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Aero India a Testimony to 'New India': PM



Prime Minister Narendra Modi visiting the Karnataka Pavilion at Aero India 2023. Defence Minister Rajnath Singh, Karnataka Chief Minister Basavaraj Bommai also seen.

The skies of Bengaluru are bearing testimony to the capabilities of New India, said Prime Minister Narendra Modi while inaugurating the 14th and biggest-ever Aero India at Yelahanka Air Station. Addressing the gathering of thousands, Modi said that Aero India's deafening roar echoes India's message of Reform, Perform and Transform and the new height is the reality of New India.

"This new height is the reality of New India, today India is touching new heights and transcending them too. India will take rapid strides to be included among the largest defence manufacturing countries and our private sector and investors will play a big role in that. Youth of Karnataka should deploy their technological expertise in the field of defence to strengthen the country," the Prime Minister said.

Modi said that Aero India 2023 is a shining example of India's growing capabilities and the presence of around 100 nations at this event shows the trust that the entire world shows in India. He

noted the participation of more than 800 exhibitors including Indian MSMEs and startups along with the well-renowned companies of the world. Throwing light on the theme of Aero India 2023 'The Runway to a Billion Opportunities', the Prime Minister expressed that the strength of Aatmanirbhar Bharat keeps on growing with each passing day.

Referring to the Defence Minister's Conclave and CEOs Round Table that is being organised along with the show, Modi said that active participation in the sector will enhance the potential of Aero India. The Prime Minister underscored the importance of Aero India taking place in Karnataka which is the hub of India's technological advancement. He said that this will open new avenues for the youth of Karnataka in the aviation sector.

"When the country moves forward with new thinking, new approach, then its systems also start changing according to the new thinking", the Prime Minister said as he highlighted that Aero India 2023 reflects the changing approach of New India. The Prime Minister recalled

when Aero India used to be 'just a show' and a window to 'sell to India' but the perception has changed now. "Today, Aero India is India's strength and not just a show and it showcases the self-confidence of India," Modi said.

The Prime Minister said that India's successes are bearing witness to its capabilities. "The new India of the 21st century will neither miss any opportunity nor will it lack any effort," he said. He underlined that the nation which used to be the largest defence exporter for decades has now started exporting defence equipment to 75 countries in the world. Modi said that the aim is to take defence exports from 1.5 billion to 5 billion by 2024-25.

The Prime Minister called upon the private sector to invest in the defence sector which will create new opportunities for them in India and in many other countries. "The India of today thinks fast, thinks far and takes quick decisions", Modi said as he drew the analogy of India in Amrit Kaal to a fighter jet pilot.

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Aero India Gives a New Identity to Indian Defence: Rajnath Singh



Addressing the gathering at the inauguration of Aero India 2023, Defence Minister Rajnath Singh said that India has become a promising manufacturing destination due to its business-friendly environment & cost-competitiveness. Singh lauded Prime Minister Narendra Modi for guiding India on the political and economic map of the world and made special mention of his unwavering commitment towards the industrial and economic growth of the country. He described Aero India as an expression of that resolve.

The Defence Minister called upon Aero India participants to become a part of India's journey towards becoming a defence manufacturing hub. "India has become the fifth largest economy in the world due to the vision and determination of our Prime Minister. It is well on course to become the third largest economy in the next 4-5 years. India's G-20 presidency this year is also a reflection of India's growing stature on the international platforms," he said.

Singh also shed light on the growth story of the Indian defence sector, saying that it has come a long way in the last few years and is marching ahead on the path of empowering the nation with full zeal and dedication. He termed Aero India as one of the pillars which has strengthened the defence sector and has given it a new

identity.

He welcomed the Defence Ministers, Service Chiefs, CEOs, officials and delegates from many countries participating in this 14th edition of Aero India. He appreciated the fact that over 800 exhibitors from India and abroad will present showcase their products & technologies during the five-day event. He termed the huge participation as a testimony to a new confidence of the domestic and global business community in India's emerging business potential. He called upon the participants to become a part of India's journey towards becoming a defence manufacturing hub.

Singh also commended Karnataka Chief Minister Basavaraj Bommai for organising the event on a grand scale. He described Karnataka as a pioneer in industrialisation and one of the most prominent states

contributing to India's economic growth.

Defence Ministers' Conclave

Singh will host Defence Ministers' Conclave on Tuesday. Defence Ministers of friendly foreign countries will participate in the meeting, which has been organised on the theme 'Shared Prosperity through Enhanced Engagements in Defence (SPEED)'. The conclave would address aspects related to deepen cooperation for capacity building (through investments, R&D, joint venture, co-development, co-production and provisioning of defence equipment), training, space, Artificial Intelligence (AI) and maritime security to grow together. The conclave is an opportunity for the defence ministers to engage with each other to carry forward the 'Make in India, Make for the World' vision. ■



Jayashree Muralidharan IAS, Managing Director, TIDCO visiting the Jayasuriya Stall at Aero India 2023. S. Kalai Arasu, Founder CEO and Managing Director also seen

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For a Seamless Transition Between AIR and Space



Air Chief Marshal V.R Chaudhari, Chief of the Air Staff, Indian Air Force, has been focussing on the need to invest more on cyber capabilities and the domain of Space. As the lead aerospace agency, the IAF has adopted a policy of boosting expertise in this critical domain.

Air Chief Marshal V.R Chaudhari
Chief of the Air Staff, Indian Air Force

The defence services the world over have been structured, manned, equipped, and trained for the conduct of warfare as we have known it in the classical sense. However with time and technological advancement, there has been a growing dependence on networking. The cyber domain has emerged as a key domain of warfare. A successful cyber-attack can cause prohibitive, but usually, non-lethal losses, cause a huge loss of functionality or even capability, and serve as a good coercive factor. More importantly, it is difficult to attribute

such attacks, and this is what makes them so attractive in No War No Peace situations. Our adversaries have invested a lot in creation of such capabilities.

The Indian Air Force was the first among the services to implement a pan-India service-specific network, and Network Centric Operations have only grown since then. Cyber defence measures, awareness, procedures, and training are areas of focus. Our systems and procedures are robust, but also subject to constant review and upgrade.

In the same manner, the domain of space is now inextricably linked with nearly all aspects of our operations today. From communications to sensors of all kinds, the dependence on our space assets, and hence their criticality is extremely high. We have a tri-services agency that has been established to focus exclusively on this domain. Nevertheless, as the lead aerospace agency, the IAF has adopted a policy of boosting expertise in this critical domain. We have always maintained that space was but an extension of the air medium. Even today, there are

extant technologies that allow for a direct interaction between air and space platforms. But emerging technologies and platforms will erase the difference between the two and permit seamless transits between air and space.

It is imperative that we understand these, adopt a future-oriented outlook and develop such capabilities as well. 'Near Space' as the intervening region between air and space will be a crowded area in times to come. And with the ability to dominate it will come a far greater ability to influence and support space operations. In fact, the domain of air will be critical to controlling the domain of space. Together with other government agencies a composite effort to develop capabilities to safeguard our interests has been put in place. The IAF will be in the vanguard of this process. Air warriors today need to understand this, train, plan and execute so that they may master it tomorrow.

The Indian Air Force has made great strides in its force optimization drive and indigenisation of defence production. The indigenous LCA (Tejas)



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programme has now matured. 16 IOC version aircraft and 14 FOC version aircraft are with the IAF. Delivery of the recently contracted 83 aircraft will commence by January 2024 and these will be used to resurrect some of the number-plated Squadrons. The major improvements include incorporation of Active Electronically Scanned Array (AESA) Radar, Electronic Warfare (EW) suite, Beyond Visual Range (BVR) missiles and mid-air refuelling capabilities. IAF is also tirelessly working to enhance the operational capability of the LCA by installing newer systems and integrating additional weapons.

The two Squadrons of the Rafale are operational at their respective bases. Now we have shifted focus on the MRFA programme and extensive discussions are ongoing within the prospective participants. The entire case is being realigned to ensure continued relevance of the platform and its capabilities hold us in good stead for at least the next four decades.

The indigenous development of LCA Mk 2 and AMCA is being progressed through DRDO and detailed deliberations are underway. Suffice to say that both the programmes have gained sufficient momentum and as soon as certain technical details are straightened out, both these projects will be launched in the near future.

The IAF transport fleet is well rounded and the C-295 aircraft with a major Make-in-India component will allow the IAF to replace its ageing Avro aircraft. On the rotary wing front, the IAF has managed to do rather well. Deliveries of attack and heavy lift helicopter for 22 Apache AH-64E and 15 Chinook CH-47 have been completed with the

formation of two units for each type. The Russian Mi-17 V5 programme has also been completed with 130 plus helicopters having been delivered. The IAF has also acquired a large number of the indigenous ALH (Dhruv) helicopters. We also plan to acquire the Indian Multi-Role Helicopter currently being designed and developed by HAL. Upgrade of the Mi-17 legacy helicopters is also in progress.

Recently, the IAF has inducted the Light Combat Helicopter in the Limited Series Production version. Upon successful induction, further procurement of this versatile platform will be initiated. The IAF plans to acquire 55 more LCH in the near future.

Capability enhancement of the helicopter fleet is an ongoing process with IAF. Induction of new missiles, EW systems, systems to allow operations in a degraded visual environment, combat SAR capability and networked operations are either ongoing or in the pipeline.

Since their induction, the existing three Phalcon-based IL-76 AWACS aircraft have been fully operationalised, networked and integrated. In addition, all three Embraer E145 platforms with the indigenous AEW&C development by DRDO have been delivered and operationalised. Additionally, the next generation AEW&C based on the A-321 will be developed by DRDO. IAF is also procuring Medium Power Radar (Arudhra), High Power Radar, Ashwini Radar and Mountain Radar for ensuring a gap free AD Coverage of its airspace.

To augment its mid-air refuelling capability, the IAF is progressing the case for procurement of six FRAs. To make the project economical, we

may also go in for pre-owned FRAs as long as they meet the operational requirements. As this process will take some time, a case for leasing one FRA to augment our training requirements has also been initiated.

Special focus is being given to enhancing our UAS capabilities across the spectrum. The IAF has been designated as the lead service to progress the procurement of MALE UAVs for all three services.

The long-pending requirement of upgrading the existing fleets of Heron UAV is now being re-aligned to Make-in-India provisions. Technical discussions are on-going with the OEM and a prospective Indian agency to find a common path ahead.

The advent of small, mini and micro UAVs has opened up a new challenge and to counter such threats, we have taken multiple approaches. All the Counter UAS systems are designed and developed in India, with hand-holding and guidance from the IAF. These systems are gradually being inducted. The IAF has an additional requirement of 106 BTAs (Basic Trainer Aircraft). Towards this, HTT-40 from HAL will be inducted soon.

The IAF had opted for the indigenous Akash SAM systems, eight squadrons of which have been inducted into service, with seven more in the process of induction. In addition, DRDO's project to develop and deliver the MR-SAM is progressing satisfactorily with the induction of three Sqns having been completed. The IAF has also operationalised the S-400 system and the rest are being delivered as per schedule.

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- Max. range* (19pax) : 775 km (418 nm)
- Max. range* (7pax) : 2450 km (1323 nm)
- Max. cruise Speed : 500 km/hr (270 Kts)
- Stall Speed : 185 Km/hr
- Endurance : 6 hours
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- High Altitude Operation : 3300 m
- Reserve Fuel : 45 min



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- TAWS - FMS , TCAS & Auto pilot and Weather Radar



Cabin Layout



Power Plant

SARAS is powered by two Pratt and Whitney Canada PT6A-67A turbo-prop engines flat rated to 1200shp driving five bladed composite propellers

Boosting Cutting-edge Technologies For Futuristic Requirements



DRDO has been working on empowering the nation with indigenous defence technologies and systems, with focus on developing the defence R&D ecosystem in the country. At the Aero India 2023, DRDO will be showcasing AEW&C Mk-II, AMCA, LCA Tejas Mk2, TEDBF and Archer (Image intelligence with Weapon Payloads) and will participate in various flight displays during the Aero Show, including LCA Tejas, NETRA AEW&C and TAPAS UAV and NETRA AEW&C, says Dr Samir V Kamat, Secretary, Department of Defence R&D and Chairman, DRDO, in this special interview in the context of the mega exposition.

Dr. Samir V Kamat

*Chairman, DRDO & Secretary Defence R&D
Ministry of Defence, Govt. of India*

DRDO celebrated its 65th Foundation Day on January 1 and you commended the fraternity for achieving a number of milestones in 2022. How much productive was 2022 for DRDO when the industry survived the impact of the Coronavirus pandemic?

Year 2022 has been a very good year for the nation as well as DRDO. Several systems developed by DRDO have been delivered, handed over to or inducted by the users. These include: Three firing units of Medium Range Surface to Air Missile for IAF, Shakti EW system, InfraRed Signature Suppression System for ships, 1000lb Thermobaric bomb, Brake Parachutes for Su-30 fighters aircraft, Commanders Thermal Imaging Sight with Laser Range Finders for T-90 Tank, Dhvani Automated Sonar Trainer, Four types of Radiation Contamination Monitoring Systems, MIG-29 Aircrew Helmet & Pressure breathing Oxygen Mask.

