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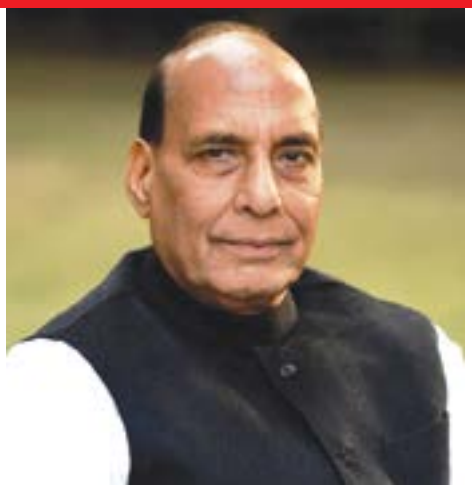
The Great Churning

The Transformation of Indian Defence Sector under Narendra Modi

It has been eight years since Narendra Modi-led NDA government came to power. The Ministry of Defence became a key focus of PM Modi's cabinet and respective Defence Ministers put in duteous efforts to give a brand new outlook to the defence sector in India. As envisioned by Modi, the Defence Ministry, helmed by Rajnath Singh, made giant strides to transform the military into a youthful, modern and 'Atmanirbhar' force in 2022, which was a year of path-breaking reforms. The country witnessed a lot of big-ticket changes in the defence sector and the year 2022 was highly productive in terms of key developments like major push for indigenisation and exports.

Narendra Modi
Prime Minister of India



Rajnath Singh
Defence Minister

Ever since the NDA government led by Prime Minister Narendra Modi assumed power at the centre in 2014, India has been nonchalantly aggressive in terms of development in all sectors, especially aerospace and defence. The Ministry of Defence became a key focus of PM Modi's cabinet and respective Defence Ministers put in duteous efforts to give a brand new outlook to the defence sector in India. Even after NDA 2.0 government retained its power in 2019, India continued to witness a lot of big-ticket changes in the defence sector and the year 2022 was highly productive in terms of key developments like major push for indigenisation and exports.

According to the annual year-end review the Ministry of Defence, the Indian Armed Forces have been equipped with state-of-the-art weapons, equipment and technologies. Amidst the emerging global security challenges and almost 30 month long standoff between the Indian and Chinese troops along the Line of Control (LOC), India has taken major advances in the defence sector in 2022. The major thrust of the reforms has been on promoting self-reliance in defence manufacturing and technology in the country.

As envisioned by Prime Minister Narendra Modi, the Defence Ministry, helmed by Rajnath Singh, made giant strides to transform the military into a youthful, modern and 'Atmanirbhar' force in 2022, which was a year of path-breaking reforms. While the Armed Forces were equipped with state-of-the-art weapons/equipment/ technologies manufactured by a self-reliant indigenous industry, a major reform was rolled out with the aim to build a youthful and tech-savvy military ready to meet future challenges.

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

A Big Boost to Defence Acquisition

Reducing imports by increasing domestic procurements has been the focus of the MoD and several major reforms were initiated for this. Utmost priority was given to the procurement of capital items from domestic sources under the Defence Acquisition Procedure (DAP)-2020.

With an objective of achieving $25 billion turnover in defence production, the Defence Acquisition Council (DAC) recently approved 24 procurement proposals worth over Rs 84,300 crore. Of these, 21 proposals worth over Rs 82,000 crore are to be procured from domestic manufacturers. The government has already released four positive defence indigenisation lists since August 2020 which includes 411 items.

India's defence exports increased significantly between 2017 and 2022, from Rs 4600 crore to Rs 12,800 crore. Moreover, defence imports have surged from Rs 37,000 crore in 2017 to Rs 50,000 crore in 2022. Between 2021 and 2022, the value of defence manufacturing rose from Rs 84,600 crores to Rs 94,800 crores. Additionally, the capital expenditure by the government for defence indigenisation climbed from 58 percent

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to 68 percent of the authorised amount.

The MoD announced that 18 major defence platforms were identified for industry-led design & development in March 2022. Those included lightweight tanks, hypersonic glide vehicles, unmanned autonomous AI-based land robots, 127 mm naval guns, electric propulsion (engines) for ships and standoff airborne jammers. The platforms including naval ship-borne unmanned aerial systems and lightweight tanks were also identified for their design and development by the private sector.

Out of the 18 platforms, 14 will be developed by the private sector under the 'Make-I' category of the Defence Acquisition Policy (DAP) 2020, which aims to underline 'Make-I' as the key driver to achieve self-reliance by involving greater participation of the Indian industry in the development of defence equipment. For boosting private participation in the manufacture of military equipment, the government brought out the concept of the Special Purpose Vehicle (SPV) model, under which Indian Multi-Role Helicopter (IMRH) and Long-Range Unmanned Aerial Vehicles (UAVs) will be developed.

