utilize focused laser beam to cause damage to a target. It will be extensively used against tactical aerial targets such as Drones, MALE/ HALE UAVs, Cruise missiles, Helicopters etc. An indigenous high-speed flying-wing Unmanned Aerial Vehicle (UAV) designed and developed by Aeronautical Development Establishment (ADE) was maiden flight tested in July 2022, followed by six flight trials in various developmental configurations using two in-house manufactured prototypes.

What are the latest indigenously developed systems that DRDO delivers to the Army, Navy, and Air Force in the coming years? Are there plans to enhance the integration of AI and robotics into these products?

The development of Very Short-Range Air Defence System, or VSHORADS has been completed and two production agencies have been engaged in the Development cum Production Partner (DcPP) mode. The missiles realised

through DcPPs have been successfully used in flight-tests conducted in October 2024, thus paving the way for early User trials and Production in a short time span. Recently, a couple of successful flight-tests were carried out in final deployment configuration, wherein two field operators carried out weapon readiness, target acquisition and missile firing.

DRDO has successfully conducted 'Zorawar' Light Tank, a highly versatile platform capable of deployment in high-altitude areas. The preliminary automotive trials of this tank have been successfully conducted, and the airlift capability was also demonstrated by the Indian Air Force. With these two phases of internal performance trials, which were actively supported by the Indian Army and the Indian Air Force, ILT would be undergoing some more trials before being offered for User trials.

Then there is the LCA Mark 2, an improved version of the existing LCA Tejas fighter jet is expected to be a heavier, more advanced aircraft with enhanced indigenous combat capabilities and is currently under development by the Aeronautical Development Agency (ADA) is expected to take its first flight in 2026.

The AMCA project is critical for India's air combat capabilities, yet it has faced delays. What are the current challenges, and when can we expect the first prototype or operational readiness?

Advanced Medium Combat Aircraft (AMCA) is a 5.5 Generation stealth aircraft fighter jet developed by DRDO's Aeronautical Development Agency (ADA) in collaboration with various private and public entities. India will develop its



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first prototype by 2028, and we hope to complete the development trials by the year 2034 and get inducted by 2035. Since AMCA is an indigenous 5th Generation aircraft, it is less costly than similar aircraft available outside. Cabinet Committee on Security (CCS) has already sanctioned the Full Scale Engineering Development (FSED) of Advanced Medium Combat Aircraft (AMCA)

India's defence exports have seen a steady rise. How is DRDO contributing to this trend, and what key systems or technologies are being offered to international partners?

DRDO's developed products/systems like radars, electronic warfare systems, missiles, naval systems, etc. have great potential for be export to our friendly countries, and some of these systems such as hull-mounted sonars, lightweight torpedoes, and radar systems etc have been exported to various countries. DRDO, being a designer of these systems, needs to play a lead role to adopt these systems to customer needs (export version) after taking into account the national security concerns. The Brahmos supersonic cruise missile have been exported to Phillipines. It was the first export of Brahmos missiles by India. Multiple other export opportunities are emerging for systems like Akash Missile System, Brahmos, Weapon Locating Radar etc to name a few. I am sure over the coming years exports are going to become a very important part of our portfolio.

DRDO's multi-layer clothing system 'HimKavach' clears user trials. Could you talk more about the game-changer product?

DRDO developed HIMKAVACH multi-layer clothing system designed for temperature range of +20°C to -60°C



has successfully cleared all user trials in actual operation. This innovative modular clothing system is designed to protect soldiers stationed in extreme cold conditions. The clothing system will be very useful in military operations in cold weather conditions along the Himalayan region. It is part of DRDO's ongoing efforts to enhance the capabilities of the Indian Armed Forces with state-of-the-art technologies. The system is expected to strengthen the Army's preparedness for operations in extreme conditions, providing much-needed support to soldiers stationed in these critical regions.

What can we expect from DRDO's participation in Aero India? Are there plans to showcase any breakthrough technologies or systems at the event?

DRDO is participating in this mega exposition in a big way. It will showcase numerous exhibits, flight displays and seminars, in addition to displaying its flagship products at the India Pavilion. The products are divided into 14 Technology Zones with 9 different themes, namely Airborne Surveillance platforms, Sensor suites, Sonar system, electronic surveillance solution, missile

systems, Unmanned Aerial systems, array of naval, land, Airborne radars etc., which is a testimony to DRDO commitment in moving ahead in sync with the rapidly evolving technological ecosystem. For the first-time, full-scale model of AMCA is being displayed at the prestigious India Pavilion. Flying display will include the Dornier with midlife upgrades.

A DRDO seminar on DRDO Industry Synergy towards Viksit Bharat is also being organised at the event. A DRDO policy to enhance Ease of doing Business and increase support to industries is also being released. DRDO policy for ToT, which has been revised in consultation with various stakeholders (industry, technology developers, DoD, DDP) is also going to be released during the seminar.

To provide an insight into India's indigenous defence systems, platforms, materials and products to friendly foreign nations, DRDO has published an updated compendium of titled "DRDO Products for Export", to be unveiled during Aero India 2025. This compendium aims to generate international interest and facilitate export and potential collaboration.

What are the key priorities and focus areas for DRDO in the next 5-10 years, and how will they contribute to India's national security objectives?

Launch of LCA Tejas Mk II, AMCA, besides focusing on other priority areas like Cyber Defence, Network Centric Warfare, Robotics and Unmanned Systems, ISR, FICV, AMCA, HEAUUV, TEDBF, DEWs, Hypersonics etc. Our focus will also be on more and more collaborations with the industry and academia to strengthen the country's defence ecosystem and developing emerging and disruptive technologies and thereby moving towards Aatmanirbhar Bharat.





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M.E.RIN has been a leading force in the design and production of both standard and customized safety tanks for over thirty years, delivering high-performance solutions to global clients across aviation, defence, marine, motorsports, and industrial sectors. “We have been exploring the Indian market to manufacture and supply Flexible Fuel Tanks and Self-Sealing Tanks to the Indian defence, aerospace and nautical sectors,” says Enzo Giambartolomei, Founder and Managing Director of M.E.RIN. Excerpts from an insightful interview with Aeromag follow.

Enzo Giambartolomei
 Founder and Managing Director, M.E.RIN

M.E.RIN is known for its innovative safety tank solutions in the aerospace and defence sectors. How does the company collaborate with clients to customize these solutions for their unique requirements?

M.E.RIN has decades of experience on all aspects concerning materials, components and accessories for flexible tanks. We are therefore able to share our know-how with the customer, from the earliest stages of the design, choosing the most suitable solution for their specific needs.

Could you talk about M.E.RIN's association with India? How do you see Indian market?

M.E.RIN's association with India is since 2019 while having a full-time presence in India in collaboration with Synergy Pathways India (OPC) Private Limited. We have been exploring the Indian market

to manufacture and supply Flexible Fuel Tanks and Self-Sealing Tanks to the Indian defence, aerospace and nautical sectors. We have been closely in discussion with various Indian Government bodies like DRDO, Hindustan Aeronautics and other stake holders under the Ministry of



Defence for introducing our products in India. We have broadened our network and strengthen our roots in the past years to further manufacture in India and to deliver our niche products to potential Indian customers and also for exports. We are motivated and working, aligning ourselves with the Indian Prime Minister Narendra Modi's ideology of Make in India and Atmanirbhar Bharat.

What sets M.E.RIN's fuel tanks apart from others in terms of performance, safety, and reliability for military aircraft?

In the past, M.E.RIN has developed several innovative solutions, some of which have been patented, both in the field of motorsport, and in the aeronautical and military field. M.E.RIN is currently developing other solutions to reduce the weight of the anti-rash tanks and to develop structures (self-sealing and self-healing) up to a gauge of 20 mm. All our solutions are tested in authorized laboratories or at military firegrounds.

What is the focus for M.E.RIN at Aero India 2025?

Our focus is to operate as an Indian Entity by the first quarter of the year. We are in the middle of the process of registration of our company in the name of “Tankonia Technologies Private Limited” based in Mumbai. In 2025 we are highly focused and motivated to service the tentative order enquiries that we have received from the Indian Government and also jointly working with private large entities on aerospace projects. This will be the beginning of our road to further plan and execute to Make in India. ■





KIRAN



MIG-29



SEARCHER



IL-76-Main



IL-78



CHETAK



HPT-32



HERON



AN-32



Kamov 28 & 31



Dornier



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3	5.00-5	HPT-32 Nose Wheel
4	6.00-4	KIRAN-Nose Wheel
5	355 x 150	CHETAK-M/W & N/W
7	1300 x 480	IL-76-Main Wheel
8	1300 x 480	IL-78-Main Wheel
9	700 x 250	AN-32-Nose Wheel
10	570 x 140	MIG-29-Nose Wheel

Sl. No.	Inner Tube Size	Name of the Aircraft
11	200 x 50	SEARCHER-M/W & N/W
12	4.00-4	HERON-Main Wheel
13	2.80 / 3.00-4	HERON-Nose Wheel
14	6.00-6	Dornier Aircraft
14	4.95 x 3½	Hurricane Aircraft
15	3/3¼-4	Chipmunk M/W
16	13¼ x 4.25-6	LVN & MKV III
17	18 x 5.5	Hawk MLG
18	4.10 / 3.50-4	Chipmunk N/W
19	480 x 200	Kamov 28 & 31 N/W
20	620 x 180	Kamov 28 & 31 M/W

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Liebherr: Future Looking Technologies



Liebherr-Aerospace & Transportation SAS, a leading name in the aerospace sector, has been at the forefront of developing innovative technologies for aircraft performance and safety. From flight control systems and landing gear to air management solutions, Liebherr is committed to enhancing both civil and defence aviation. "The aerospace product portfolio offered to civil and defence customers includes environmental control and thermal management systems, flight control and actuation systems, landing gears as well as on-board electronics," says Awibhawan Dhakharia, Head of the Liebherr-Aerospace Branch in Bangalore. Excerpts from his interview with Aeromag follow.

Awibhawan Dhakharia
Head, Liebherr-Aerospace Branch in Bangalore

LIEBHERR

Liebherr offers various products for aerospace, including flight control systems, landing gear, and air management systems. Can you give an overview of the products and how they enhance aircraft performance and safety?

Liebherr-Aerospace & Transportation SAS, headquartered in Toulouse (France), is one of 13 product segments of the Liebherr Group and a first-tier provider of on-board solutions in the aerospace and transportation industry, contributing to a more sustainable transport through innovative products, best in class services and performance excellence.

The aerospace product portfolio offered to civil and defence customers includes environmental control and thermal management systems, flight control and actuation systems, landing gears as well as on-board electronics.

How does Liebherr view the Indian market's role in its growth, and what strategies do you have in place to enhance

your presence and expand your business in the region?

Liebherr is committed to enlarge its footprint on a long-term basis through Make in India. This includes engineering support, assembly, testing and customer service. In addition, we are continuing to intensify the relationship with our Indian supply base.

Liebherr has been actively contributing to the trend of more electric systems in the next generation of aircraft. Could you share the recent updates?

Liebherr works on next generations of electro-mechanical actuators, electric wing ice protection, electric environmental control system, auxiliary power generation systems using hydrogen fuel cells, hydraulic power supply, and thermal and power management on-board the aircraft. The future of aviation has begun – and Liebherr is a part of it.

Liebherr is known for its strong focus

on research and development. Could you highlight some of the key areas of R&D that Liebherr is currently investing in, particularly in the aerospace sector?

To be ready for the next generation aircraft that will enter service in the future, Liebherr-Aerospace consistently invests above industry-average ratios into the R&D activities in its fields of expertise: landing gears, flight controls, actuation, as well as environmental control and thermal management systems.

Liebherr-Aerospace has developed an Electrical Environmental Control System (eECS) within the European Clean Sky research program. Could you talk about its capabilities?

Air conditioning systems are one of the main energy consumers on board an aircraft, because they take or bleed off air from the engines, which reduces their thrust output by ca. 5-8%. A good reason for Liebherr-Aerospace and Airbus to work on a Clean Sky 2 initiative to design a more

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energy efficient eECS for more electrical aircraft that will need less fuel and emit less CO2 and NOx.

Instead of bleeding the air from the engines, the eECS will use only ambient air from outside the aircraft. This means that the engines will have more thrust available – especially during take-off and the climbing phase until the aircraft has reached its cruising height. The ambient air is then pressurized and conditioned to a temperature that is comfortable for passengers and the crews.

Liebherr recently celebrated the delivery of the 1,000th landing gear brace for the Airbus A220, marking a significant milestone in your collaboration with Airbus. Could you talk about the importance of this achievement?

This major milestone underlines our commitment to our customers and our aim to continuously optimize our performance. We have set a new benchmark in reduced assembly time, which is testament to our efficiency.

We strive to establish and keep strategic geographical proximity to our customers,

in this specific case Airbus Canada. This allows us to facilitate fast delivery and to provide individual final assembly line support directly on site that is tailored to our customers' needs. We expand our bandwidth and capacity, allowing us to handle a broader range of our OEM components and to quickly adapt to our customers' demands.

Liebherr has a strong global presence. Could you highlight some of the key regions or countries where the company has made significant inroads and established a robust market?

The Liebherr Group has a major presence in the European Union, which has traditionally been its strongest market. It has a significant footprint in North America, Asia, and Oceania. Additionally, the Group also expanded its reach in the Africa, Middle East, and Central and South American regions, where it continues to strengthen its market presence and operations.

Could you talk about Liebherr's participation in the Aero India 2025?

What are the priorities and expectations?

As a long-standing partner of the Indian aviation industry, we are looking forward to welcome visitors at our booth J5.6 in hall J.

At our booth we display highlights, i.e. advanced technologies for primary and secondary flight control application, as well as for cabin comfort.

We also present our wide range of customer service solutions including full lifecycle support.

Our safety critical products are already flying every day on board a wide range of aircraft platforms in India, operated by airline customers, the Indian Air Force and the Coast Guard. The units are maintained locally or within the Liebherr service centre network.

We expect to meet customers and partners to exchange views and do networking.

We showcase examples of our high-quality products and advanced technologies that are tailored to the special requirements of defence platforms in terms of reliability, safety, and resilience.

ADA: India's Fighter Force Architects



The Aeronautical Development Agency (ADA) has developed the Tejas, now in service with the Indian Air Force, and is working on the Tejas Mark 2 and the AMCA. ADA is also focusing on unmanned aerial vehicle systems like Lakshya, HALE, and RPSA. "ADA collaborates with top institutions for expertise and projects, offering young talent exposure to advanced technologies needed for ADA programmes," says Jitendra J Jadhav, Director General of ADA. In an interview with Aeromag, he discusses ADA's strategic initiatives, the progress of key projects, and India's journey toward aeronautical self-reliance.

Jitendra J Jadhav
Director General of ADA

In the new age of drones, where does India stand in the development of advanced unmanned aerial vehicle system? How does ADA support the nation to boost UAV capabilities with reference to the UCAV programme?

Aeronautical Development Establishment of DRDO has been actively working on development of unmanned Aerial Vehicle systems like Lakshya, HALE, RPSA etc.

ADA has demonstrated expertise in Manned Combat Aircraft Systems Design and Development through the LCA program and upcoming aerospace projects.

ADA is working closely with Government Labs, Academia & start-ups to develop key advanced technologies like Automatic Take-off and Landing (ATOL), Dynamic Root planning, Automatic Target recognition & attack, Man Unmanned Teaming (MuM -T), Multi sensor data fusion etc. for 5th & 6th generation Manned. These technologies can be seamlessly integrated on the next generation UAV's designed by ADE.

ADA continues to develop advanced combat aircraft, with spin-off technologies contributing significantly to UAV.

Climate change is very real now, and

the world nations are fighting it. How is ADA addressing environmental concerns, such as carbon emissions, in its aircraft development projects?

Aeronautical Development Agency (ADA) understands the growing importance of climate change and its impact on our country and the world as a whole.

ADA's LCA AF Mk2 and AMCA aircraft are powered by advanced propulsion systems with high efficiency and lower fuel consumption.

Aerodynamic design is catered through multi-disciplinary design optimization leading to lower fuel consumption and reduced greenhouse gas emissions.

ADA has taken up green initiatives by developing eco-friendly coatings to replace anodization, chromium & cadmium plating of aircraft components & assemblies in LCA Mk2 and AMCA.

How is ADA engaging with private industry partners to enhance India's aeronautical capabilities? How do you assess India's private sector in supporting the defence manufacturing?

ADA has identified private industries in the specialized areas like Aero structures, Avionics, Flight controls, Flight test instrumentation and other components.

Today more than 300 industries are involved in the manufacturing of LCA as a Tier 1, 2 & 3 suppliers.

Apart from this about 100 design work centres are established for aircraft design & engineering. The Indian private sector for Defence manufacturing has matured and has demonstrated immense potential through realization of modules/sub-systems for global OEMs as well as LCA program.

ADA has leveraged the capabilities and capacities at private sector to realize full scale engineering Advanced Fighter Aircraft (AFA) model which will be unveiled during Aero India. ADA, in collaboration with CSIR-NAL and Private firms has developed indigenous carbon fibre/prepreg and testing is under progress.

ADA has also taken up the indigenisation of LRU's thru industries to reduce the dependencies on foreign OEM's. In order to meet the future demands of high technologies /quality and rate of production, ADA is pursuing implementation of Industry 4.0 technologies including Automation, Augmented Reality, Optical aided assembly lines etc in Aircraft manufacturing through public/private industry.



MATERIALS & INNOVATION

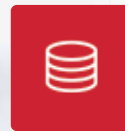
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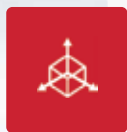
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SSK Innovations, based in Pune, is our trusted long-term partner in India, specializing in EDA and Matveda implementation. SSK delivers innovative, tailored solutions to meet your needs.



Could you provide an update on the current status of the Light Combat Aircraft Mk2 programme? There are reports that the project cost may rise. Will it be a challenge?

The project is progressing very well. The assembly Jigs & Fixtures for aero structure components are ready. Parts manufacturing is in advance stages. The realisation of sub-assemblies like Wing, Fuselage, Radome and control surfaces are in advanced stage of assembly.

All orders for development of LRUs/ Systems have been placed and they are in advanced stage of realisation. The team is fully geared up towards 1st flight planned anytime between End 2025 to 1st quarter of 2026. At present no cost revision is envisaged.

What strategies has ADA implemented to mitigate supply chain challenges in aerospace procurement?