Acceptance of Necessity has also been accorded by Defence Procurement Boards and Defence Acquisitions Council for induction of several DRDO developed systems. Some of the notable systems include: Sarang ESM system, Light Tank, Tactical Advance Range Augmentation Kit (TARA), Long Range Guided Bomb (LRGB) Gaurav, Naval Anti Ship Missile-Medium Range (NASM-MR), Air

surveillance radar for NGMV, Low Level Transportable Radar (LLTR) Ashwini, New Generation Anti Radiation Missile (NGARM), Pralay Guided Extended Range Rocket Ammunition for Pinaka, Self-Propelled Mine Burier, Infantry Combat Vehicle-Command, Anti-Personnel Fragmentation Mine 'Ulka', Infantry Floating Foot Bridge, Bridge Laying Tank (BLT) T-72 and ACADA.

DRDO has been working on empowering the nation with indigenous defence technologies and systems, with focus on developing the defence R&D ecosystem in the country and strive to realise Prime Minister's vision of 'Aatmanirbhar Bharat'.

India has achieved a considerable level of self-reliance in critical defence technology but there is still a long way to go. What are DRDO's plans to increase the pace of attaining Atmanirbharata in defence?

DRDO has taken several initiatives to strengthen the indigenous defence R&D ecosystem in the country. DRDO is focusing on working in products and technologies which are at low readiness level. While technology which has now matured is being handed over to industries, many industries are now working with DRDO as Development Cum Production Partner (DcPP). Young scientist laboratories of DRDO are dedicatedly working in futuristic technologies namely Artificial

Intelligence, Quantum Technologies, Cognitive Technologies, Asymmetric Technologies and Smart Materials. DRDO has established 15 Centres of Excellence in collaboration with various academia institutes all over the country to develop critical technology for meeting futuristic requirements of Armed Forces. DRDO also funds research under its various Grant-in-Aid Schemes to undertake research in the fields of Aeronautics, Armaments, Naval and Life Sciences to strengthen funded research.

DRDO has also identified 108 systems and subsystems for designing and development by the Indian Industry only. All DRDO system laboratories have AI technology groups to introduce AI features in products under development.

Increasing defence export share is crucial for India considering its ambitions in the industry. How strong is DRDO's export business?

DRDO developed Defence products have created a lot of interest in many countries and have been exported too. Many products based on DRDO technologies have already been exported by DPSUs and Industry.

BrahMos Aerospace Private Limited (BAPL), the joint venture company of DRDO & NPOM, Russia has signed a contract with the Department of National Defence of the Republic of Philippines last year for supply of Shore Based Anti-Ship Missile System to Philippines.

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This contract will give further impetus to indigenous production of critical weapon system and ammunition with active participation of our industry. Previously, DRDO developed WLR Swathi was exported to Armenia. Many naval products developed by DRDO like Torpedoes, Sonars have been exported to the neighbouring countries.

Akash Missile System has been recently cleared for export. More export opportunities are emerging for Weapon Locating Radar, Torpedoes, Sonars, etc.

DRDO has also come out with a compendium on "DRDO Products for Export" to give impetus to export. This will provide the necessary and handy information about the DRDO products, which are ready for export. We will see tremendous increase in defence exports in next few years.

Acceptance of Necessity (AON) has been accorded by the Defence Procurement Boards and Defence Acquisitions Council for induction of several DRDO developed systems. Could you elaborate?

Defence Acquisition Council (DAC) in January this year accorded Acceptance of Necessity (AoN) for procurement of HELINA Anti-Tank Guided Missiles,

launchers and associated support equipment which will be integrated on the Advanced Light Helicopter (ALH) and will further strengthen the capability of Indian Army. Besides, DAC also accorded AoN for procurement of VSHORAD (IR Homing) missile system under design and development by DRDO. Procurement of VSHORAD, as a robust and quickly deployable system, will further strengthen the Air Defence capabilities.

Prior to this, in December 2022, the DAC headed by Hon'ble Raksha Mantri Shri Rajnath Singh had accorded approval for AoN of Futuristic Infantry Combat Vehicles, Light Tanks, Naval Anti-Ship Missiles, Multi-Purpose Vessels, new range of missile system, Long Range Guided Bombs, Naval Anti-Ship Missiles etc., which will further modernise our Armed Forces and will provide substantial boost to the defence industry to achieve the goal of 'Aatmanirbhar Bharat'. The AoNs accorded will equip the Indian Army with platforms and equipment such as Futuristic Infantry Combat Vehicles, Light Tanks and Mounted Gun System providing a quantum jump to Indian Army's operational preparedness. Similarly, Indian Air Force will be further strengthened with enhanced lethal capabilities by

induction of new range of missile system, Long Range Guided Bombs etc.

Several major systems developed by DRDO have either been completed or are in the final stages of user evaluation. Could you talk more about it?

Several major systems developed by DRDO have either been completed or are in the final stages of user evaluation. These include Advanced Towed Artillery Gun System (ATAGS), Third Generation Helicopter Launch Anti-Tank Guided Missile 'Helina', NAMIS (Tracked) and 'Nag' Anti-Tank Guided Missile, Quick Reaction Surface to Air Missile, Medium Range Surface to Air Missile, Mechanical Mine Layer (self-propelled), 84 mm Anti-Thermal/Anti-Laser Smoke Grenade, HEPF and RHE (Enhanced) Rocket Ammunition for Pinaka MRLS, 125 mm FSAPDS, Air Defence Fire Control Radar 'Atulya', Weapon Locating Radar for Mountains, V/UHF Manpack Software Defined Radio, P-16 Heavy Drop System, Portable Diver Detection Sonar System, Advanced Light Weight Torpedo, and Sea Water Purification Kit for Gaganyaan Mission.

Several other systems are also undergoing developmental trials.

These include Electronic Warfare Systems for Naval platforms under the programme Samudrika, Phase-II Ballistic Missile Defence Interceptor AD-1 Missile, extended range version of BrahMos from Su-30 aircraft, Very Short Range Air Defence System, Naval Anti-Ship Missile-Short Range, Agni Prime, Vertical Launch-Short Range Surface to Air Missile (VL-SRSAM), Akash-New Generation, Man-Portable Anti-Tank Guided Missile (MPATGM), Enhanced Range Pinaka Rocket System, High speed expendable Aerial Target 'Abhyas', Small Turbo Fan Engine, Kaveri Dry Engine, WhAP-CBRN, Shatrughat and EW Systems for Plains and Desert Active Electronically Scanned Array Radar 'Uttam', Advanced Light Towed Array Sonar among others. It is expected that most of the systems under trials will be handed over to the users in the coming year.

What are the latest updates on the Electronic Warfare Systems for Naval platforms under the programme Samudrika, Naval Anti-Ship Missile-Short Range and Advanced Light Towed Array Sonar, which are undergoing developmental trials?

Programme 'Samudrika' will result in achieving hundred per cent indigenisation of Electronic Warfare fit onboard Indian Naval Platforms Electronic Warfare (EW) Systems for Naval platforms. The Programme SAMUDRIKA is undergoing developmental trials. The programme aims at design and indigenous development of a family of Seven Electronic Warfare Systems meeting the requirements of Navy for different platforms viz., Ships, Helicopters and Aircrafts, with a firm commitment from Navy for quantity production and induction of these Systems.

Advance Light Towed Array Sonar (ALTAS) development is critical to underwater defence of the Indian Navy. This will enhance the Navy's capabilities to detect quieter enemy submarines underwater. It is useful in Anti-Submarine Warfare (ASW) operations and is the apt sensor for warships to locate silent submarines capable of launching high speed torpedoes. With NPOL emerging as a leading and high performing R&D laboratory working in the area of underwater surveillance systems, Sonar systems developed by it are being used in Indian Navy's frontline platforms for last few decades and many of them have entered into third



and even fourth generation products.

Aiming to improve logistics for operations in the Himalayas DRDO has developed an unmanned aerial vehicle (UAV) recently. Could you talk more about it?

With an aim to carry out logistic operations in the Himalayan frontier, DRDO has developed an untethered multi-copter payload, an unmanned aerial vehicle (UAV). The multi-copter can carry out autonomous missions with waypoint navigation. The multicopter was exhibited by DRDO at recently held 108th Indian Science Congress in Nagpur, Maharashtra.

Could you talk about DRDO-Industry-Academia Centres of Excellence which are important in developing the defence R&D ecosystem in the country?

DRDO has established a total of 15 DRDO-Industry-Academia Centres of Excellence (DIA-CoEs) in collaboration with various academia institutes all over the country to develop critical technology for enabling futuristic requirements of Armed Forces. Currently, 867 projects are on-going with academia at a cost of Rs 1,183 crore. DIA-CoEs have been established to conduct directed research in advanced technologies for defence and security and to create a world-class research centre developing cutting-edge technologies. DRDO funds directed research through DIA-COE in the identified research areas. It will also make a major contribution towards 'Aatmanirbhar Bharat' in defence sector.

What are the highlights of DRDO's participation at Aero India 2023? How do you look at the expo as a platform to boost Indian defence business?

Aero India 2023, the premier biennial air show is being hosted during February 13 to 17, 2023 at the Yelahanka Air Force Station in Bengaluru. DRDO is

participating in this mega exposition in a big way. More than 300 products, technologies and innovations are being presented in indoor, static and flying displays. With an endeavour to integrate various stakeholders of defence systems development in the country, the DRDO has planned an enriching experience of indigenous defence technologies and systems. Various interactions are expected with the scientists to explain and demonstrate the systems and exhibits.

At the India Pavilion, DRDO will be displaying five exhibits. The exhibits are AEW&C Mk-II, AMCA, LCA Tejas Mk2, TEDBF and Archer (Image intelligence with Weapon Payloads). In addition, DRDO will participate in various flight displays during the Aero Show. These displays will include LCA Tejas, NETRA AEW&C and TAPAS UAV and NETRA AEW&C.

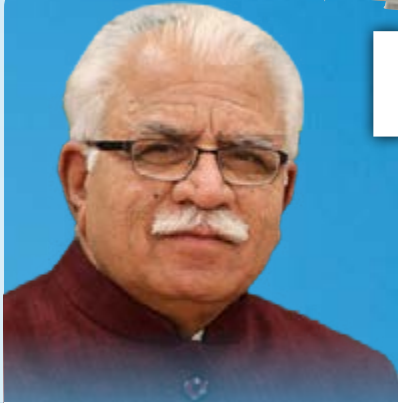
As a prelude to Aero India 2023, DRDO in association with the Aeronautical Society of India (AeSI) is organizing the 14th Aero India International Seminar on February 12, 2023 at Bengaluru. The Seminar is of global importance and provides best exposure to all participating professionals by bringing together the best in the field from all over the world. Besides, DRDO's AR&DB is also organising a seminar on February 14, 2023 on Indigenous development of 'Futuristic Aerospace Technologies including Way Forward for Development of Indigenous Aero Engines'.

DRDO's participation at Aero India 2023 is an excellent opportunity for Indian aerospace community to foster the cause of indigenous development of military systems and technologies with the spirit of self-reliance and national pride. It will provide a platform for collaboration and evolve new opportunities to boost the export of indigenous defence products.



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Salil Gupte, President, Boeing India, asserts that Boeing is committed to supporting aerospace and defence industry in India with a vision to bring the best of Boeing to India and take the best of India to the world. Among foreign OEMs, Boeing leads the way in investments across the aerospace and defence value chain – be it in manufacturing, engineering and R&D, skilling and training – helping develop the aerospace and defence ecosystem in India.

Salil Gupte
President, Boeing India



There are reports that Boeing plans to increase the sourcing of components from India for global manufacturing as part of the company's strategy to de-risk the supply chain. Could you elaborate on this and talk about how the company support Make in India and Aatmanirbar Bharat initiatives?

We continue to grow a globally competitive supplier base in India, with strong partnerships aligned with the Aatmanirbhar Bharat vision. Boeing is by far the largest foreign OEM in terms of sourcing from India, with over \$1 billion per year from a large and growing base of over 300 suppliers manufacturing critical systems and components for some of Boeing's most advanced products. We are also helping develop Micro, Small & Medium Enterprises (MSMEs), and in fact, over 25 percent of our suppliers from India are MSMEs. Through our skilling and up-skilling initiatives, Boeing is developing Indian MSMEs, and training hundreds of pilots, aircraft maintenance engineers, technicians, and frontline factory workers across India with partners like Air India, Tata, and MSMEs - Rossell Techsys, SASMOS, Jaivel and also other industrial partners like Indo MIM, Lakshmi Machine Works, Air Works and Wipro. These programs have skilled close to 4,000 frontline aerospace manufacturing workers and aircraft maintenance engineers. Boeing's investment in supplier development,

training, tooling and quality management has enabled Indian suppliers to engage in high-value, high-tech manufacturing of complex aerospace components and subsystems for India and for some of the most advanced platforms in the world.

Our joint venture with Tata, Tata Boeing Aerospace Limited (TBAL), in Hyderabad - is already in its seventh year of operation. Spread over 14,000 sq. m., this state-of-the-art facility with over 900 engineers and technicians, it demonstrates co-development of integrated systems in aerospace and defence in India. An example of Boeing's commitment towards Make in India and Aatmanirbhar Bharat. The TBAL facility in Hyderabad manufactures aero-structures for Boeing's AH-64 Apache helicopter, including fuselages, secondary structures, and vertical spar boxes for customers worldwide, including for the U.S. Army. As of January 2023, more than 190 fuselages have been delivered by TBAL. More than 90 percent of the parts used in these aerostructures assemblies are manufactured within India with over 100 MSME suppliers. On January 19, TBAL completed the delivery of the first fuselage for the Indian Army's six AH-64 Apache attack helicopters.