INS Vikrant: A Testimonial of Atmanirbharata

In September, Prime Minister Narendra Modi commissioned the country's first indigenous aircraft carrier INS Vikrant which was built at Cochin Shipyard, propelling India to a select club of six nations with the capability of indigenous manufacturing and design of an aircraft carrier. The aircraft carrier has 76 percent indigenous content and the 262.5 m long and 61.6 m wide is equipped with state-of-the-art systems and equipment. This has been designed for a crew of 1,600 officers and sailors.

Designed with a high degree of automation for machinery operations, ship survivability and navigation and survivability, it has the capability of operating air wing which consists of 30 aircraft — MiG-29K fighter jets, Kamov-31 helicopters as well as MH-60R multi-role helicopters, and indigenous Advanced Light Helicopters (ALH) and Light Combat Aircraft (LCA) Navy variant. It has a novel aircraft-operation mode — Short Take Off But Arrested Recovery.

IAF's War Machine LCH 'Prachand'

The Light Combat Helicopter (LCH) Prachand, designed and developed by state-owned aerospace behemoth Hindustan Aeronautics Limited (HAL), was formally inducted into the Indian Air Force (IAF) in October. LCH is the first indigenous Multi-Role Combat Helicopter and is capable of potent ground attack and aerial combat. It has formidable night attack capability, modern stealth characteristics, and robust armour protection, guns tailored for close combat, air to air missiles and advanced navigation system. Together all these make the LCH suited for the modern day battlefield.

Make 'C-295' in India

In a first, a private sector company is going to manufacture military transport aircraft C-295 for the Indian Air Force. In October 2022, PM Modi laid the foundation stone of C-295 transport aircraft manufacturing facility in Vadodara, Gujarat. Under a joint collaboration between Tata Advanced Systems Limited and Airbus Defence and Space S.A., Spain this facility will manufacture C-295 aircraft for IAF at a total cost of Rs 21, 935 crore. As per the contract 40 aircraft are going to be manufactured at this facility and 16 will come straight from M/s Airbus Defence and Space S.A.

Missile Destroyers/Frigates

Defence Minister Rajnath Singh launched two frontline warships of the Indian Navy – 'Surat' and 'Udaygiri' - at Mazagon Docks Limited, Mumbai in May. 'Surat' is the fourth Stealth-Guided Missile Destroyer of P15B class, while 'Udaygiri' is the second Stealth Frigate of P17A class. Project 15B class of ships are the next-generation stealth guided-missile destroyers of the Indian Navy which are follow-on class of the weapon intensive P15A (Kolkata Class) Destroyers. P17A Frigates are warships that are follow-on class of the P17 (Shivalik Class) Frigates with improved stealth features, advanced weapons & sensors and platform management systems. Y-12705 (Mormugao), the second ship of Project 15B, was delivered to Indian Navy in November, while fifth Stealth Frigate 'Taragiri' of P17A was launched in September.

Positive Indigenisation Lists

The defence ministry launched such policy direction under the notification of four positive indigenisation lists to reduce imports. It identifies a total of 411 items of services and three positive indigenisation lists of 3,738 items of

Defence Public Sector Undertakings (DPSUs), for which there would be an embargo on imports beyond the timelines indicated against them.

While the first positive indigenisation list of 101 military items was notified in August 2020, the second list of 108 items in May 2021, and the third list actually brought major platforms and equipment under the overall scheme of indigenisation. Again, the fourth list of another 101 items was announced by the Prime Minister during the opening ceremony of DefExpo 2022 in Gujarat in October. The List focused on government-owned DPSUs to minimise imports.

Innovations for Defence Excellence (iDEX)-Prime

In continuation of the iDEX, the MoD extended the programme to Defence Excellence (iDEX) Prime. The iDEX-Prime will support projects, requiring support beyond Rs 1.5 crore up to Rs 10 crore to help ever-growing start-ups in the defence sector. The Grant-in-Aid is up to Rs 10 crore which is for the development of high-end solutions. It included problem statements under which startups will offer solutions in terms of the design and development of the sub-systems for the armed forces.

The scope iDEX-Prime further broadens into key areas, especially in the domain of Artificial Intelligence (AI). The policy prioritises AI in Defence. In a major announcement, during the first ever 'AI in Defence' symposium and exhibition organized by the Ministry of Defence in New Delhi, the defence minister launched 75 newly-developed Artificial Intelligence (AI) products.