ADA mitigated the aerospace supply chain challenges by identifying more than two sources for supply for majority of LRU's and subassemblies. In case of some of the critical components sourced from single OEM, ADA is exploring a long-term business agreement (LTBR) for supply and Long Term Agreement for Maintenance (LTAM) for sustainability of fleets.

Also, ADA has initiated indigenisation of critical LRU's to mitigate dependencies on foreign OEM. The digital Enterprise project management (EPM) tools are introduced to track the deliveries, associated risks and work out the mitigation plan for timely

deliveries.

What key projects and innovations will ADA showcase at Aero India 2025?

ADA would be showcasing the Full-scale engineering model of AMCA, scale down model of TEDBF and LCA Mk2 as a platform in the Aero India 2025. Along with the platforms, ADA would be displaying Modern flight simulator with Large Area Display of LCA MK2 and deep tech innovations for 5th generation technologies in the field of Materials, Avionics, mechanical systems, advanced coatings, AI & ML , electrical systems, propulsion systems etc among others.

What are the latest developments in the Advanced Medium Combat Aircraft project, and how is it progressing towards its milestones?

AMCA project is sanctioned by government of India in April 2024. ADA has realised a full-scale engineering aircraft test specimen for carrying out various tests to verify key design features. Detail engineering activities are progressing as per schedule. The critical technologies are concurrently developed and being tested. The roll out is planned in end 2027.

India is facing the challenge of brain drain. How does ADA attract and retain top talent in the competitive field of aeronautical engineering?

ADA collaborates with top institutions for expertise and projects, providing young talent exposure to advanced

technologies required for ADA programmes. ADA provides the conducive working environment for the employees thru digitalisation by introduction of powerful tools like Employment Relation Management (ERM) , Enterprise Resource planning (ERP) , Enterprise Project Management (EPM) and continuously improving skill set thru strong HR policy. This initiative attracts students, offering then hands-on experience and encouraging them to join ADA.

Could you share insights into the commencement of LCA Mk1A trials and the expected timeline for their completion?

LCA Mk1A is undergoing key trials. The major hiccups are overcome now and will be inducted shortly.

What factors have contributed to the delays in delivering LCA Tejas units, even those order a decade ago, to the Indian Air Force, and how is ADA addressing these challenges?

Two LCA Mk1 fighter squadrons are already operational, and six trainers are being delivered. The main bottlenecks were supply chain issues from major OEMs like GE and others due to the disturbances in their tier suppliers during pandemic. The situation is progressively improving, and HAL has setup now three lines to produce about 24 LCA aircrafts per year so that delays in deliveries can be expedited after the resumption of supply.

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Schiebel's CAMCOPTER® S-100: A Multi-Domain, Versatile UAS



The CAMCOPTER® S-100 is the only tactical VTOL UAV in its class with extensive operational experience, currently deployed by various Navies and Armies across five continents, both on land and at sea. "The S-100 system is proven to operate effectively and efficiently in extreme environments," says Jajati Mohanty, CEO of Schiebel India. In an interview with Aeromag, he discusses the company's contributions to India's "Atmanirbhar Bharat" initiative, S-100's varied capabilities and its presence at Aero India 2025.

Jajati Mohanty
CEO, Schiebel India

How has the Schiebel Camcopter S-100 contributed to strengthening the relationship between India and Austria? Could you highlight key milestones in the bilateral technological collaboration?

Any product being manufactured in India brings about a sea change to the industrial horizon of the aerospace & defence setup. In this case we are talking about the world's leading rotary unmanned aerial system, hence it brings along the necessary knowledge of licensed production, maintenance, repairs, overhaul and test stands, just to name a few. Austria has always been at the forefront in the field of technological

innovation, which is why we will see the same getting absorbed here in India with necessary skilling as well as creation of jobs in this sector. We are also looking at harnessing the huge human resources available in India in the field of software, hardware and composite manufacturing. In the long run, we would be looking at making India the MRO hub for Asia & Africa along with manufacturing for the world market.

How does the Schiebel Camcopter S-100 enhance security and maritime surveillance in the Indian Ocean Region (IOR), especially in terms of monitoring

sea lanes and protecting critical maritime infrastructure?

These deck-based rotary UAVs provide more tactical leeway to the fleet and the warships in local ISR (Intelligence Surveillance & Reconnaissance) as well as closer air-cover to fleet warships. Combat air patrol by the deck based rotary UAVs are becoming the new normal and making maritime surveillance more robust with very little margins for error. The Indian Navy is the dominating force in the IOR and availability of tactical UAS operating from the deck of capital warships is a game changer with ISR availability at short notice. We see that more and more Indian Navy ships would be operating these deck based unmanned systems to monitor SLOC and ensure availability of critical infrastructure towards maritime security at sea.

What are the unique features and innovative technologies of the Camcopter S-100 that make it stand out in the unmanned aerial system market?

The CAMCOPTER® S-100 is the only proven VTOL UAV in its class. As a market leader in rotary UAS, Schiebel has gained extensive experience around the world over the last 20 years. With several hundred thousand flight hours across the fleet in all climatic conditions, several hundred UAVs delivered to more than 40





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customers on five continents and having operated from more than forty classes of ships, the S-100's experience, pedigree and maturity is second to none.

The multi-role, multi-domain UAS caters to the specialised needs of navies, armies, air forces and commercial customers alike. The payload-agnostic unmanned aircraft allows customers to add a robust and value-for-money "eye in the sky" to their existing capabilities, allowing for the provision of Intelligence, Surveillance and Intelligence (ISR), Search and Rescue, environmental protection, critical infrastructure inspection and monitoring, cargo delivery and more.

What makes the Schiebel Camcopter S-100 such an effective and reliable platform in extreme environments, and how well is it suited for the diverse climatic conditions of the Indian subcontinent?

The S-100 system is proven to operate effectively and efficiently in extreme environments. Customers routinely employ the S-100 capability in arctic conditions down to -40°C and deserts up to +55°C, as well as in climatic zones of extreme humidity. With its service ceiling of up to 12,000 feet and its endurance exceeding 6 hours with a full fuel load and 34 kg of payload, the UAS is the ideal asset for hard-to-reach areas and challenging terrains.

How is Schiebel supporting India's "Atmanirbhar Bharat" vision in defence, especially through its technologies and partnerships with the Indian armed forces?

Schiebel has set up an office in India and partnered with VEM Technologies for the local production of the CAMCOPTER® S-100. This partnership is manufacturing



the CAMCOPTER® S-100 along with its payload under the Buy (India) category with up to 60% indigenisation content. The endeavor would be to create necessary skills for integration and testing in India (licensed production), creation of a robust eco-system consisting of component manufacturer, dealers for off the shelf items and also setting up of the MRO with Indigenized tests stands and diagnostic testers towards fault detection and rectification in addition to overhauling and testing. The creation of facility and skills in India would be to sustain the platform for 15 years and above based on the technology obsolescence.

Could you discuss how the Naval Shipborne Unmanned Aerial System (S-100) has strengthened the Indian Navy's maritime capabilities, especially with its integration on frontline warships?

Availability of the S-100 has changed the complete scenario of operations for the frontline warships since the surface picture area has extended dramatically and provides the command at sea with better decision-making matrix. A fleet or warship operating at sea is dependent on

a good and robust ISR, and if the deck operating UAS is able to provide the same on time and every time, then the engagement becomes more focused with lesser variables. Furthermore, as the raw data from the S-100 gets integrated into the combat management system of the ship, the CMS provides better avenues for engagement with suspected targets.

Can you elaborate on Schiebel's approach to expanding its export operations, particularly in the defence and aerospace sectors, and the role its products play in global markets?

We see Schiebel growing along with the Navy in the maritime domain with Coast Guard too following close behind since they too have requirement for these kind of capability. In fact, we have a large number of Coast Guard customers around the world who are effectively exploiting this system for shore & sea-based patrols and search & rescue at sea.

S-100 is also suitable for various land-based operations, and we are working potential customers for induction into Army and Air Force. Further, oil & gas has also shown huge potential towards utilization of this asset for ISR and logistics. Hence, we feel that Schiebel is slated for substantial growth in the coming few years.

What can we expect from Schiebel's participation in Aero India 2025, and how will the company showcase its capabilities in the Indian defence and aerospace sector?

We will display the S-100 with the new capability option of EO/IR and Searchlight. We will also provide information and detail of the S-300 for potential customers. A team of Schiebel experts will be present & will attend to customers and their queries.





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AccuBeat Unveils Anti-Spoofing Solutions for Military

AccuBeat's Advanced Anti-Spoofing Solutions for Military Applications: The AR51-09 and AR51-07 are two of AccuBeat's flagship AR51 family GPS Disciplined Time and Frequency Solutions designed to meet the stringent demands of the defense sector. These systems use high-precision Rubidium atomic clocks and cutting-edge technology to ensure secure, uninterrupted time synchronization, even in environments where GNSS signals are compromised.

In modern military operations, reliable and accurate timing is crucial for the seamless operation of communication, navigation, and surveillance systems. However, as reliance on GNSS increases, so too does the threat posed by GNSS spoofing—a form of cyberattack that sends false GNSS signals, disrupting the accuracy of time and positioning systems. Recognizing this growing vulnerability, AccuBeat, a leading provider of time and frequency solutions, has developed highly sophisticated anti-spoofing systems to safeguard military operations. The AR51-09 and AR51-07 are two of AccuBeat's flagship AR51 family GPS Disciplined Time and Frequency Solutions designed to meet the stringent demands of the defense sector.

In the military, GNSS spoofing poses a serious risk, as it can manipulate navigation systems, delay time-sensitive operations, and distort communication channels. Spoofing can mislead drones, aircraft, and ground forces by providing false location and time data, leading to critical errors in mission execution. Moreover, in battlefield scenarios where

high precision and security are imperative, these disruptions could have dire consequences, ranging from operational delays to mission failure.

AccuBeat has tackled the challenge of GNSS spoofing head-on with its AR51-09 and AR51-07 solutions, which integrate AccuBeat's own designed and manufactured high-precision Rubidium atomic clocks and cutting-edge anti-spoofing technology. These products



are designed to provide secure and uninterrupted time synchronization, ensuring that military systems remain fully operational even in GNSS-compromised environments. The AR51-09 is one of AccuBeat's most advanced military-grade anti-spoofing systems, featuring a Rubidium-based atomic clock that offers unparalleled accuracy and stability. With a frequency accuracy of 1E-12, the

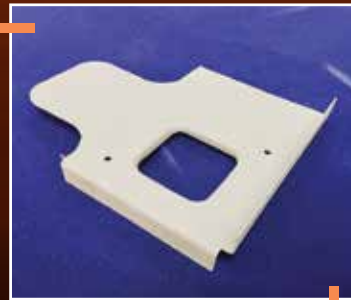
AR51-09 can maintain precise timing even during GNSS-denied scenarios, where spoofing or jamming may disrupt satellite signals in real-time. The system continuously monitors incoming GNSS signals and performs signal integrity checks to identify anomalies that could indicate a spoofing attack.

When an attack is detected, the AR51-09 instantly switches to holdover mode, relying on its internal atomic clock to maintain synchronization. This ensures that mission-critical systems continue to operate with accurate timing, unaffected by the compromised GNSS signals, vital for the secure coordination of UAVs, missile platforms, and communication networks, where even a slight timing error can result in mission failure or equipment malfunction.

The AR51-07 is designed for military vehicles and portable platforms, providing anti-spoofing protection for systems that require mobility and flexibility. The AR51-07 is also equipped with Rubidium atomic clock technology, ensuring stable and reliable timing in GNSS-denied environments. The AR51-07 is particularly effective in ground-based operations, where military vehicles and field units are prone to GNSS spoofing attacks ensuring continuous and accurate timing for radio communications, targeting systems, and other time-dependent applications, even when under attack.

In recent military scenarios, both devices have demonstrated their ability to maintain timing accuracy in GPS-denied environments, ensuring that all systems continued to receive accurate time data, enabling smooth mission execution. AccuBeat's AR51-09 and AR51-07 are indispensable tools for modern military forces facing GNSS spoofing threats. AccuBeat's high-precision Rubidium atomic clocks and advanced anti-spoofing algorithms, provide reliable timing solutions, even in the most challenging environments. For defense organizations seeking to enhance the security and resilience of their timing infrastructure, AccuBeat's solutions offer unmatched performance and reliability.





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Chalet No-30

RTX in India: A Partnership for Progress



RTX, a global leader in aviation, defence, and next-generation technology solutions, has a long and deep-rooted partnership with India spanning over seven decades. With its three business units – Collins Aerospace, Pratt & Whitney, and Raytheon – RTX plays a significant role in India's commercial, defence, regional, and general aviation sectors. "Collins Aerospace is concentrating on bringing manufacturing of advanced aerostructures, interiors and avionics to India," says Martin Williamson, Regional Managing Director, APAC, Collins Aerospace - Customer & Account Management. In an interview with Aeromag he discusses RTX's strategic approach to the Indian market.



Aircraft (LCA) MKI. RTX has also supported and continues to support India's legacy platforms like the Hawk and Jaguar.

RTX has produced a wide range of propulsion systems and products for global war fighters and aircraft programs for decades, including systems for the latest 6th-Gen aircraft in development. For the indigenously developed LCA MKI, Collins has provided a suite of products and systems, including avionics, mechanical and power control systems, and aerostructures.

How do RTX businesses view the growing opportunities in the Indian market?

RTX's partnership with the Indian Armed Forces spans more than seven decades. Collins Aerospace has significant content on most western transport aircraft in service today and has provided products for India's indigenous warfighter Light Combat Aircraft (LCA) Tejas Mk1, as well as platforms like the C-17, C-295, C-130J, P-8I, PC-7, AH-64E, CH-47F, and MH-60R.

Some of India's key military transport platforms like the C-17, and the C-295 are powered by Pratt & Whitney's F117 and PW127G engines, respectively. Meanwhile, Raytheon is currently working to provide a variety of defence capabilities to the Indian Armed Forces which include Integrated Air and Missile Defence, Naval undersea technologies, precision munitions, air platform sensors

RTX is constantly advancing in the fields of aviation, defence systems, and next-generation technology solutions to address global challenges. How does RTX ensure it stays ahead of the curve in this rapidly evolving technological landscape?

RTX's three business units - Collins Aerospace, Pratt & Whitney and Raytheon - have partnered with India for over seven decades across the commercial, defence, regional and general aviation sectors.

With nearly 7,000 employees and one of the largest sourcing of services and components from India, RTX is one of the largest multinational aerospace and defence OEMs in India.

RTX products and solutions are found on the Indian Air Force, Indian Navy, and Indian Army's most modern platforms, including the C-17, C-295, C-130J, P-8I, AH-64E, CH-47F, MH-60R, and the indigenously developed Light Combat



and modernization payloads, Intelligence, Surveillance and Reconnaissance (ISR) and Wide Area Surveillance (WAS) solutions.

As India embarks on its next phase of modernization and indigenization under the 'Atmanirbhar Bharat' initiative, RTX's advanced products and solutions will provide the technological edge and mission-readiness required for the Indian Armed Forces' various next-generation programs, such as the Advanced Medium Combat Aircraft (AMCA), the Medium Transport Aircraft (MTA) and the Indian Multi Role Helicopter (IMRH). These include propulsion (with the F100 and V2500), power systems, avionics, aerostructures, systems and more – across Collins Aerospace, Pratt & Whitney and Raytheon.

Could you elaborate on your growing manufacturing presence in India and how the RTX supports the "Make in India" initiative?

RTX is expanding its in-country manufacturing and supply chain – and exploring opportunities to work directly with Ministry of Defence, and other Indian partners, to maximize benefits to the local defence industry development through co-development, co-production, and research and development.

Collins Aerospace is concentrating on bringing manufacturing of advanced aerostructures, interiors and avionics to India. Collins Aerospace has invested nearly \$200 million in its manufacturing and engineering facilities, and Pratt & Whitney has invested \$40 million on its engineering, digital and aftermarket

centers. Collins is concentrating on bringing manufacturing of advanced aerostructures, interiors and avionics to India. We also continue to expand our network of over 600 suppliers in-country.

How strong are your foreign collaborations and export operations? Could you elaborate on the company's immediate goals ahead?

RTX remains open to discussing Make-in-India opportunities for programs like AMCA. Collins has the in-country resources, experience and capability to team with local industry to expedite development of indigenous programs such as AMCA and IMRH – as well as existing and proposed new MRO stand-up capability within in India to ensure appropriate support.

RTX continues to explore opportunities to work directly with Ministry of Defence to maximize benefits to the local defence industry development through co-development, co-production, and research and development.

Can you discuss the key technologies or products you are showcasing at Aero India 2025?

At Aero India 2025, RTX will showcase its advanced aviation, engineering, integrated defence systems, next-generation technology solutions and manufacturing capabilities that help global customers address their most critical challenges.



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Matplus: Streamlining Materials Data Management



Matplus is a prominent provider of materials data management solutions that enhance product development by optimizing crucial decisions related to material selection, process simulation, and component simulation. Its solutions seamlessly integrate with CAE and PLM systems, fostering efficient and sustainable collaboration. In an interview with Aeromag, Dr Uwe Diekmann, CEO & Founder of Matplus discusses how the company is revolutionizing industries with its unmatched technological prowess.

Dr Uwe Diekmann
CEO & Founder, Matplus

Could you give us an overview of Matplus EDA and explain how it ensures seamless collaboration in the design of products and processes?

Matplus EDA is a powerful platform designed to streamline the integration of materials information into product and process design workflows. By acting as a central hub for materials data, it enables engineers and designers to access accurate, contextual information directly within their existing tools, such as CAD, PLM, and ERP systems. This approach accelerates decision-making, reduces trial-and-error in materials selection, and simplifies regulatory compliance, ensuring faster and more efficient design process.

Materials information plays a pivotal role in product development by driving efficiency and maintaining consistency across the entire lifecycle. With Matplus EDA, teams can collaborate seamlessly, relying on real-time, centralized materials data to align their efforts and accelerate innovation. This combination of robust materials management and open infrastructure empowers organizations to optimize their processes while retaining the flexibility to adapt to evolving needs.

One of the key strengths of Matplus EDA lies in its foundation on an open Free and Open Source Software (FOSS) infrastructure. This not only provides organizations with flexibility to adapt workflows and customize the platform through Python-based plugins but also

eliminates vendor lock-in, significantly reducing costs. The open architecture ensures seamless integration with other systems, fostering collaboration across teams and departments.

With the release of EDA 24 Matplus strengthens its position as a leader in materials information systems. In which areas has the functionality of EDA 24 been expanded?