In a significant announcement, Boeing has said that its commercial airplanes will be capable and certified to fly on 100 per cent sustainable aviation fuels by 2030. Could you talk more about the initiatives Boeing is undertaking in India to support this?

In 2019, 4.5 billion people flew, 7 trillion in goods were exchanged and the aviation industry supported 87.7 million jobs. Air Transport Action Group's (ATAG) analysis predicts that by 2050 air travel will carry over 10 billion passengers a year, support 180 million jobs and generate nearly \$9 trillion in economic activity. The industry also created 900M tons of carbon emissions in 2019 which is 2.6% of the world's emissions and 12% of transportation's emissions.

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

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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.

Boeing contributed to the first report "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, World Economic Forum (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 can we expect from Boeing at Aero India 2023? How do you look at the expo to expand your business opportunities in South Asia?

We are excited to be at Aero India 2023 and will have a large presence at the show. You should look forward to some interesting announcements that further boost Boeing's Make in India and self-reliant India focus. Among foreign OEMs, Boeing leads the way in investments across the aerospace and defence value chain – be it in manufacturing, engineering and R&D, skilling and training – helping develop the aerospace



and defence ecosystem in India.

Boeing India's exhibit will highlight strategic investments the company has made across the ecosystem to build local services infrastructure, capabilities, workforce development and partnerships, while harnessing the strength of Indian talent and its large and growing network of more than 300 supplier partners. Boeing is committed to supporting aerospace and defence industry in India with a vision to bring the best of Boeing to India and take the best of India to the world.

LMW Geared up to Deliver Complex Hybrid Structural Assemblies – Metallic & Composites



Providing a one-stop solution for Aerospace and Defense customers through extensive range of capabilities, including machining, sheet metal, special processes, composites, and assembly, Lakshmi Machine Works Limited has been primarily affiliated with major PSUs including HAL, BEL, and DRDO and associated with major global defence companies, delivering structural components for Military Aircraft and Helicopter OEM programs in the United States and Europe. Soundhar Rajhan K, Director – Operations, Lakshmi Machine Works Limited, says they are in discussion with various OEMs for supply of hybrid structural assemblies made from Composites and Metallic materials to military aircraft and helicopter programs. Excerpts from a special interview in the context of Aero India 2023

Soundhar Rajhan K

Director – Operations, Lakshmi Machine Works Limited

LMW has been active in aerospace and defence sector for more than a decade. What are the major achievements?

LMW has developed expertise in machining, sheet metal fabrication, Composites, special processes,

and subassemblies for the Aero-Structure, Aero-Engine and Space-Structure segments.

In the Aero-Structure segment, we have successfully delivered structural sub-assemblies for Sukhoi 30 Aircraft

to HAL, Fracture critical Wing parts for foreign military aircraft and a major structural assembly – Metallic Dome for Surveillance Aircraft containing over 1500 unique detail parts within a year. Air Intake assembly to HAL LCA division and Tail boom assembly for HAL Helicopter division are currently supplied by our company.

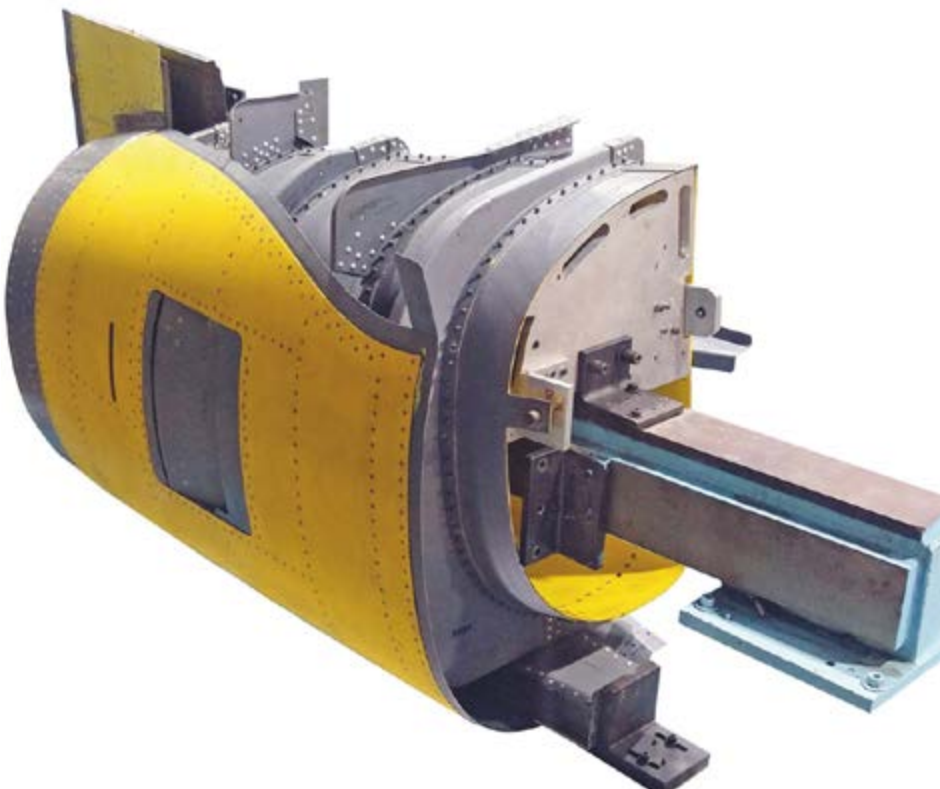
In the Aero-Engine segment, the company established a Center of Excellence for Bleed Valve assemblies of commercial aircraft engines and delivered complex engine parts, such as Shroud Segment, Body Weldment, Compressor Discs and Casings among others.

In Space Structure segment, we supply Payload Fairing (Heat Shield), Payload Adaptors and Equipment Bay Shroud for VSSC's GSLV Mk III projects supplying as well as structural sub-assemblies for SSLV and PSLV.

We have established strong relationships with numerous OEMs & Tier 1s in the United States and Europe by supplying high-quality products under long-term contracts.

Could you share with us highlights of your operations in the aerospace and defence sector? How does LMW associate with the Indian DPSU's?

LMW provides a one-stop solution





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for Aerospace and Defense customers through our extensive range of capabilities, which includes machining, sheet metal, special processes, composites, and assembly, enabling us to have greater process control with minimum lead-time, thereby ensuring the highest quality and on-time delivery. To ensure that our customers' lines remain uninterrupted, we have dedicated resources and installed IoT to collect real-time data. The aerospace and defence industries require highly skilled work force which is achieved through ongoing skill development programs.

LMW has primarily been affiliated with major PSUs including HAL, BEL, and DRDO. We began collaborating with most HAL divisions. HAL LCA division for Air Intake Assembly, HAL Helicopter division for ALH (Advanced Light Helicopter) and LUH (Light Utility Helicopter) programs, HAL Composites division for large cowling parts, HAL Aircraft and Aerospace division for large structural machining parts. We recently entered Ground segment by supplying Composite Radome and Reflector components to BEL. Through our ecosystem, we are also developing one of the engine modules for DRDO.

Could you elaborate on the facilities of LMW's Advanced Technology Centre (ATC)?

LMW ATC was founded to serve the aero engine and structure segment.

We have made investments in machining centers that can produce structural products from 0.3 metres to 10 metres in length and 5-axis machines for manufacturing engine components out of hard metals like Titanium, Steel, and Nickel alloys as well as in special processes like heat treatment of aluminium alloys, NDT - Fluorescent Penetrant Inspection, Magnetic Particle Inspection and anodizing lines that can handle parts up to 6 metres in length to ensure the delivery of our value proposition.

Our Composites facility is well-equipped to serve the space and aerospace industries, with equipments such as CNC Pre-Preg cutting machine, a larger autoclave measuring 6 metres long and 4 metres in diameter, and a smaller autoclave measuring 2.4 metres long and 1.3 metres in diameter. We have two ISO Class 8 compliant clean rooms, measuring 6 and 12 metres in height. Additionally, the smaller clean room can be upgraded to ISO Class 7. A Hot Air Oven measuring 6.5 metres long, 4 metres wide, 3.5 metres high and C-Scan with 10 axis dry and wet probes measuring 7 metres long, 2 metres wide, 3 metres high were recently established. We are also expanding from "built to print" to "built to specification" to meet all the composites requirements.

Could you share the details of your

exports operations in defence sector?

LMW has been associated with major global defence companies. We provide structural components for Military Aircraft and Helicopter OEM programs in the United States and Europe. As an Indian Offset Partner, we are proud to supply structural products to multiple original equipment manufacturers. We are in discussion with various OEMs for supply of hybrid structural assemblies made from Composites and Metallic materials to military aircraft and helicopter programs.

Could you talk about LMW's participation in Aero India? What are the highlights?

Since 2013, LMW has exhibited at Aero India, showcasing our capabilities in the aerospace and defence sector. It allows us to have significant interactions with our customers and supply chain partners. It is an opportunity for us to join the Aerospace community and exhibit our diverse manufacturing capabilities for the aerospace and defence industries.

Among the highlights are enhancing our relationships with current clients, showcasing our capabilities, and exploring business opportunities with prospective clients.

We cordially invite you to visit us in Aero India 2023 @ Hall A, Stall 8.7-4 in Tamil Nadu Pavilion.

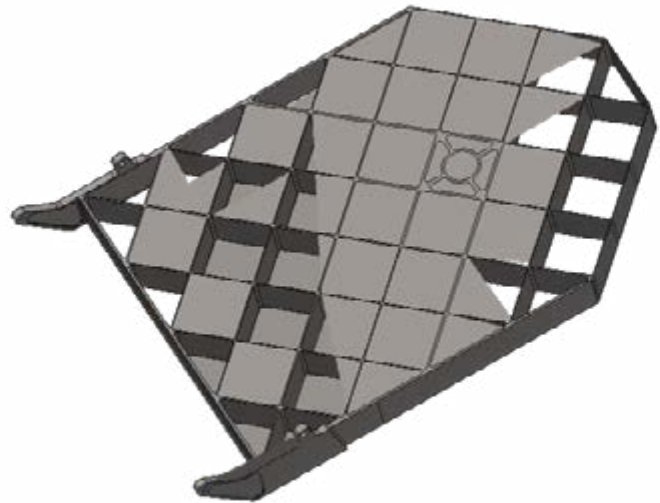


Safety takes precedence as the Gaganyaan Mission takes to the skies

As the Indian Space Research Organization's Gaganyaan Mission prepares for launch in 2024, Ankit Aerospace is proud and honoured to be a manufacturing partner for the Grid Fins, using an industry-first Electron Beam Additive Manufacturing process to 3D print these large parts.

Their EBAM technology revolutionizes the way large components are made for critical missions, resulting in a 75% reduction in Titanium material usage with no functionality loss.

For a mission that has the world's attention, only the best will do, and we are proud to deliver on this promise.



Above image is a property of Ankit Group

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EMUGE-FRANKEN: Case Study for Being Close, Precise, Innovative



The rapid pace of the 'Make in India' campaign has brought about a focussed approach in almost all sectors of India. The Aerospace and Defence sector are not to be left behind. They too have taken a leap forward with multiple progressive advancements and new developments, overcoming numerous challenges such as machining, complex shaped components and difficult to cut materials.

Over the last few years as a tooling solution provider, EMUGE-FRANKEN India Pvt. Ltd. has an increasing demand in machining of many aero engine parts. These comprise of components, both on the cold and hot side of the engine, with HRSA materials like Titanium and Nickel based alloys.

They stand tall with their tooling solutions in the field of Threading technology, Workpiece Clamping technology and Milling technology. Their expert team promises to extend the best support in application engineering for complete machining solutions, with close co-operation with the end-users. This can be achieved through:

Suggestions to make the right selection of machine for suitable process

Recommending the best suited machining methods for the prevailing machining conditions (machining strategies using CAM systems)

Supply of high precision tool holding and optimized high-performance tools from their range of products

A focussed approach to continuously be engaged with the user to establish the correct and safe process.

They have been successful in adding value to manufacturing processes for components like Fan Blisk, Integrated Blade Rotors, Impellers, Shrouded Impellers, Combustion Casing, Turbine Casings, Nozzle Guide Vanes, Flaps & many others.

An interesting case to note is that of the application where the manufacturer of one of the components used in the hot side of the aero engine was facing difficulty with the physical properties of the material. The material required needed to have high strength, long fatigue life, combined with good resistance to oxidation and corrosion, which would help in its functioning continuously around 1800 ~ 2200 F. Such material made by a deadly chemical composition of alloy elements with significant traces of Nickel, Cobalt & Chromium and allied with a few more, had proved disastrous for any tool to work.