Thrust on Defence Exports

The consistent efforts of the central government under the leadership of Prime Minister Narendra Modi have helped the country in harnessing the potential of the Indian industry, both public and private, and clocking its best in terms of defence exports recently. Touching Rs 13,000 crore during 2021-22, which is the highest ever export number recorded in Indian defence history, is a significant milestone for a country that was, at one point, totally dependent on imports.

India's defence exports have grown by 334 per cent in the last five years and the country is now exporting to over 75 countries due to collaborative efforts. India's defence exports achieved a six-fold increase between 2017 and 2021, taking defence export from Rs 1,520 crore to Rs 8,435 crores. It is a testimonial that India can make significant gain in defence export business. With the private sector accounting for 70 percent of the exports, it further hints at the potential Indian industry has.

However, there is a lot of ground yet to be covered in terms of development of new products and the scale of production. Hence, boosting defence exports, which is vital for desired expansion of the defence industrial base, is inevitable to give impetus to enhanced participation by domestic private industry in design, development and manufacture of defence products.

The focus of the MoD has been to increase the country's defence exports to friendly nations in an effort to achieve the collective goal of global peace and prosperity. In line with `Make in India' & `Make for the World' vision many countries have expressed interest in the Indian platforms and this has resulted in record defence exports. India's defence exports target of Rs 35,000 crore by 2025 may appear very ambitious, but considering the potential of Indian industry and recent triumphs, it is not impossible to achieve.

India as a Blue - Water force

The landmark export deal with the Philippines and more countries showing interest in the missile have emboldened BrahMos Aerospace's resolve to further widen its footprint internationally. In an interview with Aeromag, Atul Dinkar Rane, Director General BrahMos, CEO and MD, BrahMos Aerospace, talks about how BrahMos leads from the front to realise India's target of achieving $5 billion in defence exports by 2025.

Dr. Samir V Kamat
Chairman , DRDO & Secretary Defence R&D
Ministry of Defence, Govt. of India

The Indo-Pacific is clearly a focal point today with multiple stakeholders becoming involved in the region. India's vision of a safe, free and open Indo Pacific is a core geostrategic area of interest for the leading nations of the world. Accounting for more than 60% of global GDP and almost 50% of global merchandise trade through its waters, the region is very dynamic from an economic perspective as well. The Indo Pacific Economic Framework (IPEF) as a medium also aims to build inclusive free and fair-trade commitments in the region which makes the security of the region all the more critical.

India's maritime strength and resilience is largely a manifestation of decades of untiring efforts towards augmenting capabilities and capacities. With an aim to have a functioning and operational force level of around 175-200 ships and submarines in a decade, the Indian Navy's Maritime Capability Perspective Plan aims for significant upgrades and acquisitions. With current force levels of around 130 ships and submarines, another 45 currently under various stages of construction and around 39 more in the pipeline at various stages of the contracting procedure – the plan is surely in place to achieve the targeted fleet strength. It is parallelly important to note that it is not just about the platforms, but also about what further goes on top of the platforms to get them ready for operations. Hence, with supply chain shocks and geopolitical volatility providing persistent headwinds in the last few years, there has been a lot of focus and effort towards indigenization.

The Navy has reportedly indigenized around 3400 items under the indigenization plan which include spares for machinery, electrical, aviation and weapons with more fast-moving mandatory spares for aircraft also being parallelly pursued. It is known that the Navy's float component is most indigenized followed by the move and fight components in that order. With the specialized grade steel now also being produced by SAIL in collaboration with Defence Metallurgical Research Laboratory (DMRL), the move component is largely an indigenous affair now. The 'fight' component, arguably the least indigenized till date,

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is being progressed upon on a war footing. Weapons, radars and sonars are being indigenized and plans are afoot to further build on the existing base. The commissioning of INS Mormugao, second of the four Visakhapatnam class destroyers indigenously designed by the Warship Design Bureau of the Indian Navy, is testimony to India's growing capabilities . One of India's strongest warships, it will reportedly be among the world's most technologically advanced missile carriers.

The Navy is working with DRDO and the industry towards reducing developmental timelines to ensure that the technology being researched and developed is entering production as early as possible. Some of the most specific focus areas for further indigenization include anti-submarine weapons and sensors, missiles (antiship and medium range surface to air), electronic warfare equipment, communication systems, batteries for submarines, components for missiles and torpedoes etc. To further add to the ongoing efforts, the Navy has project managed teams interfacing with DRDO labs and their industry DcPPs for inputs at every stage to 15 futuristic technologies and more than 100 DRDO projects currently underway for development.