With the release of EDA 24, Matplus has significantly expanded its functionality to reinforce its position as a leader in materials information systems. One key area of enhancement is the seamless integration of materials knowledge into widely used design and enterprise systems, such as CAD, PLM, and ERP. This ensures that engineers and decision-makers can access critical materials data directly within their workflows, streamlining processes and reducing the time required for material selection and compliance tasks.

Another major development is the introduction of new tools that address complex industry needs. For instance, the Materials Selection Application (MSA) now integrates directly with platforms like Siemens NX and Catia, allowing engineers to efficiently select materials within their design environments. The Substance Compliance Reporter (SCR) simplifies the generation of compliance reports, helping organizations meet increasingly stringent

regulatory requirements with minimal effort.

EDA 24 also features enhanced support for workflow automation and process optimization through its Business Process Modelling Notation (BPMN) editor. This enables users to design traceable, BPMN2-compliant workflows for materials-related activities. Additionally, the new Process and Flow Analyzer (PFA) allows users to model and analyze material property evolution over time, supporting a more detailed understanding of material behaviors in different conditions.

These advancements, combined with Matplus EDA's open FOSS-based infrastructure, ensure that the platform remains highly adaptable, interoperable, and scalable, meeting the diverse needs of industries while driving innovation and efficiency in materials management.

Could you elaborate on the technical innovations and enhancements included in version 24 of MMPDS?

MMPDS (Metallic Materials Properties Development and Standardization) is a critical reference for the aerospace industry, providing validated design data for metallic materials used in structural applications. As a proud member of the Industrial Steering Committee (ISC), Matplus actively contributes to shaping this standard, ensuring it meets the evolving needs of the industry.

With version 24, the Matplus Version



Established in 1959, CSIR-NAL is a high-technology R&D institution focusing on advanced disciplines in aerospace and has a mandate to develop aerospace technologies with strong science content, design and build small and medium size civil aircraft and support all national aerospace programmes.



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of MMPDS introduces the concept of master materials and engineering materials, streamlining material definitions by linking core properties to specific product forms and heat treatments. This approach enhances usability and ensures consistency in design processes.

Additionally, the new optional export feature enables seamless integration with downstream applications like Teamcenter, bridging material data with PLM systems to support traceability and efficiency. These enhancements reaffirm MMPDS's pivotal role in advancing materials management for aerospace and other high-performance industries.

Can you provide insights into Matplus GmbH's operations in India and how the company is contributing to the local aerospace and materials engineering sectors?

Matplus GmbH has a strong and active presence in India, where it collaborates closely with two trusted partner companies: SSK Innovations and Sunfibo. These partners play a dual role, not only supporting sales but also

actively contributing to the technical implementation of Matplus solutions in the local aerospace and materials engineering sectors. Their expertise ensures that Indian customers receive tailored, high-quality solutions and services that meet their specific needs.

These partnerships are not just limited to market support; both SSK Innovations and Sunfibo have significantly contributed to the development of Matplus EDA, particularly in versions 23 and 24. Their inputs have enhanced the platform's functionality, ensuring it addresses the unique challenges of industries in India and beyond. By fostering these collaborations, Matplus is strengthening its commitment to innovation and actively supporting the growth of aerospace and materials engineering in India.

What are the highlights of your participation in Aero India 2025? What are the priorities?

One of the key highlights of our participation in Aero India 2025 is the launch of our new product, Matveda. This innovative and lean system is

designed to support informed material decisions in multi-CAD and multi-CAE environments, relying on a single source of approved information. Matveda offers a low-barrier entry point to Matplus technology, making it accessible for organizations looking to integrate robust materials management into their workflows.

What makes Matveda truly special is its development journey, which was undertaken in close collaboration with our Indian partner SSK Innovations. The product was specifically created with local requirements in mind, ensuring it addresses the unique needs of the Indian aerospace and materials engineering sectors. As Devdas Malekar, Technical Head of SSK, humorously points out: "Our influence is not only technical—there is a clear influence on the naming of the product visible."

Our priority at Aero India 2025 is to showcase how Matveda can transform materials management and decision-making processes while further strengthening our ties with the Indian aerospace community.



India-Russia Relations Set for Stronger Growth

India and Russia share a deep-rooted, multifaceted strategic partnership that spans decades, built on mutual trust and cooperation. The all-weather friendship, which began during the Cold War, has flourished across multiple sectors including defence, energy, trade, technology, and so on. Today, this partnership continues to thrive, with an increasing focus on defence and military collaboration.

One of the most prominent examples of this enduring alliance is Russia's role in supporting India's defence modernization. Russia's state arms exporter, Rosoboronexport, has been a key player in delivering cutting-edge defence systems to India, including aircraft, missiles, and naval assets.

Su-57E: A New Chapter in Fighter Aviation

For the first time, India's skies will witness one of the world's most advanced stealth fighter jets, Russia's Su-57, making its debut at Aero India 2025. This historic appearance marks a significant milestone in India's efforts to modernize its air force. Developed by Sukhoi, the Su-57 is a fifth-generation fighter promises to bring cutting-edge technology to India's defence landscape, offering a glimpse into the future of air combat.

The Su-57's participation in Aero India is poised to influence India's defence procurement decisions, especially as the Indian Air Force (IAF) evaluates its options for next-generation fighters.

The Sukhoi Su-57 is a fifth-generation multirole fighter designed to engage air, ground and naval targets. The Su-57 features stealth technology with extensive use of composite materials, can achieve supersonic cruising speeds and is equipped with cutting-edge onboard electronic systems, including a powerful onboard computer (the so-called electronic second pilot), a radar system spread across its body and other innovations, in particular, armament placed inside its fuselage.

Enhancing the Indian Navy's Capabilities

Rosoboronexport handed over Project 11356 frigate, named Tushil, to the Indian Navy in December 2024. Tushil became the seventh Project 11356 frigate in the Indian Navy, suggesting the high effectiveness demonstrated by these ships and high confidence of the Indian Navy in Russia's defence industry. The first six ships of the project are intensively and successfully performing their assigned tasks in various regions of the world's ocean and have deserved high praise from the Indian Navy's sailors and commanders.

"Raising the Indian flag on the Tushil

ship is another significant milestone in the Russian-Indian military-technical cooperation, which fully complies with the principles of the Make in India program. The Russian-built frigate carries 20 Indian-made hull systems and is equipped with the BrahMos supersonic missile system. Besides, Rosoboronexport and India are implementing about 10 joint naval projects alone and are discussing several new ones", - said Alexander Mikheev, Director General of Rosoboronexport.

Advancing Military Technology and Make in India

Russia's military partnership with India goes beyond just supplying hardware. When implementing military-technical cooperation projects, Russia and India are focused on technological partnership, which is in line with the Make in India and Self-Reliant India programs. Rosoboronexport has been successfully fulfilling licensing contracts in India for years, for example, for Su-30MKI fighters, armored vehicles and ammunition.

The Kalashnikov AK-203 is now being manufactured in India through a joint venture between Rosoboronexport and Kalashnikov Group. This project, which aims for 100% localization, fits perfectly within India's Atmanirbhar Bharat (Self-Reliant India) initiatives.



Distinguished participants and organizers of the Aero India 2025 International Aerospace Exhibition!

It is my great pleasure to extend warm greetings on behalf of Rosoboronexport JSC, the Russian state-owned special exporter of military, dual-use, and civilian products, technologies, and services.

Russia has been a regular participant in this exhibition, which was first held in Bangalore in 1996 and has since grown to become one of the largest international platforms for showcasing equipment and technology for air forces, the missile and space industry, as well as air defense systems and solutions.

At Aero India, Rosoboronexport organizes the unified Russian exhibit, which features the latest and best aircraft,

helicopters, engines, air defense systems, and complexes produced by State Corporation Rostec, Almaz-Antey Air and Space Defense Corporation, and other leading defense holdings of our country.

In 2025, India will witness for the first time the debut of the Su-57E, the newest Russian fifth-generation fighter jet. Its outstanding flight and technical characteristics will be demonstrated in the skies over Yelahanka Air Force Station by Sergei Bogdan, a distinguished test pilot and Hero of the Russian Federation.

Rosoboronexport will also showcase modern guided missiles and bombs designed for integration into the aviation weapon systems of 4++ and fifth-generation fighters, both of Russian and foreign manufacture.

Making its debut in India will be the Lancet-E loitering munition, which stands out in its market segment thanks to its exceptionally successful use in real combat scenarios.

The Russian exhibit will also introduce new developments in the field of aircraft engines. For the first time at Aero India, the new "Item 177S" engine, designed for multi-role fighters of the 4++ and fifth generations, will be presented, along with the VK-650V engine, intended for light multi-purpose helicopters.

The VK-650V engine is also suitable

for the Ka-226T helicopter, which is to be manufactured under a joint Russian-Indian venture registered in India and awaiting orders from the country's security agencies.

In the air defense sector, we will showcase long, medium, and short-range systems capable of targeting a wide variety of threats – from ballistic missiles to small commercial drones.

For all the models presented at the exhibition, Rosoboronexport is ready to engage in industrial cooperation with Indian private and public enterprises in full alignment with the Make in India and Atmanirbhar Bharat programs.

Given our positive experience of cooperation and the extensive portfolio of successful projects in the framework of technological partnerships, Rosoboronexport is excited to expand its participation in joint Russian-Indian programs for the development and production of new models on Indian soil.

During the exhibition, we also plan to discuss opportunities for joint production and promotion of military and dual-use products to third countries in collaboration with our Indian partners.

I warmly invite all guests and participants of Aero India 2025 to visit the unified Russian exhibit at Pavilion J. I wish you a successful and productive event and an excellent mood!

Alexander Mikheev,
Director General of Rosoboronexport JSC

Additionally, Rosoboronexport JSC has established manufacturing of 3VBM17 Mango armor-piercing fin-stabilized discarding-sabot (APFSDS) rounds in India. The ammunition is designed to defeat armored vehicles fitted with composite armor. The project is being implemented under the Make in India program.

The 125mm Mango round is designed to be fired from the guns of T-72 and T-90 MBTs. Various versions of these combat vehicles are in service with the Indian Army.

Rosoboronexport's Presence at Global Defence Expos

Rosoboronexport delivered a remarkable showcase of advanced military technology at both Airshow China 2024 and Vietnam Defence Expo 2024, emphasizing Russia's leadership in modern warfare capabilities. At Airshow China, the company

highlighted its cutting-edge air-launched ordnance, including the stealth missile Kh-69, anti-radar missile Kh-59UShKE, and GROM-E1 guided missile, as well as innovative smart bombs. The Su-57E fighter, Ka-52E helicopter with integrated weapons, and the S-350E Vityaz air defense system captivated visitors with their impressive capabilities. Meanwhile, in Vietnam, Rosoboronexport introduced the Typhoon-K MRAP vehicle with an automated Kornet-EM ATGM launcher for the first time abroad. Other notable displays included the Iskander-E theater missile system, T-90MS tank, Msta-S self-propelled howitzer, and the Lancet-E loitering munition system, which made its Southeast Asia debut. The company also exhibited cutting-edge UAV systems, such as the Orlan-10-E and Orlan-30 drones, alongside the Kalashnikov AK-200 series rifles, Chukavin sniper rifle, and other

specialized weapons, showcasing Russia's commitment to enhancing defence cooperation with countries like China and Vietnam.

With strong participation at international defence events like Zhuhai, Hanoi, and Aero India, Russia demonstrates its powerful return to the global defence expo scene, and reinforcing its position as a key player in global defence.

A Strong Strategic Foundation

The India-Russia defence partnership has evolved significantly. Recent high-level visits, including Prime Minister Modi's trip to Moscow, reaffirm the importance of this relationship. With ongoing cooperation in defence, energy, and technology, Russia remains a vital partner in India's modernization efforts, and future projects promise to further strengthen this enduring alliance.

PBS INDIA: A Growing Force in Indian Defence Industry



PBS INDIA has established itself as a significant player in the Indian defence and aerospace sector. "PBS India intends to strengthen its presence and plans to expand its business in the country. We aim to build a larger presence in our "Indian hometown" Bengaluru and grow our operations across India and Southeast Asia too," says Petr Motýl, Director of PBS INDIA. In an interview with Aeromag he discusses the company's achievements, future plans, and its role in India's defence indigenization efforts.

Petr Motýl
Director of PBS INDIA

What would you say is the biggest achievement of PBS India so far?

PBS has a rich heritage in India dating back to 1955 when the brand was first registered in the country. However, it's been in recent years that the company has truly flourished with the establishment of PBS INDIA, achieving remarkable success and steady growth while forging valuable new partnerships. Today, PBS INDIA stands as a well-established player in the Indian aerospace and defence market, collaborating with prominent defence organizations and companies including

DRDO, HAL, JSR Dynamics, and L&T Defence.

Our commitment to the Indian market is demonstrated through our regular participation in major aerospace and defence exhibitions. Following our successful presence at Singapore Airshow, Vietnam Defence, Malaysia last year, PBS INDIA is now preparing to showcase its capabilities at the upcoming Aero India exhibition in Bengaluru.

A significant focus of our operations is the development and supply of advanced Auxiliary Power Units (APUs) specifically

designed to perform in the most challenging environments. Our APUs have been engineered to deliver exceptional reliability and performance across extreme weather conditions, ensuring consistent operation whether in high-altitude mountainous regions or in extreme desert conditions. This robust capability directly enhances the operational readiness and mission effectiveness of various aircraft platforms in the Indian Air Force fleet.

What products will you present at Aero India?

We will showcase our comprehensive portfolio of aviation products. The centrepiece of our presentation will be our advanced PBS turbojet engine family, demonstrating our expertise in propulsion systems. Visitors will have the opportunity to see our complete range of Auxiliary Power Units (APUs), which are known for their exceptional reliability in extreme conditions. Additionally, we will present our Environmental Control Systems (ECS), highlighting their efficient performance and versatility across various aircraft platforms. Our technical experts will be available to discuss specific applications and customization possibilities for all these systems, particularly focusing on their





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integration into both existing and future aerospace programs.

Which of the company's products could be well suited for Indian aircraft, helicopter and UAV programmes?

The Auxiliary Power Units (APUs) and environmental control systems (ECS) are a great fit for future Indian helicopters and aircraft programmes. In terms of UAVs, PBS has delivered thousands of turbojet, turboprop & turboshaft engines for single-use and multi-mission UAVs in both civil and military sector.

What's new in APUs?

We are proud to showcase our comprehensive range of mutually interoperable APUs and Environmental Control Systems, designed specifically for medium helicopters and adaptable for heavy UAV applications. Our product portfolio is perfectly aligned with India's

aircraft, helicopter, and UAV programs. As part of PBS GROUP, a leading aerospace manufacturer with nearly 50 years of international experience, we leverage extensive expertise in our solutions. Our strength lies in our comprehensive in-house capabilities – from development through manufacturing to testing - all conducted to the highest global aerospace standards.

PBS India has the ability to design, construct, manufacture and test entire products – how can this cater to Govt efforts towards greater defence indigenisation?

It is simple, PBS INDIA shares the know-how and capabilities of the entire PBS GROUP, which boasts a 200-year history and 50 years of experience in designing, manufacturing, and testing aircraft turbine systems. Therefore, any requirements from the Indian Government or the Indian

MoD will be supported by the whole group. This will lead to independence from foreign companies and faster development of crucial systems for various types of civil and military aircraft, which I believe will prove highly beneficial. We are ready and willing to support the Indian aerospace industry. We are starting to be really Make in India, this means, we are starting manufacturing engines in India too.

What do you see for the future of PBS INDIA?

PBS recognizes the growing role of India in the global economy. PBS India intends to strengthen its presence and plans to expand its business in the country. We aim to build a larger presence in our "Indian hometown" Bengaluru and grow our operations across India and Southeast Asia too. This expansion will create more jobs and increase our demand for locally produced materials, services, and workforce as we allocate more production, service, and after-sales support capabilities in India. And of course, we are excited about working with young talent from this beautiful country. PBS INDIA is growing, and we are proud to be a reliable partner for the Indian defence industry.



JSM Composites: Mastery in Composite Manufacturing



JSM Composites is a leader in composite manufacturing, offering engineering, tooling solutions, and prototyping techniques tailored to meet industry needs. Serving sectors such as automotive and aerospace, JSM Composites is recognized for its reliable and precise solutions that help clients develop effective, high-performance applications. "Our commitment to democratizing access to cutting-edge composites, coupled with rapid turnaround times and stringent quality control, has fuelled our growth," says Srajan Kumar, Founder & Technical Director, JSM Composites. In an interview with Aeromag, he discusses the company's growth and its diverse capabilities.

Srajan Kumar
Founder & Technical Director, JSM Composites

Can you share the story behind the inception of JSM Composites and how the company has grown to become a leader in the industry?

JSM Composites was born out of a critical observation while working with a UAV company: India's composite manufacturing ecosystem lacked access to advanced, aerospace-grade materials that are foundational for high-performance applications. At the time, materials like High-Performance Tooling Boards, PMI Foams, Aramid Honeycombs, and Structural Adhesives were either scarce or required costly imports. Recognizing this gap, we founded JSM Composites to bridge the divide by not only supplying these materials but also integrating technical support and end-to-end manufacturing services.

Our commitment to democratizing access to cutting-edge composites, coupled with rapid turnaround times and stringent quality control, has fuelled our growth. Over the past few years, we've evolved into a trusted partner for aerospace and defence sectors, enabling clients to develop indigenous, world-class products. Today, our success is measured by the value we deliver—accelerating innovation while maintaining

uncompromising standards.

How does JSM Composites leverage the latest technology and methodologies to drive innovation and set new benchmarks?

Innovation is embedded in our DNA. Our team combines deep technical expertise with state-of-the-art infrastructure, including in-house 3D laser scanning, 3-axis and 5-axis CNC milling, and advanced moulding capabilities. By keeping the entire product development cycle under one roof—from design to machining and quality assurance—we ensure precision, agility, and full control over timelines.

We also invest in cutting-edge methodologies, such as automated machining systems and high-tech dimensional checks to enhance consistency, repeatability, and assurance. This holistic approach allows us to push boundaries, whether in machining novel materials like high-temperature epoxy boards or delivering complex tooling solutions for next-gen aerospace applications. By staying ahead of technological curves, we empower clients to redefine what's possible in composites manufacturing.

What sets JSM Composites' tooling solutions apart and makes them the preferred choice for clients?