The highly optimized tooling solution available within EMUGE-FRANKEN standard program and optimized tools came to the rescue. Having successfully jointly established a safer process to produce the component, they undertook the task from the FRANKEN product range. While the user was not even able to cut any chips from the component, and kept breaking the end mills, the EMUGE-FRANKEN expert team was successful in understanding the basic inputs and working conditions properly, before starting to work with their standard range of tools and tool holders with suitable machining strategies. They could successfully start producing the chips without any tool breakage. The resultant joy from the operator, who had been breaking tools previously and struggling to work with this component

for so many months, has been testimony to the company's efforts and expertise. Working closely with the user and partnering with the CAM companies, the right and best suited machining strategy was implemented, which resulted in:

- a. Increased MRRs
- b. Dramatic reduction in finishing operation up to 80%
- c. Increased tool life more than 300%
- d. Very good and high consistency in surface quality

The resultant hassle-free, stable process established has been extremely safe. Using standard and special tools to ensure alignment to the requirements of stringent norms and standards to quality, this entire activity has been built with a lot of confidence in the minds of end-user. The team of experts are now geared up to take similar highly critical components posing challenges, towards helping the customers in development and process implementation which would result in 'first time right'. This would also further reiterate the brand values of being 'Close, Precise, Innovative'.

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Embraer showcases the C-390 Millennium at Aero India 2023



Defense & Security's products & solutions will highlight Embraer's presence at the show

Embraer is showcasing the C-390 Millennium military multi-mission tactical air transport aircraft, which will be on static display at Aero India 2023.

Complementing the C-390 Millennium's presence at the show is Embraer's booth (Hall B, B2.2 B) that will offer visitors a closer look at Embraer Defense & Security's comprehensive portfolio and innovative solutions, which include the A-29 Super Tucano, the P600 AEW&C, and the radars & border surveillance solutions.

"We are proud to bring Embraer's iconic C-390 Millennium to India for our guests to experience the true capabilities of this 21st-century military multi-mission aircraft," said Bosco da Costa Junior, President & CEO, Embraer Defense & Security. "India is a key market for Embraer, and we are keen to establish partnerships in the country that can further boost India's defence industries and capabilities. We look forward to engaging with India's defense

& aerospace ecosystem at this event."

Since it entered into service with the Brazilian Air Force (FAB) in 2019, the C-390 has proven its capability, reliability, and performance across a variety of missions. FAB's fleet of five aircraft, all refueling versions, designated KC-390, have already accrued more than 7,500 flying hours, and recent numbers have shown a mission completion rate of 99%, demonstrating outstanding productivity in its category. Embraer has orders for the C-390 Millennium from Portugal & Hungary, both NATO member nations. The Netherlands, also a NATO nation, selected the C-390 Millennium in 2022.

The C-390 is the most modern next-gen military tactical transport aircraft, and its multi-mission platform offers an unbeatable combination of low operating costs and fast turnaround. The aircraft can carry more cargo (26 tons) compared to other medium-sized military cargo aircraft and flies faster (470kts) and further on a standard crew duty day.

The C-390 Millennium can carry out a

wide range of missions using the same platform, including Air-to-Air (in-flight) Refueling (AAR) for fixed & rotary wing aircraft, airborne operations, troop & cargo transportation, humanitarian missions, medical evacuation, firefighting, and search & rescue, with simple and rapid reconfiguration between the different configurations using conversion kits and state-of-the-art built-in reconfigurable cargo floor systems. The aircraft was designed to operate on semi-prepared or damaged runways as well as in hostile environments, ranging from hot & humid to cold, dry conditions.

One of Embraer's defense products operating in the country is the Indian Air Force's Netra AEW&C. Built upon the ERJ 145 regional jet platform, the fleet of three Netras is the product of collaboration between Embraer and DRDO. The aircraft took part in the Fly Past grand finale of India's recent 74th Republic Day and is often deployed in key missions.



Ankit Aerospace to Showcase Advancements in Aerospace Manufacturing at Aero India 2023



Ankit Aerospace, one of India's leading aerospace component manufacturers specialising in the production of complex machine parts, fluid fittings and small assemblies, is showcasing a host of advanced solutions and capabilities at Aero India 2023.

Ankit Aerospace takes its place in the spotlight, in particular with the 3D printing capability showcase, a reaffirmation of quality and precision - two tenets that hold the industry in good stride. Some of the components 3D printed by Ankit Aerospace will make their way to Gaganyaan, the Indian Space Research Organisation's first manned mission slated for takeoff in 2024. The mission-critical nature of these parts demands precision, and that is what the use of 3D printing delivers in this context.

Other innovative showcases include the Titanium main rotor bolts used to attach

the rotating blades of helicopters to their transmission shaft. Ankit Aerospace load tests these parts for up to 10 million fatigue cycles to ensure that every potential scenario is taken into account.

This unwavering commitment to innovation has been a key driver in their success as they look to becoming the most preferred manufacturer of components across capabilities and applications, as needed by the aerospace industry.

Ankit Aerospace is currently showcasing at Hall B, BR1.2.

The Ankit Group with headquarters in Bengaluru is a dynamic engineering conglomerate that caters to

the Aerospace, Space, Defense, Automotive, and Industrial sectors.

Within the Group, Ankit Aerospace is a renowned name in aerospace manufacturing, while Ankit Fasteners manufactures the critical small parts used in aerospace, space, and defense applications.

Ankit Engineering, with the recent acquisition of Pune, MH-based R K Polymer Industries Pvt Ltd introduces a one-stop solution for all engineering and manufacturing needs across sectors with the introduction of capabilities such as plastic injection molding.

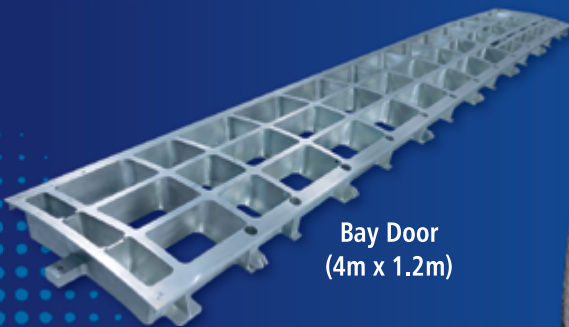


LMW Aerospace & Defence

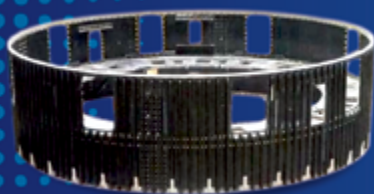


LMW Advanced Technology Centre (ATC) was established in 2010 to produce Metallic & Composites Aerospace systems, modules, assemblies and components. ATC is a one-stop shop for Aerospace majors. ATC has world-class manufacturing facilities, its Quality Assurance standards are aligned with AS 9100D certification and it has NADCAP accreditation for Special processes & Composites. Its Composites facility has processing and assembly capabilities of international standards to deliver a variety of composite and hybrid structures for space, aerospace and defence applications.

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With a wide array of products for Army, Navy and Air Force, BDL is aggressively promoting its products such as Anti-Tank Guided Missiles, Surface-to-Air Missile, Air-to-Air Missiles, Torpedoes and Counter Measure Systems in the international market with an aim to expand its footprints globally. Commodore Siddharth Mishra (Retd), CMD, BDL, focusses on key areas in the next few years towards realization of Atmanirbharta in Defence, in this special interview

Commodore Siddharth Mishra (Retd)
CMD, BDL

What is unique about BDL's participation at the Aero India - 2023?

BDL will be showcasing the largest-ever display of its products during Aero India 2023 in comparison to the previous editions of Aero India. The Company will be displaying a few of its products for the first time. BDL is also planning to launch three new products during the Bandhan ceremony being held as a part of Aero India 2023. In addition to this, BDL will be signing MoUs with various companies during the event.

What is the product portfolio of BDL?

BDL has a wide array of products for Army, Navy and Air Force. These are Anti-Tank Guided Missiles, Surface-to-Air Missiles, Air-to-Air Missiles, Air-to-Surface Weapons, Launchers, Test Equipment, Underwater Weapons and Counter Measure Systems for the Armed Forces. The Company is also making inroads into new areas such as drone delivered payloads like Bombs and Missiles, Mines etc.

BDL has recently added new products to its existing range of products. Could you briefly let us know about them?

During Defexpo 2022, BDL launched 'Anti-Tank Guided Missile for MBT ARJUN,' the 'Sangramika', a Light Weight Vehicle Mounted Anti-Tank Guided Weapon System and the

'Sanharika', an Armoured Vehicle mounted Laser Guided Short Range Anti-Aircraft Weapon System for the Indian Army. Prior to this the Company has launched, 'Garudastra', an advanced anti-submarine self-guided state-of-the-art homing torpedo and 'Dishani', an expendable air-deployed ASW sonobuoy system, both for the Indian Navy.

What products is the Company offering for export?

BDL is offering Akash Weapon System (Surface-to-Air Missile), Astra Weapon System (Air-to-Air Missile), Nag, Konkurs – M & Amogha (Anti-Tank Guided Missiles), Smart Anti-Airfield Weapon & Helina (Air-to-Surface Weapons), Light Weight Torpedo & Heavy Weight Torpedo (Underwater weapons), Counter Measures Dispensing System & Anti-Submarine Warfare Suite (Counter Measure Systems) for export to friendly countries.

How far BDL has been able to penetrate the export market?

BDL is aggressively promoting its products such as Anti-Tank Guided Missiles, Surface-to-Air Missile, Air-to-Air Missiles, Torpedoes and Counter Measure Systems in the international market with an aim to expand its footprints globally.

As a result of this, BDL has bagged orders for export of Light Weight Torpedoes to a friendly foreign Country.

BDL has also bagged another export order for supply of Counter Measures Dispensing System to Airbus, Spain.

BDL has received leads for export of Akash Weapon Systems to friendly

foreign countries, which is expected to materialize in one to two years.

BDL is in regular interaction with overseas customers for achieving its export targets. Offset implementation also offers a major opportunity to achieve export targets. BDL is regularly interacting with aero-space and defence majors in Europe and Russia to seize opportunities arising out of offsets.

How does the Company propose to meet the increase in demand from Indian Armed Forces and friendly foreign nations?

BDL at present has three operating units namely, Kanchanbagh Unit at Hyderabad, Bhanur Unit in Sanga Reddy district in Telangana State and Visakhapatnam Unit in Andhra Pradesh.

In addition to these, BDL has three upcoming manufacturing units located in Ibrahimpatnam in Telangana, Amravati Unit in Maharashtra and the latest one, at Jhansi in the UP Defence Corridor. BDL is also upgrading its manufacturing facilities by leveraging state-of-the-art technology to meet the demands of armed forces, both domestic and foreign.

In addition to expanding of Infrastructure, the Company is taking up Automation and process improvements in a big way, wherever feasible. The upcoming units together with modernization of production facilities will be sufficient to meet the demands.

What efforts are being made to enhance the in-house R&D of BDL?

BDL has a strong in-house R&D division with talent drawn from

premier institutions. The Division is leveraging emerging technologies like AI to develop state-of-the-art weapons for the Armed Forces. The Missile Development group set up within the in-house R & D Division is working on Next Generation Missile Programs. BDL has also signed MoUs/ agreements with foreign OEMs and start-up companies to develop weapons of next generation.

To what extent indigenization efforts are being made to contribute towards creation of Aatmanirbhar Bharat?

BDL has always been focusing on concept of indigenization across its programs and all efforts are put to maximize the indigenous content. In the foreign collaboration programs that BDL has entered into, the company has been successful in indigenizing these items, over and above the contracted indigenization content percentage with the support of OEMs. The average percentage of indigenization across BDL is between 80 to 90 percent. This philosophy of the company has helped it reduce the import cost and offer competitively priced products to the Indian Armed Forces. This has been very important factor since the Armed Forces were getting technology at the best price and with assured products life cycle support from BDL. In line with the Aatmanirbhar Bharat initiative of the Indian Government, BDL has furthered its indigenization processes by inviting Indian vendors who indigenize components through the Government's 'Srijan' portal. BDL is creating a 'vendor ecosystem' to support the various programs with indigenous components towards realization of Aatmanirbhar Bharat in the Defence Sector.

What facilities have been created recently in the Company towards realization of Atmanirbharta in Defence?

BDL is giving high priority for the development of infrastructure to help in achieving Atmanirbharta in defence sector. Towards this, Warhead facility, the RF Seeker facility and the Central Storage facility have been set up last year.

The warhead facility at Bhanur Unit of the Company will be used both for its current as well as futuristic missiles manufactured by BDL.

The R F Seeker Facility Centre has been set up for production and testing of RF seekers. Seeker is a critical and technology intensive subsystem which

will be used in all future Missiles for target tracking. BDL is manufacturing Ku Band seekers, which is first of its kind by BDL. The indigenous manufacturing of the seeker, which is about half the cost of the missile, is a major demonstration of Atmanirbharta and contribution of BDL in creating a complete indigenous vendor ecosystem in India. Setting up of this facility has made BDL join the elite club of select few companies across the globe to have the capability to produce seekers.

The Central Storage facility established at BDL, Visakhapatnam is equipped with modern storage system consisting of vertical Carousel System, Mechanical Compactor and Motorised Compactor which can cater to the entire storage needs of the Unit. The facility has state-of-the-art features for real time transactions of the items and Inventory monitoring.

Being a Defence PSU, how are you fulfilling the MSE Mandate issued by the Government of India?