Our tooling solutions are engineered for excellence. At our core are proprietary PU and Epoxy Tooling Boards from Base Materials UK, renowned for their dimensional stability, low thermal expansion, and ease of processing. These boards can withstand extreme temperatures (140°C–190°C), making them ideal for high-performance aerospace tooling, including prepreg-compatible molds and direct-to-part applications.

Clients choose us because we combine material superiority with end-to-end support. For instance, in recent projects, we delivered machined epoxy molds for structural panels on both manned and unmanned aircraft, reducing lead times and costs by 40% compared to traditional methods. By prioritizing precision, durability, and adaptability, our tooling solutions empower clients to achieve faster, cost-effective, and scalable production.

How does precision engineering play a crucial role in JSM Composites' ability to deliver innovative, reliable lightweight

materials with rapid turnaround times?

Precision engineering is the backbone of our operational philosophy. By integrating advanced CAD/CAM systems with automated machining technologies, we achieve micron-level accuracy in every component. This precision is critical for developing lightweight materials, where even minor deviations can compromise performance. For example, our CNC-machined honeycomb cores and PMI foam panels for core applications are optimized for strength-to-weight ratios, meeting stringent aerospace standards.

Rapid turnaround is enabled by our vertically integrated workflows. From material selection to final quality checks, every step is streamlined to eliminate bottlenecks. Recently, we delivered a batch of UAV structural components in just 21 days—a process that typically takes competitors 6-8 weeks. This synergy of precision and efficiency ensures our clients stay ahead in fast-paced industries.

What makes JSM Composites' prototyping solutions stand out in terms of efficiency, precision, and reliability for turning concepts into finished products?

Our prototyping solutions thrive on three pillars: speed, accuracy, and scalability. Leveraging additive manufacturing and high-speed 3-axis machining, we transform conceptual designs into functional prototypes within days. For instance, our in-house 3D laser scanning allows real-time validation of prototypes against original CAD models, ensuring flawless geometry.

Reliability stems from rigorous testing protocols, including thermal cycling and load simulations, which validate prototypes under real-world conditions. A recent success involved developing a flight ready functional drone—delivered in 21 days, it underwent seamless transition to mass production. By merging agility with uncompromising quality, we turn visionary ideas into market-ready solutions.

What are the highlights of JSM Composites' participation in Aero India 2025, and what are your strategic priorities?

At Aero India 2025, we're excited to showcase our latest innovations, including next-gen epoxy tooling boards capable of 200°C resistance and advanced quality inspection systems. A key highlight will be live demonstrations of our rapid prototyping workflow, illustrating how we compress development cycles by at least 40%. Our priorities align with India's vision for self-reliance in aerospace. First, we aim to forge partnerships with public and private aerospace firms to co-develop indigenous composite solutions. Second, we're launching a skilling initiative to train engineers in advanced composites manufacturing, addressing industry talent gaps.

Through these efforts, JSM Composites is not just participating in Aero India—we aspire to shaping the future of aerospace innovation.

BHARAT FORGE



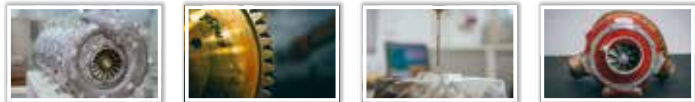
Bharat Forge Aerospace's state-of-the-art facilities include advanced forging presses, 5-axis machining centres, and NADCAP-Certified heat treatment units. Supported by cutting-edge R&D, our expertise drives precision, innovation, and excellence in aerospace manufacturing.



With digitisation enhancing efficiency and new capabilities under the **Technology Development Fund (TDF)**, Bharat Forge is well-prepared to meet the evolving needs of the aerospace sector. We continue to set global benchmarks while building a sustainable and innovation-driven future.

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Raytheon Awarded \$333M Contract for SM-6 Block IA Production



Raytheon, an RTX business, was awarded a \$333 million contract from the U.S. Navy to produce Standard Missile-6 (SM-6) Block IA missiles.

"SM-6 has a proven performance, and this contract is an important step for providing this urgently needed weapon to our armed forces," said Barbara Borgonovi, president of Naval Power at Raytheon. "Raytheon

continues to work closely with our customers to ensure our military has an unfair advantage at sea and to keep our adversaries guessing."

Deployed on U.S. Navy ships, SM-6 delivers a proven, over-the-horizon offensive and defensive capability by leveraging the time-tested Standard Missile airframe and propulsion system. It's the only missile that supports anti-air and anti-surface warfare and sea-based terminal ballistic missile defense in one solution, enabling the U.S. and its allies to cost-effectively increase the offensive might of surface forces.

SM-6 has been successfully fired from various U.S. Navy ships, unmanned vessels, and launchers on land. In March 2024, SM-6 demonstrated its anti-missile capabilities by successfully intercepting a medium-range ballistic missile target at sea during the Flight Test Aegis Weapon System (FTM)-32 exercise.

CSIR-NAL: Advancing Civilian Aerospace Research



Council of Scientific & Industrial Research - National Aerospace Laboratories (CSIR-NAL), the only government aerospace research and development laboratory in the country's civilian sector, is driving key aircraft programs such as the two-seater flying trainer (Hansa-NG) and the Multi-Role Light Transport Aircraft (19-seat SARAS-Mk II) to boost air connectivity under the Government of India's UDAN scheme. In an interview with Aeromag, Dr Abhay A Pashilkar, Outstanding Scientist and Director of CSIR-NAL shares insights into these cutting-edge aircraft development programs.

Dr Abhay A Pashilkar
Outstanding Scientist and Director of CSIR-National Aerospace Laboratories

Could you talk about the significance of CSIR-NAL in the civil and military arena of the nation?

Currently, the laboratory has taken up major civil aircraft programmes like indigenous two-seater flying trainer (Hansa-NG) and Multi-Role Light Transport Aircraft (19 seat SARAS-Mk II) to enhance the air connectivity under Govt. of India's UDAN scheme.

It has also led the Project Definition Phase of the Regional Transport Aircraft (RTA) for preparation of the Detailed Project Report (DPR). The aircraft programs aim to meet the country's civil aviation requirements and to synergize the multidisciplinary expertise of the laboratory meeting the objectives of Atmanirbhar Bharat. NAL has also taken up the development of High Altitude Platforms (HAP) for applications like broadband communication, surveillance, earth observation, climate research etc., The laboratory is also in the process of implementing the 150 kg class Loitering – Munition UAV along with a prospective industry partner.

CSIR - NAL has been involved in all the major strategic aerospace programs in the country, notably the Light Combat Aircraft (Tejas) of Aeronautical Development Agency (ADA). The major technologies provided for the success of the LCA-Tejas include: Fly-by-wire control system, Fresnel lens optical landing system for LCA navy, and Composite structures.

The laboratory has also contributed to the Satellite and Launch Vehicle Programs of Indian Space Research Organization (ISRO), and the Missile Programs of Defense Research and Development Organization (DRDO).

CSIR-NAL significant contributions both in civilian and strategic sectors have resulted in the development of new technologies and systems which are also interest to industries.

To mention few key technologies and systems developed / being developed that are of interest to industries include: UAVs

for agriculture & health applications, Carbon fiber airframe components using innovative and cost effective fabrication technologies, Flight Control system for fighter aircraft, Wankel engine for UAVs, radomes for airborne and weather applications, indigenous autoclaves for composite manufacture, Electronic Target System for the marksmanship training for locating bullet hits on targets for the strategic sector, DRISHTI- an airport runway visibility assessor systems, AWMS- Airport Weather Monitoring System, Multi-Zone hot Bonder for composite repair, ARINC 818 IP core for high speed avionics solutions, Chromate free anodizing process for aerospace aluminium alloys, NAL FOQA flight data analysis system, etc.

Could you briefly outline the standout features of Hansa-NG two seat pilot training aircraft?

HANSA-NG is one of the most advanced flying trainer powered by Rotax Digital Control Engine with unique features like Just-In-Time Prepreg (JIPREG) Composite lightweight Airframe, Glass Cockpit, Bubble Canopy with wide panoramic view, electrically operated flaps, etc. HANSA-NG is designed to meet the Indian flying club needs, and it is an ideal aircraft for Commercial Pilot Licensing (CPL) due to its low cost and low fuel consumption. We have already received more than 100 nos. of LoIs (Letter of Intent) from various flying clubs.

The aircraft has got Type Certification by DGCA. Further to this, CSIR-NAL has invited EOI from the Indian industries for out-licensing of the Hansa-NG aircraft Know-how for Manufacturing & Commercialization. We have received quiet a good response and the in process of selecting the ToT partner shortly. We will be showcasing the HANSA-NG with a fully loaded cockpit with comfort hosiery, Bubble canopy with wide panoramic view, digital glass cockpit demo at Aero India 2025 so that the flying club instructors/owners can get a feel of the aircraft.

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Hansa - NG

Could you share the latest updates on the development of the Saras Mk 2, and how it contributes to India's ambitions in the civilian sector?

SARAS-Mk II aircraft specifications have been evolved through the interactions with Airline Operators and Armed Forces to meet their current operational requirements. SARAS-Mk II is a 19 Seat Light Transport Aircraft with multirole capabilities like Passenger transport, Troop transport, VIP transport and Casevac (Air Ambulance).

The aircraft is exclusively designed for operations from short runways, hot and high airfields, and semi-prepared runways for connecting Tier 1 & Tier 2 cities/towns. SARAS-Mk II is one of the unique aircraft where operational benefits are maximized through the Pressurised Cabin, Digital antiskid braking, Autopilot with Cat II landing, two lever engine operation, Lightweight materials etc., keeping cost minimum. At present, the SARAS-Mk II programme has completed the preliminary design of all the systems. We also realized all high fidelity test facilities to reduce the flight test efforts where the majority of test points can be demonstrated on the ground. The Critical Design Review is ongoing and expected to be completed by end of April this year.

Subsequent to this the fabrication of components, sub-assemblies and assemblies will be initiated. Fabrication of Jigs/Fixtures/tools for assembly integration is ongoing. The aircraft has been designed for ease of manufacturing and assembly with the use of dynamic digital mockup tools (DMU) to reduce assembly and maintenance time. Armed Forces have already committed 15 number of Saras Mk2 for initial induction. The aircraft will be compiled to FAR 23 standards and will be certified by DGCA and CEMILAC for Civil and Military use. The first flight is likely to be held by end of 2027 and the production will be from 2030 onwards at HAL. The SARAS MKII will be a game changer to boost air connectivity under the UDAN scheme. In the Aero India CSIR-NAL is looking for potential risk sharing partner for civil application of Saras Mk-II.



SARAS-Mk II

CSIR-NAL has made impressive progress on the RTA program. Would you elaborate on the estimated timeline for this project to reach its final stage?

CSIR-NAL along with DRDO-ADA & HAL has successfully completed the Project Definition Phase (PDP) of the programme and a Detailed Project Report (DPR) along with inputs to formation of Special Purpose Vehicle (SPV) to implement the RTA programme has been submitted to Ministry of Civil Aviation (MoCA), Govt. of India. MoCA is further taking up the formation of SPV with the Government for necessary appraisal and approval.

Under the PDP, design activities related to top level aircraft requirement, statistical studies, take-off weight estimation, constraint analysis, wing design, empennage design, and cabin layout & fuselage design, defining test plan and facilities, requirement for production, identification of new technologies for induction have been included. The outcome of the PDP also addressed cost and time estimates for the Full Scale Engineering & Design Phase (FSED) and Series Production Phase (SPP) to be taken-up by the SPV.

How NAL's High Altitude Platforms (HAP) will be a game-changer in surveillance & telecommunication applications?

High Altitude Platforms (HAP) or High Altitude Pseudo Satellite (HAPS) – when integrated with a payload - are solar -secondary battery airborne platforms, that merge the persistence of a geostationary satellite with the re-tasking or re-purposing ability of a UAV and do not have the time window limitation of low-earth-orbit satellites.

They can provide strategic area ISR, earth observation, weather information, non-terrestrial network for communications, among other uses. In order to fully utilize the potential of such HAP systems, there are several hurdles that have to be surmounted which would address availability of payloads suitable for usage on such aircraft, potential denial of critical subsystems that are globally sourced, launch sites for these aircraft and navigation of this autonomous vehicle through commercial airspace and regulatory aspects of such aircraft. As regards telecommunication application, while cellular networks in the



CSIR-NAL's High Altitude Platform Vehicle

form of ground stations and towers are addressing these needs, in mountainous and remote areas these face challenges. Earlier studies have shown that a HAP deployed at an altitude of 20km over such areas can provide services to a circular area of 300km diameter.

They have several advantages over terrestrial and satellite in that they can have a larger coverage area than ground based systems and better path-loss characteristics than satellites.

The Proof-of-Concept of full-scale HAP is expected to be demonstrated at a height of 20 km with 2 hrs endurance by end of 2025. HAP will be a game-changer to work as a pseudo satellite for telecommunication applications in the 5G & 6G

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The company excels in Manufacturing Design Services, offering detailed technical deliverables such as Manufacturing Operation Sheets (MOS), process flow charts, and comprehensive documentation, ensuring seamless supplier collaboration and superior product quality. LWT's state-of-the-art facilities and skilled workforce enable them to deliver precision-crafted components that meet the stringent standards and certifications of the aerospace and defense sectors.

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Karthikkraja.G
Chief Executive Officer

spectrum with advantages like low data latency, high bandwidth, the flexibility of launch and low cost.

NAL has taken-up the development of kamkazi Drone with an indigenously built Wankel engine. Could you talk about the significance of these UAVs?

In the proposed development, the Loitering Munition UAV is going to be powered by CSIR-NAL developed 30 HP Wankel engine. The indigenous LM UAV shall be designed to carry an approximately 15 kgs of warhead and 10-15 kgs of suitable sensing payloads. It is aimed to have contemporary performance characteristics such as loitering endurance of 6 – 9 hours with a maximum range of 900 Kms. The overall weight of the LM UAV to be restricted below 150 Kgs.

In order to accelerate the development and production activities of LM-UAV, CSIR-NAL has issued the RFP for selection of industrial partner who are willing to participate as Technology cum Investment and risk sharing partners towards the development manufacturing & commercialization of LM UAV. The objective of the joint collaboration is to select suitable technology cum investment & risk sharing partner for the joint design and development of LM UAV followed by commercialization of product. The Industrial partner shall carry out design, development and testing of the subsystems either solely or jointly with CSIR-NAL, shall also take up the production, marketing and after sales of the developed Loitering Munition UAV. CSIR-NAL has already developed 30 HP Wankel engine. It



has been certified by CEMILAC for carrying out flight tests. The technology for manufacturing these engines will be transferred on Non-Exclusive basis to the Industrial partner. The advantage of the development apart from being indigenous product are many like cost effective compared to imported UAVs, scaling to the need, indigenous supply chain, variants can be delivered in short notice, swarm capability can be built around these Loitering Munition UAVs, and can be tailor-made to a particular defence application if required.

Could you elaborate on NAL's collaboration with the Indian industry in developing pre-impregnated carbon fibres, and how this contributes to the growth of the aerospace sector?

CSIR-NAL is committed to collaborate with industry partners for development of very crucial product. In this instance, we have collaborated with M/s Bhor Chemicals Pvt Ltd to develop and commercialize indigenous prepregs (resin pre-impregnated carbon fibers). This collaboration aims to address the increasing demand for lightweight materials in the aerospace sector. CSIR-NAL has transferred resin matrix technology to M/s Bhor Chemicals to produce high-temperature cure aerospace-grade prepregs for aircraft structural applications, which are currently being certified by CEMILAC and DGAQA. Through these industry partnerships, CSIR-NAL advances the development

of such cutting-edge technologies and strengthens India's self-reliance in this vital domain.

Could you provide insights into NAL's development in eVTOL aircraft and how they align with the future of urban air mobility in India ?

NAL's eVTOL efforts align with India's broader Make in India initiative, focusing on indigenous solutions for sustainable and scalable urban mobility.

We have initiated the design and development of a 2-seater, 1000 kg eVTOL prototype, which aligns with the requirements of UAM in Indian metros. Designs focus on operability in constrained urban environments, including rooftop and vertiport compatibility, essential for UAM in cities like Bengaluru, Delhi, and Mumbai. With increasing urbanization, eVTOLs provide an alternative to reduce traffic congestion by utilizing vertical space. NAL's cost-effective design approach aligns with India's vision to make UAM accessible to a broader population. The focus on electric and hydrogen propulsion supports India's commitment to reducing emissions and dependence on fossil fuels.

The challenges for the success of eVTOL encompass; advancements in energy density and charging infrastructure are critical for scaling eVTOL operations, creation of vertiports and integration into existing airspace, workable air traffic network is crucial for scaling up of eVTOL networks in urban environments, for eVTOLs data from multiple sensors are to be fused in real time for implementation of obstacle avoidance and path planning algorithms and majorly in case of any failure, control system algorithms need to provision for rotor failure, low energy state for emergency auto land options.

To accelerate the development and early entry to market, NAL is fostering collaborations with start-ups, OEMs, and regulatory bodies to accelerate eVTOL adoption. NAL is also working closely with the DGCA (Directorate General of Civil Aviation) to establish the certification and operational guidelines for eVTOLs in India. These developments position India to be a frontrunner in adopting UAM, with CSIR-NAL as a key player driving innovation and implementation.

Could you elaborate on the significance of mach33.aero and its impact on the industry?

Foundation for Aerospace Innovation, Research and Entrepreneurship (FAIRE) with a brand name of MACH33. AERO incorporated at CSIR-NAL campus by National Research Development Corporation (NRDC), in association with Foundation for Innovation and Social Entrepreneurship (FISE) with brand name of Social Alpha, an Incubation center established by Tata Trusts, and Dept. of Science & Technology (DST), along with CSIR-NAL. Mach33.aero India's first public private partnership to promote innovation and entrepreneurship in aviation, aerospace and space-technologies.

The salient benefits offered to the incubated Startups stand to receive the funds from FAIRE, Govt. Grants and Angel Investors with equity funding of up to Rs 100 Lakh subject to due diligence, paid pilot deployment opportunities, long-term incubation and FAIRE(mach33.aero) credits worth Rs 20 Lakh, and full stack venture development support. In summary as on date about 21 start-ups have been incubated under UAV Grand Challenge, IDEX Progarm, and Open Call and about 20 start-ups are provided training & mentorship in Deep Tech, Artificial Intelligence, and Green Technologies in aerospace domains.

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Paris Air Show 2025: A Look Ahead



The 55th edition of the Paris Air Show is just around the corner, and anticipation is building for what promises to be a landmark event in the aerospace industry. “The Paris Air Show plays a pivotal role in fostering international collaboration and partnerships by bringing together key players from across the globe and acts as a cornerstone for global aerospace collaboration,” says Guillaume Bourdeloux, CEO of the International Paris Air Show. In an interview with Aeromag, he provides insights into the show’s key highlights, its focus on innovation and sustainability, and its crucial role in fostering global collaboration.

Guillaume Bourdeloux
CEO of the International Paris Air Show

What are you most excited about for the upcoming 55th edition of the Paris Air Show?

I’m most excited about the incredible innovations and technological advancements that will be showcased at the 55th edition of the Paris Air Show. This year, we have a special focus on sustainable aviation, with numerous exhibitors presenting their latest developments in hydrogen propulsion, electrification, and eco-efficient aircraft. Additionally, the Paris Space Hub will highlight the critical role of space in building a sustainable future, featuring themes such as climate and the environment, connectivity, and digital technology.

Could you share how the global reach of the Paris Air Show has evolved over the years and what factors have contributed to its increasing international participation?

Over the years, the Paris Air Show has grown to become the world’s largest aerospace event, attracting participants from over 169 countries. This evolution is driven by our commitment to showcasing cutting-edge technologies and fostering a platform for international collaboration. The inclusion of diverse sectors such as civil aviation, defence, and space, along with dedicated programs for start-ups and innovations, has significantly contributed to our increasing international participation.

Could you highlight some of the new and enhanced features of this year’s show?

This year, we are introducing several new and enhanced features. I am particularly excited about the Paris Space Hub, a brand-new exhibition area dedicated to space-related innovation and collaboration. This hub will spotlight themes such as climate and environmental sustainability, digital connectivity, defence, and space exploration. The Start Me Up program for aerospace start-ups will also be a major highlight, offering a platform for innovative companies to present cutting-edge technologies. Additionally, the Paris Air Lab will provide an immersive experience exploring the future of air transport, focusing on digitalization, AI, quantum technology, sustainable energy, and eco-efficient aircraft. These features make the event a true reflection of the fourth revolution in aeronautics, fostering innovation and global collaboration.

What role does the Paris Air Show play in fostering international collaboration and partnerships in the aviation industry?

The Paris Air Show plays a pivotal role in fostering international collaboration and partnerships by bringing together key players from across the globe and acts as a cornerstone for global aerospace





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collaboration. By hosting 322 official delegations from 97 countries in 2023, it creates opportunities for governments, industries, and institutions to connect. It serves as a strategic platform for networking, knowledge exchange, and business development. The show facilitates discussions on global needs for innovation, defence, and security, and provides opportunities for companies to showcase their latest technologies and form strategic alliances.

Could you highlight some of the major companies that will be participating in the Paris Air Show 2025?

The Paris Air Show 2025 is proud to welcome 85 of the world's top 100 aerospace companies, including major players like Airbus, Boeing, Dassault Aviation, Lockheed Martin, and Safran. This extraordinary lineup underscores the event's status as a must-attend gathering for the industry. Additionally, we will have a strong presence from leading space agencies, defence companies and drones. The show will also host start-ups from around the world, showcasing their innovative solutions and technologies.

Given the ever-evolving nature of the aerospace industry, how does the Paris Air Show aim to stay ahead of the curve in terms of technology, innovation, and attendee engagement?

To stay ahead of the curve, the Paris Air Show continuously evolves by incorporating the latest technological trends and innovations. We focus on themes such as digitalization, AI, sustainable energy, and new mobility solutions. Our interactive platforms like the Paris Air Lab and the Start Me Up program ensure that attendees are engaged with the

most current and relevant advancements in the industry. Additionally, we provide a comprehensive schedule of events, including demonstrations, speeches, and networking opportunities, to keep our attendees informed and connected.

Lastly, it's important to note that the Paris Air Show is not just a trade event but also a grand public festival. From June 20 to 22, the show opens its doors to the general public, offering a unique opportunity for aviation enthusiasts and families to experience the excitement of the aerospace industry.



VEM: Powering Aatmanirbharta in Aerospace & Defence



Within a span of 37 years since being set up in 1988, Hyderabad based Aerospace and Defence and Homeland Security company in the private sector, VEM Technologies, has grown in diversified technological fields to manufacture the state of the art, highly reliable systems for aerospace and defence applications.

The core strength of VEM is assembly, integration and testing. It is also into Design and engineering, manufacturing engineering, quality engineering coupled with systems engineering which are its core strengths. The company employs more than 1200 professionals with focus on Research, Design, Development, Manufacture, Assembly, Integrating and testing of Systems, Products and Solutions.

VEM Technologies has to its credit of being the first private sector unit to make a central fuselage system for Light Combat Aircraft (LCA) Tejas. Scaling up its defence manufacturing capabilities, VEM is coming up with an integrated defence facility at Yelgoi, Zaheerabad in Sanga Reddy near Hyderabad with 1,000 crore investment. This exclusive defence facility, spread over 511 acres, will be operational in next two years (2027) and will be involved in making next generation weapon systems end to end, including missiles, radars, seekers, engines, avionics, fighter planes, helicopters and more. Recently, it signed a memorandum of understanding (MoU) with the Telangana government.

According to the Chairman and Managing Director, V Venkata Raju, this facility will also serve as a defence export

processing zone to cater to the overseas market.

VEM has a long history of successfully supporting customers in meeting their requirements. It also continues to expand the product line to meet the customers' needs. The company believes in partnership with its customers and also with its suppliers. By virtue of their support, VEM has emerged as a system integrator for various leading customers both in the domestic and international market segment.

The Founder Chairman of the company, V Venkata Raju, coming from an agricultural background did his graduation in mechanical engineering and post-graduation in tool design and engineering. He started the company by producing the connectors for the strategic Defence industries, BDL, ECIL.

He was very successful in the indigenisation of hi-precision connectors which were very critical for the productionisation of Konkur and Milon missiles and got the National award for Excellent Performance in Indigenization in the category of electrical and electronic engineering for 1996-97.

The company got through the required Licenses for Missiles, Bombs and Rockets and the license for the explosive facility is at the final stage. VEM is coming out with an Aerocity that houses the Missiles, Bombs productionisation including the explosive facility and an airstrip for the flight trails of UAVs, UAS and Business jets.

VEM has a proven track record to build to specifications and build to print of various systems from the nose to the tail for all major categories of Missiles. The in-house infrastructure caters to the systems integration and medium to large section level integration activities.

The company was the development partner for the country's Laser Guided Bomb (LGB) programme and got recognised with a national award from DRDO "Best Technology Award for the Servo System". VEM is also the single largest production partner exporting major assemblies of LGBs over the years meeting the customer requirements both





in terms of quality and quantities.

It has been working on the LGB systems with the current day technology and is in the process of establishing an indigenised weapon fitting into 'Make in India'. The company is also working on its own anti-tank guided missile system – ASIBAL and has made a good foray into the UAV/ UAS and is pacing ahead for the systems integration with the related test facilities. It has partnered with Austrian company Schiebel that manufactures design-awarded UAS.

Systems for Helicopters and Aircrafts: VEM Technologies has developed a good customer base for the systems for this segment and is working closely for many systems to make the vertical as another important contributor.

Surveillance Systems: An upcoming division of the company is mainly aimed at Land, Naval and Airborne applications covering the areas of Radars, Electro-Optical Systems and Sensors with the networking software. VEM has techno-commercial collaboration with the world leader who has a proven track record, worldwide to support and build the country's homeland security systems.

With an excellent team of experts, the company is working on various technologies, verticals like Instrumentation, Robotics, Thermodynamics, Aerodynamics, Metallurgical, Power



electronics and power systems, controls, Photonics, Embedded Systems, Signal processing and image processing, Pyro techniques and propulsion systems, warheads, Power, Avionics, Communications, Motor tubes and its lining, Aerostructures, Hi-energetics (Pyro technology) and combination of systems as part of advanced defence systems.

VEM is already associated with many of the strategic and tactical missile programmes and to its credit, all the missiles in the country fly with one or more of VEM's On Board Systems. The company has been recognized as a production centre under Category 'A' by the Defence Ministry and thus authorized to productionise classified products.

It has received the Defence Industrial licenses based on the capabilities, infrastructure and business verticals. The company is planning to build a modern composite structure facility to cater to the Advanced Fighter Aircraft (AFA) Project, HAL's Helicopter Structure and

UAV structure. In addition, the company is building a large NADCAP approved Electro-plating and Painting Facility to meet the requirement of BRAHMOS missile, large aero-structures for aircraft, UAV and other weapon projects.

VEM has a strong product development group for both hardware and software with advanced development tools to work on system on chip applications using current day Field Programmable Gate Arrays (FPGAs). FPGAs are semiconductor devices that are based around a matrix of configurable logic blocks (CLBs) connected via programmable interconnects. FPGAs can be reprogrammed to desired application or functionality requirements after manufacturing.

In its endeavour to build Helicopters and UAVs, VEM is in the process of establishing facilities for filament and tape winding, Autoclave and Curing oven, Pre-prog Plant for tapes, machining facilities for composite tubes taking into consideration the complexities.



Jayasuriya Aero: Accelerating Aerospace Innovation



Driven by innovation and a commitment to excellence, Jayasuriya Aero has achieved significant growth in the aerospace industry. "At the core of Jayasuriya Aero's success lies its robust R&D capability. The company has invested significantly in state-of-the-art facilities, advanced technologies, and a team of skilled engineers, ensuring that it remains at the forefront of industry innovation," says Jayakar Krishnamurthy, Chairman, Jayasuriya Aero, Chennai. In an interview with Aeromag, he discusses about the company's key achievements, its contributions to Atmanirbharta, and its plans for the future.

Jayakar Krishnamurthy
Chairman, Jayasuriya Aero Pvt Ltd

Since its inception, Jayasuriya Aero has achieved significant growth in the aerospace industry. What do you believe are the key factors that have driven this remarkable

Since its inception, Jayasuriya Aero has carved a niche for itself in the aerospace industry, experiencing significant growth driven by a steadfast commitment to innovation, quality, and customer-centricity. The company's journey is marked by strategic partnerships, technological advancements, and a proactive approach to emerging market demands—a combination that has fostered both operational excellence and enhanced customer trust.

Jayasuriya Aero's impressive ascent can be largely attributed to its focus on cutting-edge technology and continuous process improvements. By embracing innovation and maintaining rigorous standards of quality and safety, the company has built a reputation for reliability and excellence. Its ability to swiftly adapt to market trends—coupled with a skilled workforce—has enabled it to deliver tailored solutions that meet complex aerospace and defence requirements.

The potential integration under the UCAL Limited umbrella further strengthens its research and development, manufacturing capabilities, and market reach, positioning Jayasuriya Aero for even greater success in a competitive industry.



Jayasuriya Aero manufactures airworthy products for military aircraft and space vehicles. Could you share your major contributions to the Atmanirbhar Bharat initiative?

For over 20 years, Jayasuriya Aero has been a dedicated manufacturer of high-quality fasteners, playing a pivotal role in bolstering India's defence capabilities. In alignment with the Atmanirbhar Bharat initiative, the company has expanded its expertise to include the design and development of Line Replaceable Units (LRUs), significantly reducing dependency on foreign suppliers.

Its foray into manufacturing machined parts, electronics, rubbers, electromechanical, and hydraulic components underscore a broader commitment to empowering India's aerospace and defence sectors. By continuously enhancing its product portfolio, Jayasuriya Aero aspires to be a major pillar in India's journey toward complete self-reliance.

Your client list includes prominent organizations like HAL, ISRO, DRDO,

and so on. Could you talk about your collaboration with these esteemed clients? How has it shaped your company's operations and product development?

The close partnership model is rooted in proactive customer engagement—right from the conceptual design stage through development, testing, and final delivery. A notable achievement is the rapid development of a pressure re-fuel connector for HAL within just six weeks, a testament to the company's commitment to quality and efficiency.

By maintaining frequent project reviews and open lines of communication, Jayasuriya Aero not only meets but often exceeds customer expectations, fostering strong, trust-based relationships that drive continuous improvement in product development.

How robust is your R&D capability, and what are your plans and priorities for future growth?

At the core of Jayasuriya Aero's success lies its robust R&D capability. The company has invested significantly in state-of-the-art facilities, advanced technologies, and a team of skilled engineers, ensuring that it remains at the forefront of industry innovation.

Its R&D initiatives span extensive research on new materials, processes, and testing methodologies—allowing the company to expand its product range and emerge as a comprehensive "one-stop shop" for aerospace & defence



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components. With ongoing investments in technologies such as 3D printing and smart materials, Jayasuriya Aero is poised to drive efficiency and reliability well into the future.

What are the key highlights of your participation at Aero India 2025?

Looking ahead to Aero India 2025, Jayasuriya Aero is set to make a bold statement by showcasing its indigenously developed aerospace components. Attendees can expect to see a comprehensive display of specialty fasteners, LRUs, and advanced capabilities in rubber, electromechanical, and hydraulic parts—all engineered for aerospace and defence applications.

The exhibition will also highlight the significant enhancements in in-house capabilities following the company's integration with the UCAL Group. For international manufacturers seeking a reliable and innovative partner in the Indian aerospace and defence market, Jayasuriya Aero emphatically declares, "We are here"—ready to collaborate and drive the next wave of industry transformation.

GE Aerospace Expands Next Engineers Program to Bengaluru

The GE Aerospace Foundation is expanding its Next Engineers college readiness program to Bengaluru, India, furthering its mission to inspire young people to pursue engineering careers. This expansion aims to strengthen



India's engineering talent pipeline. The Foundation, in partnership with Bengaluru-based leadership and volunteers, will select an academic partner, with an announcement expected in late 2025.

"GE Aerospace in India has supported new technologies for the industry collaborating with academia for more than 25 years," said Alok Nanda, Chief Technology Officer at GE Aerospace's

India Technology Centre. "The expansion of the Next Engineers program locally allows increased engagement for students interested in engineering careers."

Bengaluru was selected using a range of criteria, including GE Aerospace's employee footprint, the strength of GE Aerospace's manufacturing and engineering presence, and anticipated engagement in the program. GE Aerospace in India supports the entire lifecycle of the company's engines and products. It has a strong history of volunteering in the local community, including STEM education.

"We are immensely proud to announce our Next Engineers program in Bengaluru," said GE Aerospace Foundation President Meghan Thurlow. "Nearly 22,000 students around the world have experienced the power and possibility of engineering through our program and the GE Aerospace volunteers that support it. We look forward to reaching even more students with this program expanding to India."

MIL: Equipping India's Armed Forces



Prakash Agarwala
CMD, Munitions India Ltd

Munitions India Limited (MIL) is a Defence Public Sector Enterprise under the Ministry of Defence, Govt. of India. MIL is India's biggest manufacturer and market leader which is engaged in production, development, research, R&D and marketing of a comprehensive range of ammunitions and explosives for Army, Navy, Air Force and paramilitary forces.

MIL has its headquarter in Pune, Maharashtra with 12 state of the art production facilities strategically located all over India with a skilful work force of approximately 23000 people. These factories have proven integrated base for production of small, medium and high calibre ammunition, mortars, rockets

and hand grenades etc with in house manufacturing of initiatory compositions, propellants and high explosives for over 150 years.

MIL's prime objective is to provide cutting edge technology to its armed forces by equipping them with modern and quality battlefield ammunition. MIL is also leading worldwide exporter of ammunitions and explosives. The customer base is in North America, South America, Europe, Africa and Asia. The patronage we receive from our customers both in India and abroad reflects their faith in quality of our products and services. "WE ARE THE FORCE BEHIND THE ARMED FORCES".

The company is a major contributor



to India's position as one of the top 25 global defence exporters having exported ammunitions and explosives worth INR 1500 crores for FY 2024-25 till now. As exports is the thrust area of MIL, it has made a Country- Product matrix to have a focused approach on the expansion of Geography and expansion of the exportable product base.

MIL has appointed multiple channel partners across the globe for marketing of MIL products and services and also discussing with major OEMs to become part of the International Supply Chain of the ammunition components, explosives and sub-assemblies. MIL has received various awards for achievement in exports and aims to become Billion-dollar company soon.



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India's Span Air Signs Purchase Agreement for Bell 429 Helicopter



Bell Textron Inc., a Textron Inc. (NYSE:TXT) company, announced the signing of a purchase agreement for a Bell 429 helicopter with Span Air Private Limited.

Headquartered in New Delhi, Span Air Private Limited is a leading private and corporate air charter operator that has been at the forefront of India's aviation industry since it began operations in 1995. Upon delivery, Span Air will operate two Bell 429 helicopters, solidifying its position as the first operator to introduce the Bell 429 in India in 2010.

"Since Span Air launched the Bell 429 in India, we have seen our customers consistently select the Bell 429 for their charters because of its comfort, safety and reliability," said Capt. SK Mallik, CEO, Span Air. "As a result, our Bell 429s are comfortably the most popular choice of aircraft among our customers and I am excited to see our new Bell 429 exceed expectations once again."

"We are honored by the trust that Span Air has placed in Bell for two decades with today's purchase of their Bell 429 helicopter," said David Sale, managing director, Asia Pacific, Bell. "The Bell 429 is renowned for its exceptional performance, advanced technology, and outstanding comfort, making it an ideal choice for discerning clients seeking a smooth and luxurious travel experience. We look forward to supporting Span Air as they look to enhance their operational capabilities and cater to the evolving needs of the corporate and private charter market in India with their new Bell 429."

With over 500 Bell 429s operating globally and 11 in India, the aircraft has established itself as one of the most successful light twin helicopters on the market since its certification in 2009.

The Bell 429 is renowned for its exceptional speed, performance, range, and low lifecycle cost, making it a versatile and cost-effective solution for a wide range of missions, including law enforcement, para-public operations, oil and gas exploration, and corporate transport.

Almaz-Antey Displays Comprehensive Defence Solutions



Almaz-Antey Air and Space Defense Corporation is participating in the AERO INDIA 2025 aerospace exhibition, held in Bangalore, India, from February 10-14, 2025.

The exhibition features models of combat tools that are part of the long-range Triumph S-400 SAM system designed to combat against contemporary and potential air assault tools. In particular, S-400 can

engage ECM aircraft, AWACS aircraft, reconnaissance aircraft, including those that are part of surveillance and attack systems, tactical and theatre level ballistic missiles, midrange ballistic missiles, stealth aircraft and other air assault tools in an intensive electronic warfare environment.