BDL has progressively developed MSME Vendors over a period and has been able to improve MSME participation significantly.

Apart from this, in order to improve procurement from MSME owned by SC-ST and women enterprises, BDL conducts special drive for registration of the same with active participation of organizations like DICCI (Dalit Indian Chamber of Commerce & Industry), EEPCC etc. BDL has also populated list of items to be indigenized on BDL portal and Govt Sirjan Portal. The results are encouraging. BDL goes all out to meet the stipulated targets through various initiatives and awareness programmes for MSEs.

How do you see the growth of the Company in the next few years?

BDL will witness a high growth in the coming years. The order book position is picking up. In addition to the domestic market, BDL is aggressively promoting its exportable products in the international market and aims to become a global exporter of weapon systems. The 'ease of doing business' policy of the Government has given the required momentum to the Company's efforts to expand its footsteps in international market. BDL will be utilizing this opportunity to the maximum extent.

The Company has a well-established infrastructure to execute the orders from domestic and export market

and meet the delivery schedule. Modernization of existing facilities is being taken up aggressively.

Government's push towards realization of Atmanirbharta in Defence has given several opportunities to BDL to focus on self-reliance. Being from the missile manufacturing Company, I can foresee that India will be Atmanirbhar with respect to missiles in the coming few years and the biggest gainer in terms of turn over, would be BDL, being the only missile manufacturing Company under Ministry of Defence.

What would be the key focus areas of BDL in the coming few years towards realization of Atmanirbharta in Indian Defence industry?

BDL will be focusing on following key areas in the next few years towards realization of Atmanirbharta in Defence.

Expanding Infrastructure: The Company intends to continue to invest in infrastructure which will enable the company to cater to the growing demands of its customers, both in domestic and international market.

Automation: BDL intends to automate its production systems, where feasible, to increase the productivity.

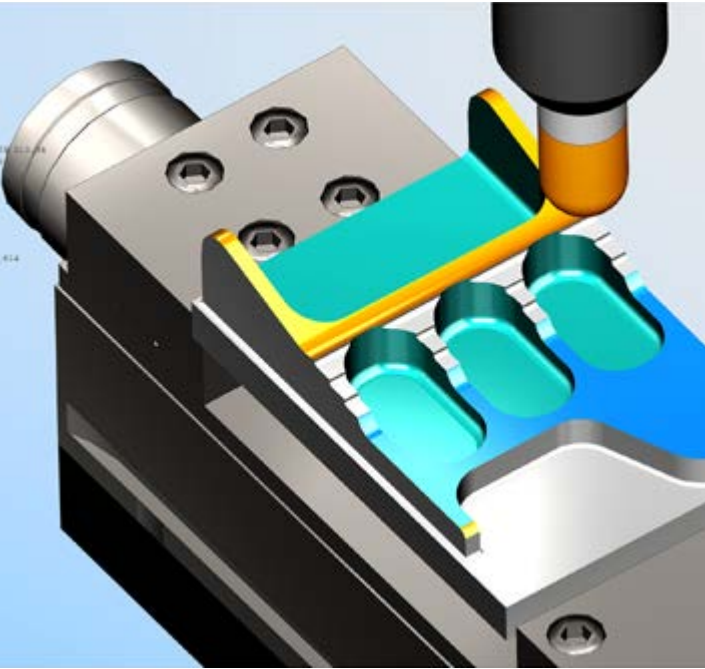
Focus on in-house Research & Development: BDL intends to increase its in-house R&D activities to develop innovative products for its customers and mitigate product dependence on foreign companies. The Company has already established the missile development group with the objective to design and develop futuristic missiles.

Improving Processes: The Company also intends to carry out process improvements, with the aim of improve productivity and efficiency of its operations and thereby lower costs.

New Generation Weapons: BDL intends to leverage its experience to manufacture weapons such as new generation SAMs, ATGMs, Air-to-Air Missile System and Heavy Weight Torpedoes. BDL is also the joint development partner-cum production agency with the DRDO for the next generation of ATGMs, Air to Air Missile and SAMs. BDL has also entered into several MoUs and non-disclosure agreements with various companies for developing new products and transfer of technologies.

Indigenization: BDL is giving thrust to indigenization as a measure to achieve self-reliance in its manufacturing and offer competitively priced products to its customers.

Improved productivity and technical competitiveness with VERICUT FORCE

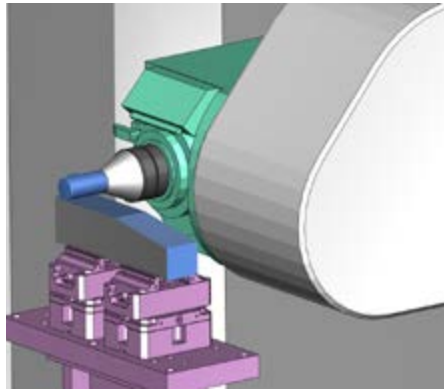


Full support for factory digitization (smart factory) from the government offices at both federal and state-level still seems insufficient for many companies to overcome resistance to sudden changes and risks that could accompany those changes. KP AERO INDUSTRIES CO., LTD (herein KP Aero) is an exception. A small but well-equipped with advanced technology in the Gyeongsang province of South Korea, KP Aero has successfully implemented the smart factory empowered by the corporate culture that conceives technological innovation as a natural task rather than burdensome. KP Aero's successful global market debut after 30 years of self-gained technology proves it well. KP Aero produces parts for A350, B737, B777, B787, and more. Korean Air, Korea Aerospace Industries, HANKUK FIBER are also important customers of KP Aero. In 2020 while the COVID19 significantly impacts the global aerospace industry, KP Aero could secure a deal with a major Japanese aircraft manufacturer.

"Aircraft manufacturers request lighter, more complicated, and precise parts. To meet these needs, which requires high-speed machining, we established a facility with machines that are capable of operating at an average speed of 30,000 rpm."

KP Aero is already a user of the CNC simulation software and optimization software VERICUT. However, when more need for precision machining is noted, and to improve the high-speed machines' productivity, the company made a call to test the optimization module FORCE.

"VERICUT FORCE is a solution that is already highly accepted in the global aerospace industry. The fact that KP Aero using FORCE optimization would give an extra boost to gain customer trust and



strengthen the price competitiveness."

A Titanium (Ti-6Al-4V) part was machined using a 5-axis DMC-100U duoBLOCK to test the software. To machine a part faster and safer, FORCE cuts the NC code into small segments and applies the optimal feed rate for each

segment, improving the efficiency of the toolpath and eliminate any risk due to overloads. After FORCE optimization, KP Aero saved 25% cutting time and eliminated tool breakage, which has been a problem while machining deep pocket corners and trims. "Performance enhancement of the company is expected thanks to FORCE that can prevent overloads and tool breakage. FORCE also provides various easy and fast-to-use analytic functions and charts."

FORCE and other VERICUT modules seamlessly connect to already established facilities. KP Aero is implementing FORCE software as a part of their smart factory processes and planning to optimize other parts' toolpaths soon.

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BEML Displaying Niche Tactical UAVs at Aero India 2023



With the theme of 'Atmanirbharata' BEML is showcasing some of its prime products such as Variants of Unmanned aerial vehicles (UAV) and structure of space vehicle along with critical components in the aero-space sector and Miniature Models of its defence equipment at the AERO INDIA 2023, the biennial mega Aero exhibition, being held at Yelahanka Airbase, Bangalore.

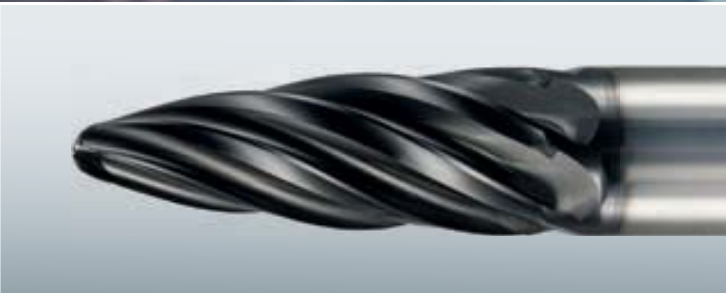
BEML's focus at AERO Show is to highlight its capability, promote Aerospace and Defence products and to interact with potential customers and also to explore collaborations. BEML would be signing MoUs, to enter into collaborations with major players in the Defence and Aerospace Business. BEML would also be using the opportunity to network with MSMEs and Start-ups to maximize its efforts of localization / indigenization.

BEML is also displaying the 25 kg Class Tactical UAV being developed indigenously in collaboration with Indian Institute of Technology, Kanpur. The UAV is intended to carry versatile payloads of 3.0 kg, such as day and night cameras. It can take off and land in short runways, fly continuously for 8 hours and has 50 kms radio range.

BEML Limited, the leading multi-technology, multi-product company, is engaged in the design, development

and manufacturing of a wide range of products for core sectors of economy such as Defence, Mining, Power, Infrastructure and Urban Transportation. Presently over 87% of total business is won against tough competition mainly from MNCs, while above 68% of the business comes from in-house R&D developed products. BEML Limited has exported its products to over 68 countries.





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ADNEC Group and Ministry of Defence Launch IDEX Next Gen at IDEX & NAVDEX

ADNEC Group, in cooperation with the Ministry of Defence, has announced the launch of IDEX Next Gen for the first time during the 16th edition of IDEX 2023 and the 7th edition of NAVDEX 2023. The exhibitions will be held under the patronage of His Highness Sheikh Mohamed bin Zayed Al Nahyan, President of the UAE, from 20-24 February 2023 at the Abu Dhabi National Exhibition Centre.

The IDEX and NAVDEX 2023 exhibitions are organized by ADNEC Group in cooperation with the Ministry of Defence, to provide an international platform to showcase technologies and innovations in the international defence sector, and to serve as global forums to highlight the latest developments in the defence industry. The exhibitions also aim to facilitate strategic partnerships between leaders in the defence and military industries from around the world.

With the participation of more than 82 startups from 25 countries around the world, IDEX Next Gen will serve as an ideal platform for companies to present their ideas, products and business strategies, and showcase the latest innovations and technological solutions in the defence sector to global leaders, decision-makers, official delegations, and major international companies.

IDEX Next Gen will enable entrepreneurs to strengthen their relationships and support their businesses by networking with investors and VIPs in the global defence sector, and establishing effective partnerships to foster trade and investment opportunities across all defence industries.

The launch of IDEX Next Gen for the first time at IDEX and NAVDEX 2023 comes in line with the position of Abu Dhabi and the UAE as leaders in the defence industry and global hubs for innovation. IDEX Next Gen will present an opportunity to benefit from the expertise of startups by enabling them to highlight the most innovative solutions, technologies, and defence equipment that are highly efficient and will contribute to enhancing the development of defence and military industries.

The IDEX Next Gen platform is a valuable addition to IDEX and NAVDEX 2023 as it will contribute to strengthening their leading global position as the largest defence exhibitions in the world. IDEX Next Gen will also provide startups from around the world with an opportunity to showcase their advanced solutions, systems, and technologies that have become pivotal in supporting the development of defence industries worldwide.

IDEX and NAVDEX are the largest events of their kind in the world, and the upcoming edition of IDEX will coincide with the 30th anniversary since the launch of its first edition. The exhibitions will



see the participation of senior leaders, officials, decision-makers, and ministers, industry experts, and specialists from all over the world.

IDEX and NAVDEX will provide a world-class platform for showcasing the latest innovations and technologies

in the international defence sector. The previous edition of the two exhibitions in 2021 was a remarkable success, with over 62,000 visitors and more than 900 local, regional, and international companies from 59 countries, in addition to 35 national pavilions.

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The event offers a unique platform for industry thought leadership through its high-level conference, forums and co-located events. Leading industry players, government and military chiefs gather here bi-annually to contribute to dialogues, exchange ideas and seek solutions and strategies to advance the interests of the global aerospace and defence sector.

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HAL Hands Over ALH to Mauritius, Ahead of Schedule

HAL successfully handed over an Advanced Light Helicopter (ALH) to the Government of Mauritius at Helicopter Division.

Nikhil Dwivedi, General Manager, Helicopter Division handed over the Certificate to A K Dip, Commissioner of Police, Mauritius Police Force (MPF) in the presence of E P Jayadeva, Director (Operations), HAL, S Anbuvelan, CEO (HC) and others.

Speaking on the occasion, Jayadeva said HAL has handed over the helicopter way ahead of schedule. This order is in line with the Govt. of India's vision to boost defence exports to Friendly Foreign Countries. The handing over of export helicopter has further bolstered the ties between both countries. The ALH Mk III helicopter will meet the operational requirements of Mauritius Police Force. The helicopter with its state of the art equipment will further enhance the operational requirements of MPF, he said.

Dip opined that the induction of a new helicopter into the stables of



Mauritius Police Force will enhance the aerial capabilities of Mauritius Police. The helicopter will contribute immensely in ensuring the territorial integrity and enhancing the speed and effectiveness of the police intervention during critical incidents and disasters.

Anbuvelan said HAL & Govt. of the Republic of Mauritius share a strong business relationship spanning over three decades, with HAL manufactured helicopters already being operated in Mauritius. HAL would provide all the necessary technical, logistic, and maintenance support for ALH Helicopters in Mauritius.

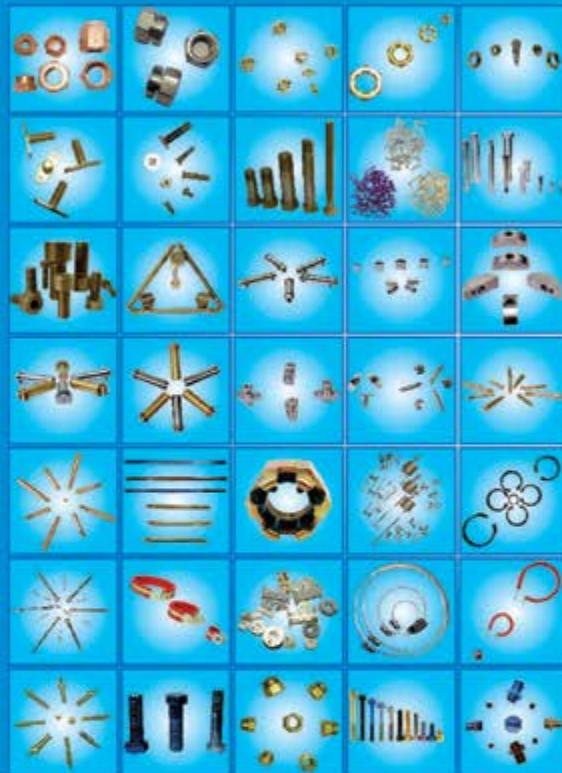
HAL had signed a contract with Govt. of Republic of Mauritius in January 2022 for export of one ALH Mk III to Mauritius Police Force. ALH Mk III is a multi-role, multi-mission versatile helicopter in 5.5 tonne category. It has proven its mettle in various utility roles, including numerous lifesaving missions during natural calamities in India and abroad. More than 335 ALH has been produced till date logging a cumulative of more than 3,75,000 flying hours. HAL also ensures technical assistance and product support to the customer to ensure healthy serviceability of the helicopter.

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Theunis Botha, CEO, AL Tariq, Edge Group, UAE visiting the Aero India 2023



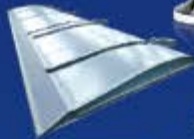
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Rosoboronexport Promotes 15 New Russian Military Products



Rosoboronexport has launched a global marketing campaign for 15 new military products developed and manufactured in Russia, said Alexander Mikheev, Director General, Rosoboronexport, part of Rostec State Corporation. "Its export catalogue was replenished with products for the Air Force, Navy, Ground Forces, Air Defense Forces as well as with UAV countermeasures. Market launch of new products significantly increases the competitiveness of Russian arms and strengthens the position of our country on the global market," added Alexander Mikheev, who holds the position of Deputy Chairman of the Russian Engineering Union.

Among the long-awaited novelties are the Orlan-30 UAV, Ballista remote-controlled weapon station module, Chukavin sniper rifle, UAV countermeasures systems, new underwater weapons, communications equipment, training simulators, motor and armored vehicles.

New Russian equipment and weapons for which export permits have been issued will be presented by Rosoboronexport at international defense exhibitions, during meetings and negotiations with partners, and on fast-growing digital platforms. The company has agreements with most manufacturers to jointly promote products in foreign markets.

The Orlan-30 unmanned aerial vehicle system developed and manufactured by the Special Technology Center is a further evolution of the Orlan-10 UAV, which is well-known in the world market and has proved its capabilities in real combat conditions.

The Orlan-30 is intended for aerial reconnaissance, search, detection and recognition of objects in the visible or infrared range. In addition, when equipped with a mission payload, it provides target designation for precision-guided weapons for destroying fixed and moving targets day and at night.

The Ballista remote-controlled weapon station is designed for mounting on armored personnel carriers. It is equipped

with a 30-mm automatic cannon and a coaxial 7.62-mm machine gun as well as with two ATGMs. The station is fitted with a combined sight with a TV camera, thermal imager and laser rangefinder capable of detecting and identifying targets day and night. In addition, the Ballista is equipped with a back-up sight, which significantly increases its combat capabilities.

Besides, the promotion of the BMP-3 infantry fighting vehicle (IFV) with a new remote-controlled weapon station, developed by High Precision Systems holding company, has begun. The vehicle was unveiled as part of Rostec's exhibit at the Army 2022 International Military and Technical Forum.

The vehicle is equipped with a 100-mm gun/launcher, a 30-mm automatic cannon and a 7.62-mm machine gun. Owing to its powerful armament, the IFV is capable of providing fire support to infantry, including afloat, effectively engaging manpower, lightly armored targets like IFVs and APCs, tanks and other targets with enhanced protection, as well as low-speed air targets, including helicopters.

In 2022, Rosoboronexport added new drone countermeasures to its export catalogue. Among others is the RB-504P-E electronic warfare system, which provides highly effective detection, identification, and direction finding of UAVs, as well as jamming

of their navigation and control links.

Rosoboronexport has started promoting modern simulators developed by Rostec's subsidiaries for training the crews of the IL-78MK-90A tanker aircraft and the IL-76MD-90A(E) military transport aircraft. In addition, the company got the opportunity to offer foreign partners a new automated artillery fire control system, a radio signal monitoring system, a heliborne ground surveillance radar system, K-5350 motor vehicle with a protected cabin, Podlet-K1KE radar station, communications equipment and small arms.

"In 2022, thanks to comprehensive support of the President and the Government of the country, as well as the active work of Rosoboronexport within the framework of the Russian Engineering Union's activities to improve legislation, a number of changes were made to the regulatory and legal framework in the field of military-technical cooperation, which have simplified the licensing procedures for launching new products in the world market. Legislative initiatives that optimize working processes, including when executing export documentation, were considered during meetings of the REU's Committee for the Development of Foreign Trade Activities in relation to military products," said Alexander Mikheev.

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Destination Karnataka: US – India Defence Cooperation Seminar on 14th at Aero India

Government of Karnataka & U.S.-India Business Council (USIBC) will organise a seminar on Destination Karnataka: U.S.-India Defence Cooperation, Innovation & Make in India at 11 AM on 14th February on the side-lines of Aero India-2023.

The seminar will seek to incubate new ideas and hear private sector success stories of Karnataka as a favoured destination for foreign investment in Aerospace & Defence and Advanced Manufacturing. It will help to build a networking platform for all stakeholders including the Government & Industry to continue to engage on potential collaborations and investments in Karnataka.

Dr. Murugesh R Nirani, Minister for Large and Medium Industries, Govt of Karnataka will deliver the keynote address.

Dr. E V Ramana Reddy, IAS Additional Chief Secretary to Govt. of Karnataka,



Dept. of Commerce and Industries, Amb. (Ret.) Atul Keshap, President, USIBC, Salil Gupte, President, Boeing India, Ashmita Sethi, President and Country Head, Pratt & Whitney, Udayant Malhoutra, CEO, Dynamatic Technologies Ltd, Mahesh Palashikar, President, GE

South Asia, Mario Gonsalves, Managing Director & Partner, BCG, Gunjan Krishna, IAS Commissioner for Industrial Development and Director of Industries & Commerce, Government of Karnataka also will speak on the occasion.

The Government of India has identified targets and opportunities to help unlock the full potential of the Indian Defence Industry to grow. The U.S.-India Defence and Security Relationship continue to grow, aided by robust political commitments in both countries and converging security concerns in the Indo-Pacific. Defence and Technology Cooperation has been one of the most Visible Sectors in that effort. Karnataka has been at the forefront of the U.S.-India Defence Corridor with a number of American and Indian investments in Defence Manufacturing and Research & Development.

Schiebel and Thales awarded Royal Navy Contract by UK MOD

Schiebel and Thales have been awarded the Uncrewed Air Systems (UAS) contract "Peregrine" by the UK Ministry of Defence. This prestigious contract award will deliver the unrivalled CAMCOPTER® S-100 UAS, fitted with a powerful naval surveillance sensor suite, to provide a comprehensive maritime capability protecting Royal Navy ships on operational tasks.

Schiebel, together with system integrator Thales, will provide the operationally proven S-100 with a range of high precision Intelligence, Surveillance and Reconnaissance (ISR) sensors and systems. The Thales I-Master radar, an EO/IR camera, and an Automatic Identification System (AIS), all fused with the CarteNav's AIMS Mission System enables an all-weather detection and identification capability of unknown targets.

The S-100's rapid launch ability, superior mission endurance and high quality sensors combine to find, track and identify targets providing additional



protection for the ship and its crew. High-definition imagery and radar data downloaded to the system operator and transmitted in real-time into the ship's Combat Management System (CMS), will provide the crew with invaluable time to prepare and enact operational decisions.

Hans Georg Schiebel, Chairman of the Schiebel Group, said: "We are immensely

proud that the CAMCOPTER® S-100 is the UK Ministry of Defence's choice for its prestigious Peregrine programme. The S-100 is the optimal UAS for a growing number of Navies worldwide and has proven its superiority and outstanding capabilities throughout its numerous operational deployments."

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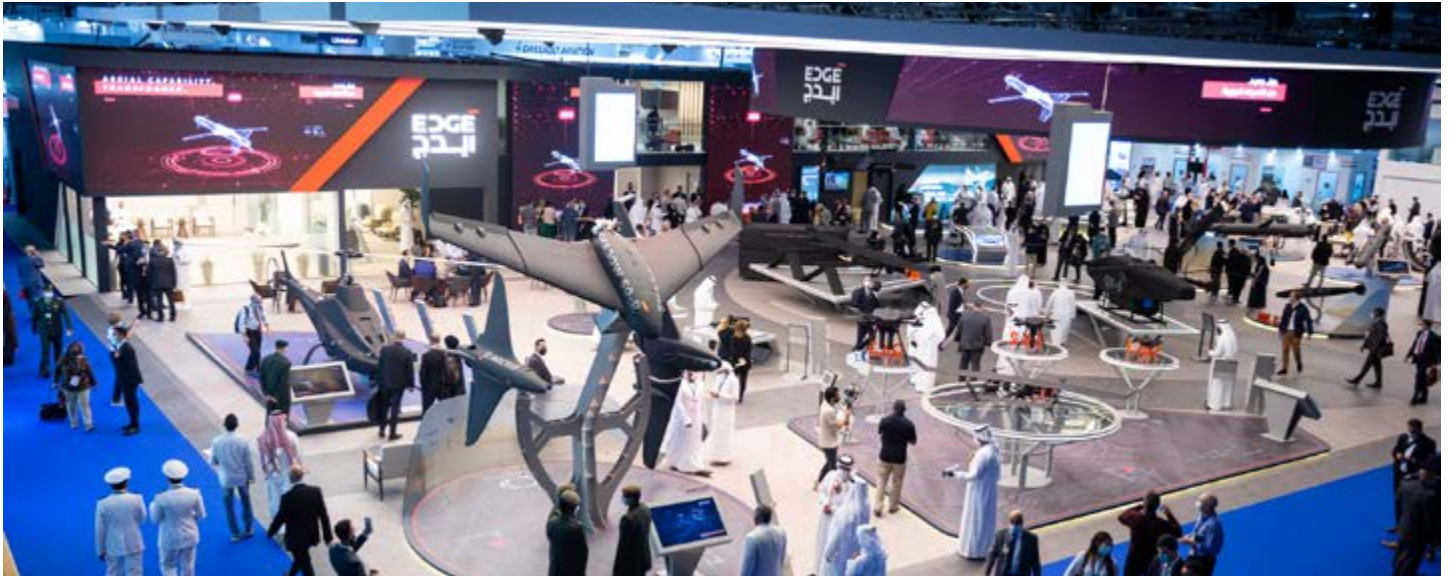
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EDGE to Showcase Large Portfolio of Advanced Technology and Defence Solutions at IDEX 2023

EDGE to have the largest presence as event's official Strategic Partner
Over 100 products and solutions will be showcased with a strong focus on advanced autonomous and unmanned systems



EDGE is marking its second appearance at the International Defence Exhibition (IDEX 2023), and the Naval Defence Exhibition (NAVDEX 2023), with the largest presence at the event, underpinning its position as one of the world's leading advanced technology groups spanning both the defence and civilian realms.

As the official Strategic Partner, EDGE will highlight its aim to significantly up-scale UAE-made future technology and defence capabilities with a showcase of over 100 state-of-the-art products, solutions, and services in the areas of autonomous systems, smart weapons, land systems, naval systems, arms and ammunition, electronic warfare, secure communications and precision engineering.

Mansour AlMulla, Managing Director and CEO of EDGE, said: "This will be EDGE's second participation at IDEX since launching three years ago, and the event this year will be the perfect opportunity for us to fully demonstrate the phenomenal progress EDGE has made in a relatively short period of time. The diverse range of technologically advanced products and solutions now available from across our portfolio of 20 companies is testament to these achievements.

"As we continue to bolster our sovereign capabilities, and expand our

global footprint through exports and valuable partnerships, IDEX remains the most effective platform for EDGE to demonstrate its high quality innovative offerings across the air, land, sea, and cyber domains, with a clear focus on Autonomous and Unmanned systems, Smart Weapons and Electronic Warfare."