The company also showcases the models of its Tor short-range anti-aircraft missile system series, including the stationary and mobile versions of the Tor-M2KM

unmanned weapons unit, the tracked Tor-2R and wheeled Tor-M2K units. They are meant to protect sensitive objects and troops, stationary and on the move, against attacks by airplanes, helicopters, cruise missiles, anti-radar and other guided missiles, glide and guided air bombs, and drones, in heavy weather and ECM effects. It only takes three minutes to switch the system from travelling to combat position. The contemporary Tor systems are capable of firing on the move; they feature high mobility, efficiency and flexibility in use.

The holding's set of exhibits also include the model of the Typhoon-PVO(E) APC manned by operators of portable SAMS. The unit is based on the chassis of KAMAZ-4386 armored truck to provide direct protection of troops against air assault during any kind of combat and on the move. Typhoon-PVO(E) is equipped with an Aqueduct radio station, an Azimut navigation system, a turret with a sighting system for a Kord type machine gun, and carries five troops including section commander, two SAM operators,





also features information about the Shtil-1, Resurs, Rif-M naval-based anti-aircraft missile units, Moskit-E and Moskit-MBE ship-mounted missile systems and the Podzagolovok-24E set of equipment for providing electromagnetic compatibility of the ship's radio and electronic tools.

The visitors will be able to learn about a wide range of radar systems including Gamma C1TE, Kasta-BME, Istra-E, Podlet-K1KE, Furke-E, Vitim, Podsolnukh-E, 1L121E, 1L122E, 1L125E, and the Voprosnik-E multiple mode radar.

The company plans to hold meetings with its traditional partners and intends to expand the range of its potential customers, including the services of upgrade and maintenance of the previously supplied equipment.

Almaz – Antey is one of Russia's largest integrated defense sector conglomerates. It is entitled to engage in foreign trade deals at its own discretion with regard to defense products, including supplies of spare parts, repair and upgrade of earlier supplied equipment.

The company pays special attention to training the customer's staff and to the issues related to use and maintenance of the provided property, offering post-production maintenance, repair, upgrade, and utilization services.

a machine gunner and a driver-electrician. The visitors will be able to see the model of the MSP-418K small-sized jamming station used on MiG-29 fighter planes. The station is capable of individual and individual-mutual active jamming of radio-electronic means of weapons guidance and control. The MSP-418K unit can be integrated into other Russian and foreign aircraft as well.

For the first time ever, Almaz – Antey presents information about its L203

Gardenia active jamming system designed to protect aircraft from radio guided air-to-air and surface-to-air weapons.

Besides, Almaz – Antey exhibits the model of the Redikom movable check-up and repair module designed for technical maintenance and restoration of air defense weapons and equipment at its deployment locations.

The holding's experts will also tell the visitors about the naval means of air defense. The company's exhibition stand



BEL: Bolstering Atmanirbhar Bharat



Bharat Electronics Limited (BEL) is playing a pivotal role in realizing the vision of Atmanirbhar Bharat by prioritizing indigenous R&D, in-house product development, and capacity expansion. The company is also strategically expanding its footprint across both Defence and Non-Defence sectors, with a focus on civil aviation, cybersecurity, and metro systems. "Diversification across products, segments, customers, industries, and geographies remains an important focus area to unlock new opportunities and scale growth," says Manoj Jain, CMD, BEL. In an interview with Aeromag, he provides valuable insights into the company's business strategies, diversification plans, and impressive financial performance.

Manoj Jain
CMD, BEL

Can you tell us how BEL is helping the Government realise the dream of an Atmanirbhar Bharat?

BEL, since inception, has been working towards achieving self-reliance. Responding to the clarion call by the Hon'ble Prime Minister of India, BEL has recalibrated its efforts and is strongly promoting the Government's Make in India initiative by laying strong thrust on in-house R&D and indigenisation, Public-Private Partnerships, Joint Ventures, capacity expansion and modernisation.

The Akash Air Defence Weapon System of BEL is a great success story and shining example of BEL's indigenous design, development and manufacturing drive. The Coastal Surveillance System developed by BEL for the Indian Coast Guard is now being offered to other friendly countries as well as for generating export business. The Weapon Locating Radar, developed indigenously by BEL and DRDO lab LRDE, and its lighter version designed for surveillance in mountainous and high-altitude terrains are proving to be game changers for India's military.

To ensure that we stay at the forefront of innovation, we invested 6.24% of our

turnover in R&D last year and, as a result, achieved 77% of our turnover in FY 2023-24 from indigenous products. Increasing the level of indigenisation of its products and systems has not only given BEL long-term competitive advantage but also helped in aligning itself with the country's dream of achieving Atmanirbharta (self-reliance) in Defence.

How do you see BEL making an impact in the domestic Defence and non-defence markets in coming years and what are your strategies to retain leadership position in these sectors?

BEL has maintained a decent mix of Defence and Non-Defence business in its overall business portfolio. In the Indian Defence Electronics segment, we continue to hold a significant market share based on our deep understanding of customer's needs and our ability to fulfil it. As the technology landscape continues to evolve in Defence sector, our concerted efforts in building state-of-the-art, innovative products and solutions have helped us in being the preferred partner of our armed forces.

BEL is actively participating in the

MoD's Make-I, Make-II and Make-III projects involving indigenous solution development with emphasis on Sub-Systems, Systems and Services for which capabilities and competencies already exist. Further, BEL is also actively investing to develop new capabilities as needed. Opportunities are being explored to build long-term relationships with defence industry participants.

Diversification across products, segments, customers, industries and geographies remains an important focus area to unlock new opportunities and scale growth. This includes growing the Non-Defence business where we see significant prospects, especially in metro, civil aviation and cyber security areas. We will continue to build on our existing competencies and diversify to newer areas. Additionally, we are pursuing opportunities to expand our customer base in the existing and new geographies.

Though competition continues to intensify in our major business segments, our laser sharp focus in delivering our brand promise of Quality, Technology & Innovation to our customers gives us a distinct competitive advantage. This will

continue to remain our guiding business mantra for retaining leadership in our core business segments.

Please tell us about your company's financial performance, turnover, order book position, etc.

BEL has always been a profit-making PSU despite various challenges including stiff competition. FY 2023-24 saw the company achieve a record turnover of Rs. 19,819.93 Crore as against Rs. 17,333.37 Crore in FY 2022-23, thereby registering a growth of 14.35%. The growth was driven by strong performances across all segments. Defence contributed to 81% of revenue in FY 2023-24 with the balance 19% coming from the Non-Defence segment. Profit after Tax grew by 33.7% to Rs. 4,020 Crore in FY 2023-24 as against Rs. 3,007 Crore in FY 2022-23.

BEL also continued the momentum in order acquisition by booking highest ever annual order inflow of Rs. 35,046 Crore during FY 2023-24. Headed into FY 2024-25, we expect order acquisition in the range of Rs. 25,000 Crores. The company's order book position as on January 1, 2025, stands at around Rs. 71,000 Crore, giving it stable revenue visibility. While we participate in new orders, we will be sharply focussed on the timely execution of the existing order book. Our near-term aim is to get an

entry into the Maharatna club of PSUs. Towards this, we are targeting a healthy revenue growth of double digits driven by the expansion of both Defence and Non-Defence businesses.

BEL won many noteworthy awards and recognitions for its multidimensional excellence, including the prestigious 'CII EXIM Bank Award for Business Excellence (2023)' for Hyderabad Unit, 'Karnataka State Export Excellence Award', Economic Times 'Iconic Brand of the Year Award - 2023', 'Employee Excellence Award' from Times Group, Institution of Engineers (India) 'Industry Excellence (Gold) Award for Business Excellence', 'Project of the Year - Large Category (Runner Up) Award' from Project Management Institute, Indian Chamber of Commerce 'PSE Excellence Awards', Governance Now PSU Awards, National Export Excellence Award, etc.

What is your vision for taking BEL on a fast-track growth path in coming years?

It's well acknowledged that fast track growth is basically the outcome of super synchronised functioning of various key business functions including R&D, Marketing, Operations, HR, Finance, etc. Our concerted focus has been towards streamlining each of these business functions to set a strong foundation for BEL

to deliver fast track growth. Alongside our existing business segments, various high growth areas (like Arms & Ammunitions, AI, Cyber Security, Unmanned Systems, Rail & Metro) have been identified and a resilient business model is being worked upon to deliver sustained growth in these emerging segments.

Innovation has been the cornerstone of our success, and our customers can rest assured that BEL will continue to develop innovative and quality products for them through collaborations with DRDO labs, research & premier academic institutions, and niche technology players. We will continue to build on our existing competencies and diversify into newer areas. Opportunities abound, we also remain watchful of the challenges brought by geopolitical situations, emerging technologies, regulatory changes and evolving customer expectations. We will remain agile to effectively navigate them and ensure steady growth path.

Roadmaps have been created for the development of future products and technologies, creation of IPRs and acquisition of key technologies. This will enable us to stay at the cutting-edge of technology and meet our customer's evolving requirements with cost-effective and innovative solutions. ■

US Air Force Completes First Flight of L3Harris Viper Shield EW System

The L3Harris Technologies all-digital electronic warfare (EW) suite, Viper Shield™, has completed its first flight in a single-seat Block 70 F-16 operated by the 412th Test Wing at Edwards Air Force Base, California.

Viper Shield provides the most advanced EW capability to F-16 fighter fleets for six international partners.

"This flight launches the latest capability enhancement for the F-16 and our warfighters. The Viper Shield system combined with a Block 70 airframe creates a leap in capability compared to the traditional Block 50 Viper I grew up flying," said Maj. Anthony Pipe, F-16 Experimental Test Pilot, U.S. Air Force. "The EW advancements this system brings will ensure pilots flying these aircraft continue to make it home."

The flight included a series of risk reduction tests related to the mission computer and other avionics subsystems compatibility, as well as interoperability



with the APG-83 active electronically scanned array (AESA) fire control radar.

"Our building block approach to test hardware and software in labs, demonstrate functionality in dense radio frequency environments and validate the

EW system on the ground prepared us for Viper Shield's successful first flight," said Ed Zoiss, President, Space and Airborne Systems, L3Harris. "With this milestone, we are ready to continue flight testing and deliver systems in late 2025 as Viper Shield is the only advanced EW solution that is funded and in active production for international F-16 partners."

Viper Shield is a low-risk, low-cost system that counters modern radar threats with immediate detection and advanced jamming responses to disrupt the adversary's kill chain. Unlike other EW system providers, Viper Shield will integrate across all F-16 Blocks with minimal modifications to the aircraft, and it is fully configurable with both the current Mission Modular Computer and the Next Generation Mission Computer. ■

Embraer's C-390 Millennium: Strength & Splendour



The C-390 Millennium is a high-performance, multi-role aircraft designed for demanding conditions, already in service with several countries, including Brazil, Portugal, Hungary and South Korea. It has proven capabilities in humanitarian, military, and interoperability missions. "The C-390 has been designed to operate round the clock from unpaved runways in the most demanding conditions, be it hot and high, cold and dry or humid conditions," says Bosco da Costa Junior, President & CEO, Embraer Defense & Security. Excerpts from his interview with Aeromag follow.

Bosco da Costa Junior
President & CEO, Embraer Defense & Security

Could you highlight some of the key milestones that Embraer has achieved in its 55 years of innovation, establishing itself as a global leader in aerospace?

Embraer's journey began with a focus on defence, and over 55 years, we have grown to become a global leader in aerospace, offering innovative solutions for commercial and business aviation as well. This commitment to innovation is reflected in Embraer's latest defence product: the C-390 Millennium.

Since 2000, Embraer has developed and certified over 20 new aircraft types. With 9,000 aircraft delivered to over 100 countries and a portfolio of over

800 patents, Embraer continues to drive innovation in the aerospace industry.

Embraer has a strong history of developing high-value defence solutions, from the C-390 Millennium to the A-29 Super Tucano, a versatile light attack and advanced training aircraft chosen by air forces worldwide. We also have a proven track record in creating advanced integrated defence systems, including radars and border surveillance systems.

Tell us more about the recent achievements of the C-390 Millennium

2024 has been a pivotal year for the C-390 Millennium - a new generation,

mission proven, military transport aircraft, the most advanced in its class. It flies faster, farther and carries more payload than other aircraft in the medium transport category. The C-390 has been designed to operate round the clock from unpaved runways in the most demanding conditions, be it hot and high, cold and dry or humid conditions.

In addition to Brazil, Portugal, and Hungary, the C-390 has also been acquired by the Netherlands, Austria, the Czech Republic, and South Korea. Sweden also confirmed the selection of the C-390 Millennium, and Slovakia reported that the C-390 was indicated as the best option for updating its transport aircraft fleet. Recently, an undisclosed customer contracted two C-390s to modernize its air force.

The selection by a growing number of countries reflects their confidence in the aircraft's capabilities. Embraer's customers benefit from a complete support and training package in order to ensure a smooth entry into service and to make sure the C-390 is operational anytime, anywhere.

Could you cite some examples of missions undertaken by the C-390?





Since entering service with the Brazilian Air Force in 2019, the Portuguese Air Force in 2023, and the Hungarian Air Force in 2024, the aircraft has shown 93% mission capability, mission completion rate above 99% and has clocked in more than 16,300 flight hours demonstrating exceptional productivity in its category.

The C-390 has been involved in complex humanitarian evacuation missions in numerous cases around the world. Also, as an illustration of the C-390's capability to transport vehicles: days after the first KC-390 was received by the Portuguese Air Force in October 2023, the aircraft flew to the United States to take a UH-60 Black Hawk helicopter to Europe. This mission, which covered almost 5,200km, was repeated a month later.

Proving again the multi-mission transport aircraft's versatility, the United States Army's M142 HIMARS rocket launcher was loaded onto the Portuguese Air Force's KC-390 in a testing activity that took place in July 2024. The operation was designed to reinforce NATO's interoperability capabilities. This exercise is a crucial step in enhancing rapid deployment and mobility strategies within allied forces.

The aircraft continually demonstrates its interoperability in complex international exercises like Storm Flag in the US.

The C-390 Millennium customers appreciate the versatility, reliability and cost effectiveness of this new generation aircraft.

Recently, Portugal became the launch customer for Embraer's A-29N Super Tucano. Could you elaborate on the capabilities of the A-29N?

The A-29 Super Tucano is a multi-mission aircraft that provides air forces with versatility for armed reconnaissance, close

air support (CAS), light attack, advanced training missions, airborne forward air control (FAC), airborne armed ISR, border & coastal surveillance, UAV interception/targeting/ armed interdiction, all on a single platform, which exponentially increases the aircraft's availability and operational flexibility. Its robust airframe allows the aircraft to operate from unpaved runways in austere environment. In all of these areas, it has a proven track record of outstanding performance and reliability.

Portugal has acquired 12 A-29N Super Tucanos that will equip the Portuguese Air Force, making Portugal the launch customer of the new variant of this advanced trainer and light attack aircraft. The A-29N Super Tucano variant incorporates advanced avionics, NATO specific communications systems and other non-disclosed new capabilities tailored to meet Portugal's operational requirements.

The A-29 Super Tucano is the global leader in its category, with over 290 orders, surpassing 570,000 flight hours, with 60,000 of those in combat. In 2024, highlights include new sales of the Super Tucano to the Portuguese Air Force (A-29N), Uruguayan Air Force, the Paraguayan Air Force and orders from an undisclosed country in the APAC region and in Africa.

How relevant is the A-29 Super Tucano for India?

It is a relevant aircraft for the Indian Air Force, Indian Navy, Indian Coast Guard and border forces like BSF and ITBP, due to the aircraft's versatile nature.

In addition to the exceptional features which I described in the earlier response, the A-29 Super Tucano has significantly lower flying costs than similarly

capable aircraft. In (semi) permissive environments, it becomes more pragmatic and cost-effective to fly an A-29 Super Tucano than flying a more expensive-to-operate jetfighter. With A-29's cockpit similar to that of a 4th Gen fighter aircraft, it provides a suitable option for training in addition to its broad range of operational capabilities.

It is also interesting to note that compared to sophisticated attack helicopters, except for some of these helicopters' very specialised capabilities, the Super Tucano can offer similar capabilities, and sometimes, better speed and range capabilities at a fraction of the cost.

Could you talk about Embraer's participation in the Aero India 2025 and what key innovations or products the company plans to showcase?

Embraer will have a strong presence in Aero India this year with the C-390 Millennium on display and a full line-up of the Embraer's senior team.

As we continue to strengthen our commitment to India's growing aerospace ecosystem and contribute to the Make in India initiative, we are honoured to showcase our technological advancements in both defence and commercial aviation this year. The spotlight will be on our multi-mission C-390 Millennium, which has already established itself globally as a versatile and cost-effective tactical transport aircraft.

Through our participation, we aim to engage with Indian stakeholders, from government bodies to private enterprises, and explore collaboration opportunities to forge deeper relationships, while introducing innovations that align with the nation's aspirations for advanced defence and aerospace capabilities.

AEPL: Crafting Cutting-Edge Solutions in Aerospace



Aerospace Engineers Private Limited (AEPL) has emerged as a frontrunner in bolstering India's defence capabilities through innovative advancements and indigenization efforts that are shaping the future of national security. With a focus on delivering integrated solutions across rubber, metal, composites, and sheet metal systems, AEPL is setting new standards for precision, innovation, and excellence in aerospace manufacturing. "At AEPL, innovation is our weapon-driving us to redefine aerospace manufacturing and strengthen India's defence capabilities," says R Sundaram, Managing Director of AEPL. In an interview with Aeromag, he highlights AEPL's diverse areas of expertise.

R Sundaram
Managing Director, AEPL

Could you share some of the key milestones in Aerospace Engineers Private Limited's journey, particularly in the development of critical defence components and systems?

Aerospace Engineers Private Limited (AEPL) has been a trailblazer in strengthening India's defence capabilities, driving groundbreaking innovations and indigenization efforts that are shaping the future of national security.

- **Indigenous Defence Excellence:** AEPL kickstarted its journey with the indigenization of crucial cockpit seals for fighter jets, paving the way for India's self-reliance in defence. With over

15,000 defence-critical components and subsystems now indigenized, we're reducing dependence on foreign suppliers and bolstering national security.

- **Defence-Approved Innovation:** Our 123 rubber products, proudly approved by CEMILAC, set the standard for defence manufacturing, ensuring unmatched quality and precision in every component.

- **Pioneers in Landmark Projects:** AEPL's contribution to monumental projects like Chandrayaan, Gaganyaan, and the Airbus C295 aircraft highlights our integral role in shaping India's defence and space capabilities.

- **Revolutionizing Defence Technology:**

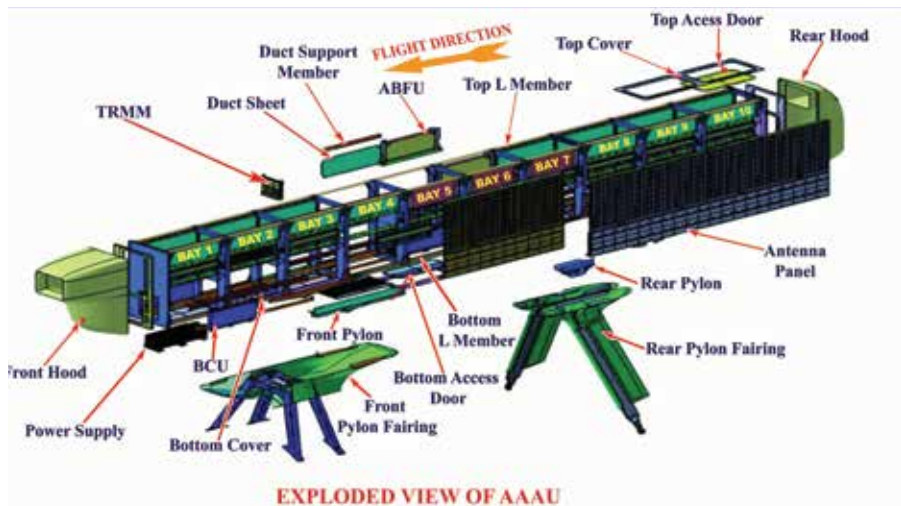
Partnering with GRSE, AEPL developed the Neerakshi Autonomous Underwater Vehicle (AUV), a game-changing innovation for maritime defence operations, launched by DRDO Chairman Dr. Samir V. Kamat.

- **Strategic Growth for Defence Power:** With a \$25M investment in expanding our Shoolagiri facility, AEPL is primed to take India's defence manufacturing to new heights, ensuring top-tier production of critical components for the forces.

Can you elaborate on some of the key components AEPL has developed, such as the oxygen mask hoses and rubber fuel tanks, and their significance for India's defence capabilities?

Aerospace Engineers Private Limited (AEPL) is fuelling India's defence prowess with cutting-edge components that are vital for mission success. Our oxygen mask hoses, and rubber fuel tanks are not just parts—they are the lifeline of high-performance defence aviation.

- **Oxygen Mask Hoses:** AEPL's oxygen mask hoses are engineered for the extreme, ensuring pilot safety in the toughest high-altitude conditions. Through our Technology Transfer (ToT) agreement with DEBEL, we produce specialized oxygen masks for the Su-30



aircraft, enhancing the Indian Air Force's operational edge and readiness.

- **Rubber Fuel Tanks:** Built for durability and designed to withstand the harshest environments, AEPL's rubber fuel tanks are key to maximizing the performance and combat readiness of military aircraft, ensuring fuel containment even in the most demanding missions.

- **Advancing Defence Self-Reliance:** By manufacturing these critical components locally, AEPL is reducing India's reliance on foreign imports and bolstering the nation's defence self-reliance. Our commitment to world-class standards ensures these components stand at the forefront of defence innovation.

AEPL's oxygen mask hoses and rubber fuel tanks are more than essential parts— they're game-changers that elevate India's defence capabilities, empowering our forces to soar to new heights of operational excellence and strategic superiority.

AEPL focuses a lot on innovation and R&D. Can you share some of the new technologies you are developing?

At AEPL, innovation is our weapon-driving us to redefine aerospace manufacturing and strengthen India's defence capabilities. With cutting-edge R&D and a relentless pursuit of excellence, we're developing game-changing technologies that are set to transform the future of defence aviation.

- **Automated Surface Treatment Solutions:** Our Aerospace Special Processing Facility is equipped with next-gen automation that delivers surface treatments meeting the highest NADCAP standards. This ensures unmatched durability and performance, keeping India's defence aircraft in top fighting form.

- **Next-Gen Materials:** AEPL is leading the charge with innovative elastomers and metallic solutions, creating components that are lighter, stronger, and more efficient—ensuring enhanced performance in even the toughest defence environments.

- **Advanced Sheet Metal Capabilities:**

Our high-precision sheet metal forming and fabrication technologies are pushing the envelope, delivering complex, mission-critical components that meet the most demanding defence standards with unparalleled quality.

- **Indigenization for Defence Dominance:** AEPL's commitment to indigenizing critical components is reducing India's reliance on imports and strengthening the nation's self-reliance in defence manufacturing, empowering our forces with world-class, locally made solutions.

Could you discuss AEPL's collaboration with international clients like the Egyptian Armament Authority, Honeywell, and Boeing?

AEPL's global alliances are proof of our reputation as a trusted leader in aerospace and defence manufacturing, earning the trust of industry giants like Boeing, Honeywell, Raytheon Technologies, Pratt & Whitney, and key agencies like the Egyptian Armament Authority.

- **Boeing:** AEPL's partnership with Boeing is a powerhouse collaboration, delivering critical components like vertical fin seals and fluid distribution system parts. Our inclusion in Boeing's QPL for BAC5071 specification showcases our world-class manufacturing excellence and highlights AEPL's role as a global defence solutions provider.

- **Honeywell:** With Honeywell, AEPL is a key supplier of precision-engineered aerospace components, supporting cutting-edge aerospace projects that power the next generation of aviation and defence technologies.

- **Egyptian Armament Authority:** Our collaboration with the Egyptian Armament Authority has opened doors to global defence manufacturing, reinforcing AEPL's international footprint and enabling us to play a significant role in supporting defence initiatives worldwide.

- **Long-Term Commitments:** AEPL's Long-Term Contracts (LTCs) with these esteemed organizations underscore the trust placed in our innovation, quality,

and commitment to delivering high-performance, reliable aerospace solutions that meet the most stringent global standards.

Could you talk about AEPL's participation in the Aero India 2025 and what key innovations or products the company plans to showcase?

- **Next-Gen Aerospace Components:** From life-saving oxygen mask hoses to high performance rubber fuel tanks, AEPL is redefining safety and reliability in defence and aviation.

- **Game-Changing Surface Treatments:** Get a glimpse of our NADCAP-certified, state-of-the-art surface treatment technologies that set a new benchmark for aerospace durability and performance.

- AEPL is also showcasing its 203 QPL-certified Fluid Distribution Systems. We'll also reveal our complete end-to-end solutions, blending rubber, metal, composites, and sheet metal fabrication to deliver unrivalled results.

Could you share AEPL's future plans for expanding its product portfolio and strengthening its position in the global market?

- **\$25M Shoolagiri Facility Expansion:** AEPL is making a game-changing investment with a \$25M expansion of our Shoolagiri facility, bringing advanced infrastructure online to meet the rising global demand for high-performance aerospace components.

- **Innovative Product Portfolio:** AEPL is pioneering next-gen solutions in both metallic and non-metallic domains, delivering cutting-edge aerospace and defence components that are ahead of the curve in performance, durability, and efficiency.

- **Global Partnerships & Expansion:** Our global footprint is growing with strengthened relationships with international clients, exploring joint ventures with US manufacturing partners, and forging strategic overseas collaborations to bring world-class technologies to aerospace sectors worldwide.

- **Contract Manufacturing Opportunities:** AEPL is ready to take on contract manufacturing opportunities, delivering customized, high-quality aerospace solutions that meet the unique needs of our global clients.



AVI-OIL: Powering Defence with Synthetic Lubricants



AVI-OIL, a leading player in the aviation lubricant sector, has been pivotal in supporting India's defence and Aerospace needs. The company's product range includes turbine oils, hydraulic fluids, greases, and lubricants for helicopters and aircraft. "In India, we have traditionally focussed on the military sector and acknowledge that this is the ideal opportunity for us to focus on the Civil Aviation sector. We already have most of the products / approvals in place," says V K Mathew, CEO, AVI-OIL. In an interview with Aeromag he discusses the company's contributions and future plans.

V K Mathew
CEO, AVI-OIL

How significant is AVI-OIL's role in supporting the Indian Defence sector, and what specific products does the company supply to meet the needs of the Indian Armed Forces?

The raison d'être of AVI-OIL is to cater to the lubrication needs of the Defence Services in India. Our stated mission is to ensure the nation's self-reliance in the strategic area of Aviation Lubricants. Towards this objective, we are proud to have set up the first Aviation Lubricants plant in India. The plant, located at Faridabad, includes a blending unit for aviation oils, an ester manufacturing unit for production of synthetic base-stocks, Quality Assurance, filling, and packaging facilities. More than 90% of the requirements of the Defence forces are manufactured at our plant.

AVI-OIL offers a comprehensive range of turbine oils, hydraulic fluids, multi-purpose greases and lubricants for helicopters, business jets and aircraft. We offer high performance products as well as cost-effective, customized solutions to meet the needs of our customers.

Our products are approved by major OEMs like Safran, CFM, GE, Rolls-Royce, Pratt & Whitney, and Pratt & Whitney

Canada etc. and airframers like Airbus, Boeing, Bombardier, ATR, Eurocopter, Dassault Aviation, Embraer and many others.

At the time of its inception, the knowledge levels within the Defence forces on Aviation Lubricants was at best rudimentary. AVI-OIL has played a major part in disseminating its knowledge on Aviation Lubricants and its usage for the various aircraft operated by the Defence. AVI-OIL was key in developing the entire Lubricants Approval process and procedures within the existing eco-system of the Defence forces and the regulatory bodies.

How does AVI-OIL support the Indian civil aviation sector?

The Civil Aviation sector in India is witnessing major growth and has already become the third largest market in the world. India stands as one of the world's premier domestic aviation hubs. Following the challenges posed by COVID-19, the sector has exhibited remarkable resilience, full recovery and showing promising signs of expansive growth. This growth is evidenced not only by the surging number of air passengers but also by the influx of

new aircraft entering the Indian airspace and the infrastructure development of airports.

AVI-OIL has firmly positioned itself within this dynamic landscape, consistently addressing the lubricant needs of India's leading airlines. Our comprehensive product lineup, backed by essential OEM approvals and unmatched Technical Services, offers customers a distinct advantage, presenting them with a compelling opportunity to source their lubricant requirements directly from us.

AVI-OIL is approved by the Directorate General of Civil Aviation (DGCA) under Section 2, Category 'E' of CAR.

With our Joint venture partner NYCO's experience across the world, we can bring the latest technologies, products and customer references globally. NYCO has a long-term partnership with Airbus which has helped us in converting some of the major airlines like Air France, EasyJet and several more.

In India, we have traditionally focussed on the military sector and acknowledge that this is the ideal opportunity for us to focus on the Civil Aviation sector. We already have most of the products / approvals in place. With a superior value



proposition, we intend to be the ideal partner for the commercial airlines in India.

Could you explain how AVI-OIL is working on innovative and environmentally friendly products?

AVI-OIL is a Joint venture between Indian Oil Corporation, Balmer Lawrie & Co and NYCO, France. However, NYCO, France provides the technology to manufacture these high-performance lubricants required for the aviation sector. The Technology transfer also covers expertise in production of niche high quality synthetic esters which are used in the blending of Aviation Lubricants.

Guided by the international chemical industry guidelines Responsible Care®, an ambitious program was built to reduce NYCO's products and activities' impact on the environment and to mitigate risks on human health. This is directly applicable to the activities of AVI-OIL in India as we follow the same processes here too.

Carbon footprint assessment has allowed to measure the impact of each stage of the processes and to identify the main emission sources. Decarbonization strategy focuses on two main domains.

Firstly, reducing products' carbon footprint through a review of its purchasing policy, promoting selection of low carbon footprint biobased raw materials.

Secondly, improving manufacturing processes to achieve eco-efficiency and better management of energy and water consumptions.

Furthermore, waste recovery and recycling possibilities are studied to promote circular economy in the lubricant industry.

Additionally, a number of these products will show biodegradability features, as well as no toxicity to the aquatic environment, making some of them compliant with environmental standards like the European Ecolabel. These are key features in any application where the lubricant may be released to the environment or the ocean, accidentally or by design.

Such products, even though they display a good environmental profile, will also demonstrate excellent technical performance, making for further improved environmental impact through extended

lifetime in operation and frictional benefits increasing energy efficiency.

NYCO's commitment to risks mitigation led to the development of a new approach method to characterize a substances' toxicity.

How does AVI-OIL plan to showcase its capabilities at Aero India 2025, and what role do you see the event playing in expanding your presence in the aviation sector?

Aero India is the premier platform in India for the Aeronautics and Defence community and is now acknowledged to be one of the best Air shows and Aviation exhibitions in the world. We would like to take advantage of this confluence of Industry experts and decision makers to showcase our prowess in this strategic arena.

While we will be present at this exhibition through our booth where we will be displaying our products, we look forward to welcoming our customers and anyone with interest in our products to our booth. Our Sales and Technical teams will be available for discussions.

How does AVI-OIL / NYCO work with OEMs globally to bring value to its customers and the Aviation sector in general?

Collaboration with OEMs is fundamental to deliver innovative solutions that benefit both our customers and the broader aviation industry.

NYCO's long-standing partnership with Airbus exemplifies this commitment. By working closely with one of the world's leading aerospace manufacturers, we ensure that our products align with their cutting-edge technological needs, while meeting the rigorous standards of the aviation sector.

Innovation is at the core of what we do. Integrating new technologies in line with our company's philosophy and innovation roadmap, ensuring our formulations remain ahead of the curve in performance, efficiency, and environmental responsibility. The approval process for our product formulations is carefully coordinated with OEMs to ensure seamless integration into their systems,

maintaining reliability and compliance across all platforms.

Our technical teams provide dedicated support, offering expertise to troubleshoot challenges, optimize performance, and deliver customized solutions to OEMs for both existing and emerging applications. This technical service also extends to helping OEMs and operators navigate challenges such as obsolescence by developing modern replacements that meet or exceed the performance of legacy products.

Can you describe what differentiates AVI-OIL from the competition in the Aviation sector in India?

AVI-OIL is probably the only domestic manufacturer of synthetic and mineral based aviation lubricants in India. Around 90% of our supplies to the Defence forces in India are manufactured at our modern plant in Faridabad. Customers are now seeing the benefit of shorter lead times and competitive prices and acknowledge that products manufactured in India are as good as, if not better than the products manufactured globally.

AVI-OIL has always laid emphasis on the quality of its products. To achieve this, we have established a modern state-of-the-art laboratory for Quality Assurance. The Quality Management System of AVI-OIL is certified to comply with the International Standards ISO 9001:2015 and SAE AS 9100:2016. This enhances the reliability of operation of the aircraft and provides confidence to the users.

Aviation lubricants per se must conform to the same governing specifications and approval procedures irrespective of the country in which they are produced. There cannot be any compromise on the Quality of these products.

AVI-OIL has laid emphasis on these issues from day one, and today its Quality Assurance organization is approved by the Directorate General of Aeronautical Quality Assurance (DGAQA) and the Directorate General of Civil Aviation (DGCA) for the military and civil aircraft respectively.

AVI-OIL also set up an R&D centre where indigenous development of lubricants for specialty applications is taken up.

Aerospace Manufacturing in India: A Critical Analysis

The aerospace manufacturing and distribution scenario in India: A critical review of aerospace OEM's business networks in India, throwing new opportunities and challenges to Indian aerospace components manufacturers- Dr Uthappa Madappa Macharanda, Managing Director-Avionics Distributors India Private Limited writes about the fueling market trend of the Defence & Aerospace Manufacturing as well as Aerospace Components Manufacturing scenario, which is crucial to Aerospace OEMs' growth potential in India.



Dr Uthappa Madappa Macharanda
MD, Avionics Distributors India Pvt Ltd

Evolution of Defense & Aerospace Manufacturing in India

The defense and aerospace industry had a steady growth in India, as compared to developed nations during the pre-independence period. Since from the inception of public sector companies by the Government, the growth has been accelerated due to initiatives taken by the Indian government with liberalized industrial policies and procedures necessary to create a conducive atmosphere for manufacturing and distribution. India had many challenges in the post-independence era facing threats from neighboring countries. India realized the need of a strong defense force not just manpower but the need for indigenously built arms and ammunitions. The first commander in chief of the Indian Armed Forces, Field Marshal K M Cariappa quotes "In modern warfare, a large army is not sufficient; it needs industrial potential behind it. If the army is the first line of

defense, the industry is the second." As a result, the Government started many defense public sector units [DPSUs] in India. The most prominent DPSU started during the pre-independence era was established as Hindustan Aircraft Limited in Bangalore on 23 December 1940 by Walchand Hirachand in association with Krishna Raja Wadiyar IV of the Kingdom of Mysore. HAL currently has 11 dedicated research and development [R &D] centers and 21 manufacturing divisions under 4 production units spread across India. The DRDO was established in 1958 by combining the Defence Science Organisation and A separate Department of Defence Research & Development was formed in 1980, with 52 laboratories spread across India. The Indian Space Research Organisation (ISRO), the space agency of India, was founded in 1969 to develop an independent space program. Bharat Electronics Limited (BEL) was started in 1954 and Lt. Gen. Apparanda Aiyappa was the first chairman of Bharath Electronics Ltd served for 18 years till 1972. The Bharat Dynamics Limited (BDL) was established in 1970 to undertake the manufacture of guided missiles. The modern manufacturing started revolutionizing the digital manufacturing concepts, in Indian manufacturing sector since 2000. This change in scenario improved the overall efficiency which encouraged OEMs' to deploy digital technologies such as e-sourcing, e-contract, a digital ledger called block chain, that can be interlinked into a digital twin of an aircraft, providing real time snap-shot of its condition whenever the parts are replaced during repair or overhaul.

Aviation, Defense and Space Global Market Size

According to Business Intelligence firm's reports, global aerospace and defense market size is anticipated to be worth USD 839.57 Billion in 2024 and is expected to reach USD 1326.14 Billion by 2032 at a CAGR of 5.88% from 2024 to 2032. As per the latest survey report published by Statista [a global data and business intelligence platform] in January 2025, the biggest defense spenders in 2023 were the United States (\$916 billion or 37 percent of the world total), China (\$296 billion or 12 percent), Russia (\$109 billion or 4.5 percent), India (\$78.7 billion or 3.4 percent) and Saudi Arabia (\$75.8 billion or 3.1 percent). Ukraine became the eighth largest military spender in 2023, at \$64.8 billion (2.7 percent of global spending).