In addition to new product launches, EDGE will place a major focus on sophisticated autonomous and unmanned systems, showcasing the QX family of autonomous loitering munitions, GARMOOSHA rotary-wing unmanned aerial vehicle (UAV) and SCORPIO unmanned ground vehicles (UGV). HALCON's HUNTER series of loitering munitions will also be on display, including the HUNTER 2-S swarming UAV, which features powerful artificial intelligence (AI).

In the Smart Weapons domain, EDGE will exhibit the AL TARIQ line of long-range precision-guided munitions (PGMs), HALCON's DESERT STING line of air-to-surface precision-guided glide weapons and SKYKNIGHT air defence missile. Land Systems on display include the AJBAN and HAFEET ranges of tactical military vehicles, and the RABDAN 8x8 Ambulance variant. Under Naval Systems, EDGE will display a broad portfolio of ADSB's inshore and offshore patrol vessels, and tactical interceptors.

Featured in the Arms & Ammunition

domain are the full range of CARACAL's high quality firearms as well as LAHAB DEFENCE SYSTEMS medium and large calibre munitions. Representing Electronic Warfare, SIGN4L will exhibit a full suite of products, including counter-drone, convoy protection, and homeland security solutions. Communications is set to include KATIM's ultra-secure communications and collaboration applications, smartphones and GATEWAY network encryptors.

Training & Services will be displayed through a variety of facility models and solutions, including BEACON RED's suite of national security enhancement services, training solutions, and RANGE ON WHEELS cyber testing range; JAHEZIYA's full scope of defence, consultation, firefighting and emergency response training solutions; and HORIZON's helicopter pilot training portfolio. Lastly, EPI's expansive range of Precision Engineering, machining, treatment, and assembly solutions will be exhibited, while AL TAIF will depict their Land Maintenance, Repair and Overhaul (MRO) and comprehensive lifecycle support capabilities.

Attendees of IDEX can visit EDGE and its portfolio of companies at Hall 5, stand A05 – C10 at the Abu Dhabi National Exhibition Centre (ADNEC) between 20 to 24 February, 2023.



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Innovative Array of EMI/ MC Shielding Products

SSD Polymers is a leading manufacturer of Electro Magnetic Interference and Electro Magnetic Compatibility (EMI/EMC) Shielding Products in India for Defence and Aerospace applications. All these products are developed indigenously in their in-house R&D facility. With more than 35 years of experience, EMI/EMC shielding products manufactured by SSD Polymers aid in achieving EMI/EMC compliance of Electronics equipments as per MIL-STD-461 and they are used by various defense organisations and Indian Military to secure their critical assets from the adverse effects of EMI/EMC.

At SSD Polymers, innovation is a continuous process. With innovative ideas and commitment, the company has developed a wide range of EMI Shielding Products over time. Some of these products include EMI Shielding Honeycomb Air vents, EMI Shielding Windows, Conductive Paint, Wire knitting Gaskets etc. All these products were

SSD Polymers offers over 25 types of EMI/EMC Shielding Products under its portfolio.



successfully tested for their performance and are being used in various Defence applications. SSD Polymers currently offers over 25 types of EMI/EMC

Shielding Products under its portfolio.

It all began with the development of samples for Bharat Electronics and after stringent testing the company executed an order for 54 types of EMI Shielding Gaskets with a time bound delivery schedule of just four months. Founded by Late Sri P.V. Subba Rao in 1984, SSD Polymers has progressed under the able leadership of P.V.V. Rao, P.V. Rao and Dr. Datta Prasad, Technical Director. SSD Polymers has received Type certificates from CEMILAC for some of its products. SSD Polymers is proud to be associated with Defence equipment manufacturers like BEL, HAL, ECIL, and TATA Power, etc.

With a dedicated R&D, Manufacturing, commitment to quality and Testing facility, SSD Polymers is well placed to cater to the requirements of the International companies.

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Tor SAM Scores Hundreds of Combat Hits on Record



The Tor short-range air defense (SHORAD) systems have intercepted hundreds of targets in combat, the Russian media reported. The Tor SHORAD family is developed and produced by the Russian Almaz-Antey Corporation's Izhevsk Electromechanical Plant Kupol. Tor is a multichannel, all-weather SAM system designed to intercept drones, high-precision weapons, aircraft and helicopters flying at different altitudes, including extremely low altitudes, in all weather conditions, at any time of day and night, under conditions of intensive fire and electronic countermeasures.

"The high combat capabilities of the Tor family of SAM systems have been repeatedly confirmed in practice, including in live combat, during which they shot down hundreds of different means of air attack. The unparalleled performance of the Tor family of SAMs is highly appreciated by Russian operators as well as Russia's foreign partners and allies," reported the Russian Aviation & Military Guide (RAMG) magazine. The distinctive features of the latest

tracked Tor-E2 version are: fast deployment time from mobile to combat mode – 3 minutes; capability to conduct reconnaissance of the combat situation on the move; large ammunition load – 16 SAMs per vehicle; response time from target acquisition to missile launch is 5-10 seconds. The airspace survey speed is 1 turn of the antenna per second, which is the world's best indicator in the class of short-range SAM systems.

The Tor SHORAD is highly automated – if necessary, it can

operate in fully automatic mode.

Optionally, the Tor family SAMs are available in a variety of carrier designs. In addition to the standard tracked version, Tor-M2K on a wheeled chassis, Tor-A on a twin tracked off-road vehicle and Tor-M2KM autonomous combat module have been developed. The Tor-M2K is optimally suited for countries with a developed network of paved roads. The carrier base of the Tor-A is a twin tracked off-road vehicle. It can be effectively used in extreme climatic conditions and difficult terrain.

All radar and optical subsystems, a high-speed digital computer, launchers with missiles and power supply and life support facilities of the Tor-M2KM modular version are mounted in special self-contained combat module (SCCM) without chassis. The deployment time is 3 minutes, while time of redeployment of SCCM from one platform (carrier) to another is 10 min. The Tor-M2KM can even be airlifted by Mi-26 helicopter.

The combat module is intended for defending of stationary objects and can be used from the deck of a ship, a railway platform, roofs of buildings etc. The module is easily coupled with any chassis of suitable payload capacity, which obviously is a beneficial solution for countries interested in integrating SAMs with their own chassis.



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Haryana's Aviation Sector Takes Wings with IAH



Being one of the most prosperous industry-friendly states in India, Haryana is committed to position itself as one of leading contributors to the aviation industry in the country. With the aim of spurring industrial growth in aerospace and defence production sector and placing emphasis on creation of an end-to-end ecosystem, the Government of Haryana, unveiled its Aerospace and Defence Production Policy in May 2022. In order to tap business opportunities in the aviation sector, the Haryana government is developing a 'Global Integrated Aviation Hub' (IAH) on the existing Hisar airfield by upgrading it to a large airport of international standards. The multi-crore prestigious project of IAH is the centrepiece in the state's vision for aviation industry.



India has embarked on a journey of becoming a USD 5 trillion economy and Aerospace and Defence sector has an extremely important role to play in India's growth story. The Indian aviation market has also recorded a decadal growth rate of 10.2% from 2008-09 to 2018-19, which indicates strong potential in commercial flying, flight services and other related ancillary sectors.

Taking in cognisance the tremendous potential of aviation to contribute to the overall growth of the economy, the state government is developing the existing airstrip at Hisar airport as a Global Integrated Aviation Hub. The Integrated Aviation Hub (IAH) shaping in Hisar, Haryana is in line with the Government of India's grand vision to boost domestic manufacturing and growth across industries. The IAH will facilitate unprecedented connectivity to a large airport of international standards and will fortify Haryana's position as an aviation leader in the country.

In the radial zone of 400 km of Hisar Airport, four major airports - i.e., Jaipur, Chandigarh, Amritsar and IGI Airport are existing, and it is expected that overflow of traffic including those from the hinterland will shift to Hisar airport, with a

majority of the shift getting realized from IGI Airport, due to high traffic congestion. The Hisar airport is in the counter magnet region of NCR and is having the potential to cater for the demand of surrounding district as well as other regions of Punjab, Haryana, Rajasthan and NCR. Considering these aspects, the State Government of Haryana has initiated the concept for the development of the 3rd largest airport of the region at Hisar as an Integrated Aviation Hub

The State of Haryana offers a conducive ecosystem for development of A&D sector and realizing the potential the State government is planning development of an all-encompassing ecosystem focusing on Manufacturing, MRO, Cargo Activities, Flight Training, Research and Development, etc.

The strategic location of Integrated Aviation Hub at Hisar, which is around 150 Kms from the national capital provides exceptional opportunity to manufacturing and services industry in accessing the NCR region market (of which 2/3rd lies in Haryana), where the consolidated trade and retail market is valued more than USD 700 billion as of today.

Given this background the State of Haryana is pursuing in earnest " Mission

IAH” to promote aviation throughout the State, while establishing an efficient, integrated airport development that will encourage and enhance Aviation Safety, Public Service, Economic Development and Environmentally Balanced Ecosystem.

The project is being developed in 3 phases with the target to become operational by 2023.

The key features of the IAH ;

- Proposed Area > 7200 acres with Integrated Aviation Hub and Industrial Manufacturing Cluster
- Investment of 945 Cores with Passenger Terminals-Separate for International and Domestic PAX
- Runway - To be extended to 10000' x200' with ILS CAT
- IIB Aircraft Parking - 50 Aircraft at Terminal & 50 in remote
- Dedicated Rail - Terminal for logistics and Passengers
- Dedicated Cargo logistic hub with Rail and Road Connectivity
- Aerotropolis: Commercial & Residential building

Various activities including extension of runway to 10,000 ft, Parking facility for Large Aircraft, Installation of CAT -II ILS facilities, etc is in advanced progress.

Additionally, an Industrial Manufacturing Cluster is being planned in collaboration with National Industrial Corridor Development Corporation (NICDC) over a land parcel of about 3000 acres within the vicinity of Airport.

The industrial ecosystem is complemented by a progressive policy regime in the State. Haryana's strive for leadership in industrial growth is complemented by a robust and conducive policy regime, with the state offering a comprehensive Haryana Enterprises & Employment Policy (HEEP), 2020 which aims to generate 5,00,000 jobs, attract investments of INR1 lakh crore, double the exports to Rs 2 lakh crore.

Apart from HEEP 2020, the government has brought in several sector specific



policies across Textiles, Warehousing & Logistics, Food Processing, Pharmaceuticals, IT & ESDM. The sectoral policies are further strengthened with the introduction of MSME Policy 2019 and the Entrepreneur & Start Policy 2017.

Further, to give the necessary impetus to A&D sector in the State, the State government has unveiled the Haryana Aerospace and Defence Policy, 2022 to place emphasis on creation of end-to-end ecosystem for Aerospace and Defence sector development. It envisages harnessing Haryana's inherent strength in automotive manufacturing sector for exploring opportunities in Aerospace and Defence manufacturing.

The policy emphasizes on several key areas like Aerospace & Defence Manufacturing across Mega and MSME categories, development of adequate Maintenance, Repair and Overhaul (MRO) facilities and services pertaining to the civil aviation requirements that includes but not limited to pilot training, in – flight services training, aircraft maintenance etc.

Government of Haryana is keen to support the start-up ecosystem in niche areas of aerospace and defence like UAV,

Drone Technology etc. The government is also in the path of creating an investment vehicle and fund under professional management to provide capital support and incubation to start-ups in these areas.

State also has four other airstrips at Pinjore , Karnal , Bhiwani and Narnual. Flying Training Institute and MRO's are operating from these locations. To accommodate RCS operations from these airports, runway extension, lighting and other facilities are planned. Aero-sport like skydiving are conducted at Narnual. A heliport is being developed at Pinjore and a Heli-Hub is planned at Global City Gurugram to enhance air connectivity.

To summarise, Haryana has nurtured a defining growth trajectory in emerging sectors like aerospace, defence and civil aviation. The government shall leave no stone unturned to facilitate industrial growth, nurture research & development led manufacturing activities and an ever-growing market driven consumption base.

The Integrated Aviation Hub will become the 'Crown Jewel' of Haryana, providing the right thrust to growth of Southern Haryana and enabling cross-sectoral opportunities for various industries in the State.

Peaks of Excellence in ODM Plus Solutions



L&T has a portfolio in its chosen segments across the defence sector with unique competencies to evolve in to a major private sector player with capability to build system of systems and platforms (Submarines, Warships, Armoured Systems, Military Communication) from scratch through in-house efforts substantiated through select partnerships, in place. While giving an overview of the spectacular growth across multiple segments of the L&T portfolio, Arun T Ramchandani, Executive Vice President, & Head, Defence IC, Larsen & Toubro Limited reveals that their focus area would be on artillery systems, Air Defence systems, Unmanned Platforms, Combat engineering solutions, Unmanned systems and Coastal Radar System at the IDEX in Abu Dhabi

Arun T Ramchandani

Executive Vice President, & Head, Defence IC, Larsen & Toubro Limited

The Indian private sector has grown since opening of the defence sector and evolved from producing components and sub-systems, to developing complete equipment and systems, system of systems and platform level solutions. Could you talk about L&T's role in this?

It has been little over three decades since L&T started its journey in the Defence and above five decades in the Strategic sector. The inception of L&T in the Defence sector commenced with the establishment of a corporate Research and Development team of L&T in early 70s. Since the mid-80s, L&T associated with the Defence Research and Development Organisation (DRDO) and Naval indigenisation focussed on partnering with DRDO Laboratories in the system level design and prototype development of complex weapon systems. Concurrently we targeted design, development, qualification and delivery of special purpose engineering equipment and Systems for indigenously designed Naval Platforms being built by MoD shipyards as well as for the DRDO program.

Over the years, our capabilities evolved from Design and Development of equipment and systems from concept design (B2D) to initiate ab-initio design and development with just Specifications (B2S) to system of systems from basic Requirements



(B2R). We began developing our own technologies, products, systems and system of systems for Defence Sector with in-house R&D efforts and eventually offer range of Weapon systems and Engineering Systems to Indian Navy's Warship programs through indigenisation initiatives of DQA (Navy) as well as through DPSU Shipyards. Opening and licensing of the Defence sector for Private Industry in 2001-02 enabled us to leverage our in-house competence, capabilities and track record to serve Armed forces by bidding for MoD RFPs since 2004 for delivering products developed with DRDO as more and more of these attained maturity and got inducted by the Armed Forces. Concurrently we also could bid for and win MoD acquisition programs under global competition. The business portfolio grew in scale and maturity to include industrialization and serial production of a range of naval and land weapon launch and engineering systems, fire control systems, missiles and space launch vehicle subsystems, radar systems and sensors, military communication systems and avionics.

Today L&T has a portfolio in its

chosen segments across the defence sector with unique competencies to evolve in to a major private sector player with capability to build system of systems and platforms (Submarines, Warships, Armoured Systems, Military Communication) from scratch through in-house efforts substantiated through select partnerships, in place.

The defence engineering business of L&T had reported significant increase in order inflow in FY21-22 across multiple segments of its portfolio. Could you elaborate?

The Defence Engineering business of L&T had reported significant increase in order inflow in FY21-22 across multiple segments of its portfolio. The major orders in this comprise of Multi-Purpose Vessels being constructed at our Shipyard, and multiple Naval and Land based Weapon and Engineering systems. The substantive increase is reflective of Government of India's policy reforms towards realising Make-in-India and Atmanirbhar Mission and enhanced capital budget allocations for acquisition from Indian Companies and specifically for quantum of allocation towards Private Sector.

L&T is also a contributor to the making of the mighty INS Mormugao commissioned on December 18. How does L&T tap the potential in defence shipbuilding industry and associating



with public sector shipyards?

The L&T shipyard is one of its kind in India and benchmarked with the best in the World. Spread over 160 acres on a 970-acre campus, and equipped with a 22,500 Ton class Shiplift, the shipyard is unique to have a capability to build multiple ships concurrently as also refit them using dry berths for higher build efficiency. We in-house designed and delivered all the ships against MoD contracts delivered them ahead or on schedule. We hold benchmarks on delivery of first of class new design ships with new hull forms. It is the fourth yard across the globe to be accredited with Five Stars and awarded a Golden Sword for Safety, Health and Environment practices, policies and performance. The Shipyard is also unique in the way that it has implemented Industry 4.0 Shipbuilding practices in its entire operations from Design to Build.

With Design and Build capabilities in Shipbuilding, coupled with in-house design, development and integration of a large portfolio of platform specific equipment, systems across Weapon Systems, Engineering Systems, Platform Management and Control Systems, Sensors, Life Support, and Logistics segments, and delivering these to all Indian and a few foreign yards and helping them integrate them on their platforms, we believe we can build all classes of ships and submarines (leveraging our established track record), in-house.

L&T designs and builds critical aerospace components, tracking and launch systems for space missions as well as for the Armed Forces. Could you talk about the latest updates of your operations in aerospace sector?

Larsen & Toubro has been the most dependable partner to ISRO for more than five decades by supplying sub-systems for Launch Vehicles and Satellites, establishing R&D/ Testing facilities, installing SATCOMM

Infrastructure much more.

For over last five decades, L&T has been contributing significantly to the various Indian Space programs including developmental ones. L&T's association with ISRO includes manufacturing of Launch Vehicle Hardware, Ground Support Systems and Advanced Test Facilities for Space applications. L&T has been manufacturing launch vehicle hardware including motor casings since 1975 including for PSLV.

L&T was recently awarded a contract to contribute towards System integration of Polar Satellite Launch vehicles. This capability coupled with the policy revisions on the Space sector being opened up to the Private industry would pave way for L&T to capitalize and deliver on end to end solutions from upstream, midstream to downstream segments.

L&T looks at SPACE as an economic frontier and would like to scale up on both role and spread by engaging with Indian Government entities, Indian value chain and global partnerships to develop and offer globally competitive solutions and services.

L&T also has a standing Joint Venture company named L&T MBDA Missile Systems Limited (LTMMMSL) with MBDA since 2017, the relationship having matured from co-operation, collaboration to partnership over the last decade. The initial years have witnessed investments in capability and capacity development to address opportunities for complete missile systems.

LTMMMSL has already offered a Short Range Air Defence Missile system to enhance maritime point and area defence capabilities of Indian Navy's in-service warships. LTMMMSL has also responded to the Navy's requirements of coastal Medium Range Anti-ship Missile system and has offered the latest version of Exocet missile system. LTMMMSL is also positioned to offer the niche technology 5th Generation Anti-tank Guided Missile (ATGM 5) to Indian Army as well as to Special Forces.

LTMMMSL is currently executing export contracts for air to air missile launchers and missile subsystems to MBDA France for the Rafale Fighters. To address these export opportunities, the LTMMMSL has built a greenfield facility in a SEZ at Coimbatore, commissioned the same amidst COVID and commenced exports.

The Indian Navy has established an "unmanned road map" to maximise the potential of unmanned technologies and systems. What are L&T's operations in this regard?

L&T has constantly remained in sync with emerging technologies so that our products reflect the latest and the most useful technologies to empower our soldiers and ease their operational roles during peace and at war. L&T has been working for last decade to develop autonomous and intelligent systems that can provide a cutting edge force multipliers to our armed forces and at the same time reduce the risk our soldiers are subjected to.

In underwater and surface sea domains, we can provide autonomous kits to make small ships or boats unmanned and AUVs ranging in depth of operation from 300m to 6000m. Our product offerings can be used independently or in combination for applications like ISR, Mine Counter Measures, Sea-bed survey, Anti-submarine Warfare, targets or decoys for training etc. The man-portable 'Maya' is a versatile AUV that can be used with different payloads to act as a target for weapon / sonar training or as an ISR vessel to do advance reconnaissance. The 1000m depth survey class 'Amogh' is also capable of Mine detection and ISR. Of similar function is the 'Adama' AUV which has the unique feat of being designed to be launched from a torpedo tube. Our ROVs can help with EOD or with underwater inspections.

Building with in-house capabilities in the realm of intelligence algorithms and data processing ensures our unmanned systems are protected from hacking and cyber-attacks. We endeavour to build modular platforms that can play multiple roles with just changing payload, thus bringing economy and efficiency. Our core strength of systems integration and track record in conventional platforms ensures that we provide the end user with integrated solutions.



About Triveni Turbine Limited

OEM of industrial steam turbines up to 100 MW with Installations base of over 6000 turbines in more than 75 countries

Installed capacity of over 14,000 MWe since establishment

Key global player in steam turbine market with market leadership position in India, having approximately 60% market share

Annual Revenues for FY 22 at INR 8.38 billion

Two state of the art facilities at Peenya & Sompura in Bengaluru to manufacture over 200 to 250 steam turbines annually

Our USP

Intellectual property rights protection of over 250 different creations generated in-house

Around 150 service engineers available round the clock and ability to refurbish any make any age of turbines up to 500 MW

No load Mechanical Run Test of the manufactured turbines with steam up to 100 MW capacities

Design & Development Capabilities

Innovative product development concepts such as design to cost, QFD, FMEA techniques, DOE

Advanced CFD, FEA, neural network based algorithms employed for aero performance and product reliability maximization

Customised Plant Engineering solutions with PLM, SAP, advanced CAD/CAE

The advanced R&D product program has over 60 field proven models/ variants

In house load tests for newly developed blades through R&D

Refurbishment solutions for Triveni & other OEM turbines

In depth turbine thermal analysis and cycle optimization for heat rate improvement guarantees for old Triveni and other OEM retrofitted turbines

Usage of upgraded blade library, new seals, CFD analysis and Dr. Havakechian expertise for larger turbines

Using R&D System1 kit, lateral / torsional rotor train analysis with available field data with tools like DyRoBeS, XL Rotor, ARMD

For effective residual life analysis (RLA), combination of structural analysis with metallurgical diagnostic study (NDT techniques) with FEM techniques (LCF, HCF, Creep)

Triveni Turbines & Indian Defence



TAT (Turbo Alternator) turbine developed & supplied to DMDE by Triveni Turbines as an OEM

Over four decades of association with the Indian Defence

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Indigenization of spares through reverse engineering and servicing of steam auxiliaries for INS Vikramaditya, Karwar and INS Jalashwa, vizag developed through reverse engineering

Supporting Hindustan Aeronautics Limited (HAL) engines & Aerospace division as well

Collins Aerospace Aims High in Indian Market



For the US aerospace and defence products major Collins Aerospace (CA), India is a very strong market with umpteen growth opportunities. "India is the third largest aviation market globally and the third largest defence spend. A lot of our products are in service in India, hence makes it a perfect place for us to be in. We will invest \$200 million to expand its R&D and production facilities in India and hire 2000 more persons," Savyasachi Srinivas, Executive Director (Engineering), Collins Aerospace. Speaking to Aeromag at the venue of Aero India, he talks about what the company aims in Indian market.

Savyasachi Srinivas

Executive Director (Engineering), Collins Aerospace

By reaching across the markets it serves and drawing on its vast portfolio of expertise, Collins Aerospace, the US aerospace and defence products major, is making the most powerful concepts in aerospace a reality every day. Being a major participant at Aero India 2023, Collins Aerospace's exhibits are in complete alignment with the 'Make in India' and Atmanirbhar Bharat.

In a first all the exhibits of the company at Aero India are 'Made in India' products, which were locally designed, developed and manufactured. Savyasachi Srinivas, Executive Director (Engineering), Collins Aerospace, said that the company has great plans for the Indian market and a lot of plans in terms of investment and hiring will be there in the coming years.

"India is a very strong market for Collins Aerospace. It is the third largest aviation market globally and the third largest defence spend. A lot of our products are in service in India, hence makes it a perfect place for us to be in. Collins Aerospace will invest \$200 million to expand its R&D and production facilities in India," Srinivas said.

Most of the \$200 million investment will go into the 26-acre manufacturing site in the aerospace SEZ adjacent to the Bengaluru airport. There will be future product transitions to the India manufacturing site once it is completed in 2026. Some of the investment will go into



a new engineering test facility to enable product qualification and certification, completing the lifecycle of product design capabilities available in India. These certifications will be in electronics, embedded systems and mechanical products.

Collins Aerospace has its second and fifth largest engineering facilities in Bengaluru and Hyderabad, respectively. The new Global Engineering & Technology Centre (GETC) campus in Bengaluru is the only location that works with all six portfolios of the company: avionics, interiors, advanced structures, connected aviation solutions, power and controls, and mission systems.

"The company currently has about 5,000 employees in India, with 3,000 of them being engineers, and plans to hire another 2,000 in the next five years. We now do everything from design to production in Bengaluru in almost all disciplines like software, mechanical, electronics, and systems engineering. Moreover, we are

associating with educational institutions to identify young talent and promote their interest in the aerospace sector," he said.

As the aviation industry works to achieve its goal of net-zero carbon emissions by 2050, the development of hybrid-electric aircraft is seen as one of the key ingredients to success. Collins Aerospace will coordinate the development of new high-voltage distribution technologies with EU industry partners under Clean Aviation HECATE project.

For HECATE, which stands for Hybrid-ElectriC regional Aircraft distribution TEchnologies, Collins will lead the project's steering committee, while Safran will serve as technical coordinator. The HECATE consortium will work to address this challenge for regional platforms, with a specific goal of demonstrating a >500 kW hybrid-electric architecture in ground tests at technology readiness level -5 (TRL) by 2025.

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The State has also emerged as a
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- 1st
- In attracting investments
 - In India Innovation Index
 - In R&D Centers
 - In the number of Startups



KARNATAKA UDYOG MITRA

- A Government of Karnataka organization constituted under the aegis of the Commerce & Industries Department.
- State Single Window Agency for approval of investment proposals in the state.
- Dedicated Investment Promotion & Facilitation agency of the state, handholding investors across their journey.
- A 'Single Point of Contact' for all Investors & Businesses in Karnataka.
- **India's top Investment Promotion Agency**
The National Investment Promotion and Facilitation Agency 'Invest India' has rated Karnataka Udyog Mitra as the top IPA agency in the country.
- The State being a "Top Achiever" in Ease of Doing Business index, Karnataka Udyog Mitra ensures the effective implementation of EODB reforms.



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Source: <https://eodb.dpiit.gov.in/>

Gunjan Krishna, IAS
Commissioner for Industrial Development &
Director of Industries & Commerce

Dr. E. V. Ramana Reddy, IAS
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IL-76MD-90A(E)

IL-76MD-90A(E) heavy military transport aircraft is intended for delivery and paratropping of military and civil cargo and equipment, including personnel and wounded.

THE TECHNOLOGY OF FLIGHT