India Aviation, Defense, and Space Market Size

As per business intelligence firm's market research reports, global aerospace and defense market size is anticipated to be worth USD 839.57 Billion in 2024 and is expected to reach USD 1326.14 Billion by 2032 at a CAGR of 5.88% from 2024 to 2032. As per the survey reports published by Mordor intelligence firm, the India Aviation, Defense, And Space Market size is estimated grow at USD 19.81 billion in 2025, and reach USD 26.32 billion by 2030, at a CAGR of 5.84% for the forecast period 2025-30. The Weapons and Munitions segment currently holds the largest share in the Indian Air Force market, accounting for approximately 44% of the total market value in

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2024. The Ministry of Civil Aviation's Vision 2040 outlines plans for expanding airport infrastructure to 200+ operational airports, bringing a fleet size of 1200-1500 aircraft by 2026. Union government boosts India as an aviation maintenance hub, bringing policy changes, including a GST reduction from 18% to 5% and plans to lease airport land at discounted rates for MRO facilities.

Privatization and commercialization of Space, Aerospace and Civil Aviation Manufacturing in India

Tata group's Tata electronics development services [TEDS] is the first private company to enter into design linked manufacturing in India in 1980. Brigadier Madan was the advisor electronics and Group Captain T D Thammaiah was heading the design linked manufacturing unit located at electronic city Bangalore. Later it was renamed as Tata Power-SED and currently its known as Tata Advanced Systems [TASL] after the merger of defense business with Tata sons. Currently, TASL entered into a joint venture with Sikorsky Aircraft Corporation to manufacture the Sikorsky S-92 helicopter in India. TASL also entered into joint-venture, with Lockheed Martin, is producing aero structures and the Lockheed C-130J Super Hercules in India. TASL-Boeing JV will serve as the exclusive global manufacturer of fuselages for AH-64 Apache helicopters supplied by

Boeing to its clientele worldwide.

Component Manufacturing Trend in Indian Defense and Aerospace Sector

In India, the major players in the component manufacturing [OCMs] sector side are the Tatas, Aequs, Dynamatic Tech, Mahindras and many other MSMEs' have made India proud by supplying aircraft components to global aerospace OEMs. Today, many small players like Rangsons Aerospace and Merlin Hawk are 100% Indian home grown companies started developing critical components to global OEMs. Dynamatic Technologies, one of the main suppliers of complex aeronautical parts, structures and designs for Boeing, Airbus and Bell Helicopter. Karnataka-based Aequs is a key supplier of parts used in commercial aircraft worldwide. Mahindra Aerostructures, too, produces parts for all commercial aircraft produced by Boeing and Airbus. Boeing's spend in India is worth approximately \$1 billion today and Airbus's global products through procurement of both components and services is worth more than \$650 million annually indicates the strong manufacturing base of original aircraft components manufacturing[OCMs] base in India.

ISRO's top suppliers chosen from 200+ strong Indian suppliers are exhibited in the image for quick glance.[Image Courtesy : aerospacenerd.com].

Bangalore based Centum Electronics,

associated with ISRO in 2002 and in just two decades, Centum started supplying satellite bus systems, test tools, power management system and data recorders for satellites. Recently a complete payload was built by Centum. These testimonies of Indian companies exhibits the strength of Indian manufacturing base for global OEMs critical component manufacturing requirements in future days.

Concluding Remarks

Indian component manufacturers have significant role in defense, aerospace and space sectorial growth in India. Hence providing conducive atmosphere for this sector with new schemes and tax rebates can address the issues faced by large and MSME sectors. DST funding should focus on creating a separate incubator eco system to attract young entrepreneurs are the key initiatives to be taken by government. The existing start up funding scheme is generic in nature and author emphasizes to make it sectorial as defense and aerospace sectors are highly regulated with critical to quality parameters as compared to other sectors. ■



ASELSAN expands presence in the Gulf Region with new office in Oman



ASELSAN has officially opened a new office in Muscat, the capital of Sultanate of Oman, as part of its global expansion strategy. This new office is aimed at enhancing the company's ability to provide better services to its partners in Oman.

ASELSAN, Türkiye's leading defense company, is fostering its existence in the Middle East and Gulf region with its office

in Oman. This new establishment is part of ASELSAN's ongoing efforts to strengthen its presence in the Middle East and Gulf region, where it already operates offices and subsidiaries in Qatar, the United Arab Emirates, Kingdom of Saudi Arabia and Jordan.

Oman office will primarily focus on the Omani market, aiming to increase the visibility of ASELSAN's more than 500

products to Omani end users, establish closer collaboration with local defense entities and enhance its ability to deliver innovative solutions tailored to their specific needs. ASELSAN's presence in Oman will also create opportunities for knowledge transfer and capacity building, and will facilitate its aim to leverage its extensive experience and expertise to support Oman's strategic objectives and contribute to regional stability.

The opening ceremony was attended by including Prof. Dr. Haluk Görgün, Secretary of Defense Industries; Prof. Dr. Muhammet Hekimoğlu, Türkiye's Ambassador to Oman; Ahmet Akyol, ASELSAN CEO; and other esteemed guests from the industry. ■

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Aero India 2025: The Mahakumbh of Defence

In the year 2025, India is witnessing two monumental events that, despite their distinct nature, embody the country's spirit of unity, resilience, and strength. The Mahakumbh Mela, the largest religious gathering on the planet, and Aero India, the nation's premier defence and aerospace exhibition, will converge in a symbolic expression of India's traditional roots and its modern ambitions. Though vastly different in scope and purpose, these events share a commonality in their representation of India's collective identity. Both events demonstrate India's stature as a spiritual and technological powerhouse, where faith and defence align in an intricate blend of progress and tradition.

Dr BK Das, Distinguished Scientist & DG(ECS)
Shri Vipin Kumar Kaushik, OS & Director-DPI
Shri Amit Sharma, Sc'D', DPI

The Spiritual Essence of Mahakumbh 2025: An Event Beyond Time



Mahakumbh Mela 2025- World's largest spiritual gathering

The Mahakumbh Mela is far more than a religious congregation—it is a timeless celebration of faith, culture, and humanity's resilience. Held at the sacred sangam (confluence) of the Ganges, Yamuna, and the mythical Saraswati in Prayagraj, this event stands as a cornerstone of Hindu spirituality. Occurring every 12 years, the Mahakumbh holds unparalleled significance, with the 2025 edition being a once-in-144-years event. This rarity elevates its importance, with the next Mahakumbh only scheduled for 2169, making the ongoing gathering a truly historic occasion.

Rooted in ancient mythology and astrological precision, the



Celestial Alignment of Kumbh - Jupiter, Sun and Moon align in specific zodiac signs

Mahakumbh's origins trace back to the legend of the Samudra Manthan, where drops of amrita (nectar of immortality) fell at Prayagraj, Haridwar, Ujjain, and Nashik. This celestial alignment, along with the belief in the sacred rivers' purifying powers, draws millions seeking spiritual merit and liberation from sins. The Kumbh Mela is timed based on specific planetary alignments, with Jupiter playing a key role. The festival occurs when Jupiter aligns with the Sun and Moon, enhancing Earth's electromagnetic fields.

Aero India 2025: A Showcase of Modern Power and Global Partnerships



Display of world class defence equipments at Aero India

At the same time that millions of pilgrims gather at the banks of the Ganges in Prayagraj, another congregation of global significance will be taking place in Bengaluru from 10th to 14th February 2025. Aero India 2025, Asia's largest airshow, is set to be a landmark event, bringing together aerospace leaders, innovators, and policymakers from across the globe. This premier platform fosters collaboration, innovation, and knowledge exchange, reinforcing India's position as a global aerospace hub.



Airborne Early Warning and Control System(AEW&C)-Eye in the Sky

Following the massive success of Aero India 2023, which saw participation from about 100 countries, 809 exhibitors, and a remarkable footfall of over 7 lakh visitors, the 2025 edition promises even greater engagement. Key highlights include dynamic exhibitions, cutting-edge aircraft displays, the prestigious Bandhan ceremony, finalisation of 250+ MoUs/partnerships worth more than Rs 75,000 Crores and participation of 27 Countries in the Indian Ocean Region(IOR)+ Defence Ministers' Conclave.

The event will feature expansive exhibition halls depicting various solutions, outdoor displays of large-scale systems, and business chalets designed for high-level meetings. It also provides unparalleled opportunities for B2B and B2G interactions, enabling industries to secure vital partnerships and explore market growth avenues. Additionally, Aero India offers extensive media coverage, amplifying the visibility of participants and their innovations on a global stage.

Aero India 2025 is not just an airshow—it is a stage where the future of aerospace takes flight, positioning India at the forefront of technological and strategic advancements in this critical sector.

The comparison between Aero India and the Mahakumbh may seem unusual at first glance. However, both events are, in their respective realms, symbols of India's global stature. While the Mahakumbh is a symbol of spiritual transcendence, Aero India represents India's ascent as a modern defence power—a nation that embraces cutting-edge technology, innovation, and international collaboration to safeguard its future.

Aero India's Strategic Importance to India's Defence Goals

Aero India has become a crucial platform for India to demonstrate its growing defence capabilities and to position itself as a key player in the global defence industry. Since its inception in 1996, the event has grown exponentially, both in terms of international participation and the technological sophistication of its exhibits. What began as a modest airshow has now become a vital stage for unveiling advanced fighter jets, drones, missile systems, and other military hardware.

Aero India acts as a catalyst for partnerships between Indian and international defence companies. The 2023 edition saw 250 B2B agreements with a combined value of ₹75,000 crore, demonstrating the potential of such collaborations to drive technology transfer and co-development initiatives.



Light Combat Aircraft Tejas

The focus on startups and MSMEs, as seen in the exclusive iDEX Pavilion at Aero India 2023, highlights the importance of nurturing homegrown talent. The previous edition successfully pledged over 200 crore through the iDEX Investor Hub, emphasising India's commitment to fostering innovation in the defence sector.

Aero India 2025 plays a pivotal role in advancing India's defence objectives, aligning with the nation's vision for self-reliance and technological supremacy under the 'Make in India' initiative. In 2025, the event is expected to draw representatives from over 50 countries, including global defence contractors, aviation experts, and policymakers. By fostering joint ventures, promoting indigenous innovations, and facilitating global collaborations, the event strengthens India's defence ecosystem.

The strategic importance extends to the showcasing of India's airpower, with grand flypasts and static aircraft displays serving as a testament to the nation's growing aerospace capabilities. Aero India 2025 is poised to reinforce India's defence and aerospace goals, contributing to a robust, self-reliant, and globally competitive sector.



Naval Anti Ship Missile-Short Range(NASM-SR)

DRDO at Aero India 2025



Sentinel for Maritime Domain Awareness; SHYEN-Payloads for Dornier Mid Life Upgrade

The Defence Research and Development Organisation (DRDO) will present a formidable display of over 330 state-of-the-art products, systems, and technologies at Aero India 2025 in indoor pavilion, reinforcing its role as the backbone of India’s defence innovation. DRDO’s participation will be structured around nine key themes such as “Airborne Surveillance Solutions”, “Naval Warfare”, “Next-Generation Missile Systems”, “Supremacy in the Skies – ADA’s 5th Gen Leap”, “Unmanned Aerial Systems”, “RadarScape: Mapping the Invisible”, “Maritime Sentinel: A New Era of Surveillance & Safety”, “Sensors Suite for Fighter Aircraft” and “Raksha Kavach”. All themes are being supported by various operational scenario, salient features depicted in the form of video contents using immersive technologies like anamorphic display, LED walls, Digital standees, Holographic fans etc.

Additionally, with the mandate of DRDO focussing more on technologies, 14 advanced Technology Zones will highlight cutting-edge research which includes “Advanced Materials & Composites”, “Surveillance & Reconnaissance Technology”, “Antenna & Microwave Technology”, “Soldier Support Systems”, “Combat Aircraft Technology”, “Corporate Directorates”, “Micro Electronic Devices, Computational Systems, and Cyber Security”, “Land Systems & Munitions”, “Missile Technology”, “Next-Gen Combat Vehicles & Tactical Mobility”, “Photonics, Laser and Quantum Technology”, “Electronic Warfare & Communication”, “Simulation & Training Technology” and “Aero Propulsion Technology”.

A major highlight of DRDO’s presence will be its contribution

to the prestigious India Pavilion, showcasing state of the art Defence systems. This pavilion exemplifies the combined strength of India’s private industries, Defence PSUs, start-ups, and DRDO, the premier defence research organisation under the Ministry of Defence. Among the 17 DRDO products on display will be the Advanced Medium Combat Aircraft (AMCA) with all its weapons & sensors, Dornier mid life upgrade with DRDO designed systems, Advanced Lightweight Torpedo, Naval Anti-Ship Missile-Medium Range, Kaveri Derivative Aero Engine (without afterburner), Medium Range Maritime Reconnaissance (MRMR) Aircraft, Guided Pinaka, and Twin Engine Deck-Based Fighter (TEDBF).



Advanced Medium Combat Aircraft(AMCA)

DRDO’s exhibits will be spread across indoor, outdoor, and live demonstration zones. The outdoor exhibits will feature QRSAM, AKASH NG Launcher system, Archer UAV, and VHF Radar, Advanced EW System Dharashakti etc., while the flying display will include the upgraded Dornier Aircraft with advanced mid-life modifications. Additionally, DRDO will organise a seminar titled “DRDO-Industry Synergy towards Viksit Bharat: Make in India, Make for World” to highlight its collaborative vision for self-reliance in defence technology.

With an expansive and technologically diverse exhibition, DRDO’s participation at Aero India 2025 underscores India’s growing strength in aerospace and defence, advancing Atmanirbhar Bharat and positioning the nation as a leader in global defence innovation.



Quick Reaction Surface to Air Missile(QRSAM)

The Common Threads and Overarching Theme

a)Unity, Strength, Faith and Global Presence

Though the Mahakumbh and Aero India differ in their focus—

one being a deeply spiritual gathering and the other a high-tech defence exposition—they share underlying themes of unity, strength, faith and global presence. Both events capture India's essence as a nation that thrives on diversity and collective effort.

In the Mahakumbh, unity is seen in the convergence of millions of pilgrims, each arriving from different parts of India and the world, representing various backgrounds, languages, and customs. It is this diversity that makes the event so powerful, a visual and spiritual representation of India's motto: "Unity in Diversity." & "Atithi, Devo Bhava" The pilgrimage is a journey toward self-realisation, but it is also an expression of the collective consciousness that binds the nation together. The sight of millions standing shoulder to shoulder, immersed in devotion, reflects the strength that comes from this unity.

Similarly, Aero India is a gathering of global defence leaders, manufacturers, and innovators, each contributing to a common goal: ensuring security and stability in a rapidly changing world. Unity in this context is seen through the collaborations and partnerships that emerge from the event. India's defence sector is not an isolated entity; it thrives on global cooperation. Countries such as the United States, France, Israel, and Russia, among others, have long been key partners in India's defence acquisitions and technological advancements. Aero India 2025 will be a platform for strengthening these partnerships, fostering new collaborations, and ensuring that India remains at the forefront of defence innovation.

b) Strength Through Spirituality and Security

The strength displayed at the Mahakumbh is spiritual—a testament to the endurance of faith and the power of belief. For centuries, despite the changing tides of history, the Mahakumbh has remained a constant, a symbol of India's unbroken connection to its past. The rituals performed at the event, such as the sacred dip in the Ganges, are acts of devotion, but they also represent resilience—the strength to uphold tradition in an increasingly modern world.

At Aero India, strength takes on a different form: it is the strength of military power, technological advancement, and national security. In a world where geopolitical situations are ever changing, India's ability to defend its borders and protect its interests is of paramount importance. Aero India is not merely a show of force; it is a demonstration of India's preparedness to meet any challenge that may come its way. The advancements in indigenous defence technology, showcased at the event, underscore India's commitment to achieving self-reliance in defence manufacturing, a goal that is crucial for the country's strategic autonomy.

c) A Global Stage: India's Soft and Hard Power on Display

In 2025, the world will be watching as India takes center stage, both through the Mahakumbh and Aero India. These events highlight India's soft power and hard power—its ability to influence the world through both culture and military strength.

The Mahakumbh, with its vast global audience, showcases India's soft power in action. As a country that has long been the spiritual epicenter of the world, India's cultural and religious influence extends far beyond its borders. The event attracts pilgrims, tourists, and media from all corners of the globe, providing a glimpse into India's cultural depth and its enduring connection to the spiritual realm.

Aero India, on the other hand, represents India's hard power. It is an event that highlights the country's growing defence capabilities, its strategic partnerships, and its ambition to become

a leading player in the global defence industry. The event sends a clear message to the world: India is not only a nation with a rich cultural past but also a modern power capable of protecting its interests in an increasingly volatile world and all set to become a reckoning defence force for the world.



Dharashakti Electronic Warfare System

Conclusion: The Mahakumbh of Defence

In 2025, India will stand as a beacon of extraordinary progress, seamlessly intertwining its rich cultural heritage with its bold aspirations in defence and technology. From the sacred sangam at Prayagraj to the bustling aerospace hub of Bengaluru, the Mahakumbh Mela and Aero India 2025 symbolises India's remarkable ability to unify spiritual depth with cutting-edge innovation.

Aero India 2025, hailed as the "Mahakumbh of Defence," will serve as a dynamic platform where the State, academia, investors, and international collaborators converge within a robust Defence Ecosphere to chart the future of global security and technology exchange. Anchored by the pivotal role of DRDO, the event is showcasing India's steadfast commitment to Atmanirbharta in defence by unveiling groundbreaking indigenous technologies and fostering innovation across sectors. DRDO's extensive participation will highlight India's achievements in self-reliance, while enabling foreign collaborations that accelerate co-development, technology transfers, and mutual growth in defence capabilities.

This grand congregation also aligns with India's vision of Viksit Bharat 2047, where the nation aspires to achieve holistic development through technological leadership, economic self-reliance and strategic global partnerships. The ideals of Vasudhaiva Kutumbakam—the world is one family—resonate deeply with Aero India's mission to unite diverse stakeholders in the pursuit of shared security and global progress. By integrating stakeholders across the Defence Ecosphere and emphasising the importance of indigenous innovation, Aero India 2025 will exemplify India's role as a leader in shaping a secure and prosperous world order.

As the world witnesses this extraordinary synthesis of tradition and modernity, Aero India 2025 reaffirms India's stature as a global powerhouse, embodying the spirit of unity, resilience, and innovation while paving the way for a secure and inclusive future for all.

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