DRDO's labs aligned towards naval systems and materials pursue design and development efforts for products across the spectrum for both current and futuristic applications. The Naval Science and Technological Laboratory (NSTL) in Vishakhapatnam for example undertakes research and development of naval weapons and related systems like underwater mines, torpedoes, fire control systems, weapon launchers and target decoys. For instance, more recently NSTL solicited interest from Indian battery manufacturers having some

experience in, and willing to absorb, the technology transfer for high power li-ion battery. NSTL having developed the same possesses the relevant knowledge that can be passed on to the industry for production, certification and supply of Li-ion battery systems.

Similarly, DRDO's Naval Materials Research Laboratory (NMRL) pursues application-oriented technology development in metallurgy for naval applications and energy system. The Air Independent Propulsion (AIP) system for submarines and fuel cell technologies are some of its more recent and more prominent research areas. One of the most important and unique milestones of NMRL has been the fuel cell-based AIP system since the hydrogen required is generated onboard the system itself. The technology has reportedly matured enough for fitment into target vessels now . AIP can have a significant force multiplier effect on the lethality of India's diesel electric submarines as it enhances the endurance level of the submerged platform by multiple times.

Another dedicated DRDO lab towards naval systems is the Naval Physical & Oceanographic Laboratory (NPOL) which works on the development of sound navigation and allied technologies including underwater surveillance systems and oceanographic research for anti-submarine warfare applications. More recently, NPOL launched Hull Module of Submersible Platform for Acoustic Characterization and Evaluation (SPACE) facility towards evaluating and quick deployment of sonar systems for ships, submarines and helicopters. This is testimony to the fact that enabling infrastructure for long term sustenance as an Atmanirbhar nation is also a very important area for India.

Apart from dedicated labs for naval research, there are other labs like the Electronics & Radar Development Establishment (LRDE) which work on very critical areas for the naval platforms. LRDE for example has developed Revathi, a 3D surveillance radar, having a digital receiver, programmable signal processor providing high resolution, accuracy, response and information availability. With an ability to auto track up to 150 targets, Revathi is a key component on warships which leverage it for their close range weapon systems against air and sea targets.

DRDO has worked with the industry in developing some of the most critical indigenous requirements of the Navy. The Naval Research Board of DRDO, set up in 1996, continues to strengthen and deepen the knowledge base related to naval science and technologies. With a Grants-in-aid scheme, the Board also nurtures scientific talent to crease research base in IITs, universities and other research centers in India. Coordinated through seven specialist panels across materials, hydrodynamics, sonar and signal behavior, ocean environment, scientific computing, marine systems and hydro-vibro acoustics - the Board is working on securing the naval strength of India.

Multiple steps are being taken in research and development and DRDO is at the core of it all. From (i) raw materials (specialized steel), to (ii) designing warships, to (iii) development of legacy as well as futuristic weapons, radars and sonars – there is a significant DRDO contribution and will hopefully continue to be in times to come. It is important that the ecosystem evolves with the changing times. Technology is improving exponentially and it is important to either be ahead of the curve or be in sync, else it will always remain a game of catch up. ■

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BrahMos Steadfast to Propel India's Defence Exports

The landmark export deal with the Philippines and more countries showing interest in the missile have emboldened BrahMos Aerospace's resolve to further widen its footprint internationally. In an interview with Aeromag, Atul Dinkar Rane, Director General BrahMos, CEO and MD, BrahMos Aerospace, talks about how BrahMos leads from the front to realise India's target of achieving $5 billion in defence exports by 2025.

Atul Dinkar Rane
Director General BrahMos, CEO and MD, BrahMos Aerospace

BrahMos Aerospace is set to conclude its silver jubilee celebrations. Could you share the major milestones over the glorious 25 years?

The India-Russia BrahMos JV embarked on the milestone 25th year of its formation in 2022 which coincided with India's 'Azadi ka Amrit Mahotsav' commemorations. It has been an incredible journey for the JV company which has designed, developed and delivered one of the most powerful, state-of-the-art, unparalleled deterrent weapon to the Indian Armed Forces. The coming together of two scientific-technical institutions of eminence – DRDO and NPOM – redefined India-Russia strategic partnership and led to the development of the 'world-class' BrahMos weapon system. This highly successful Defence JV programme has no parallels in the world.

We have realised many successful moments and milestones in these 25 years, including delivering the supersonic cruise missile system to the Indian Navy in 2005, to Indian Army in 2007, and to the Indian Air Force in 2020. BrahMos is the only weapon in its class and calibre to have been operationalised in all three Services of Indian Armed Forces, making India the first and only country in the world to possess a 'Supersonic Cruise Missile Triad'. The tactical weapon has been tested for a record number of times from frontline land, ship and air platforms and established an unbeatable record. The missile has validated its supremacy as the 'weapon of choice' for modern, network-centric warfare operations. The BrahMos JV has been leading from the front in the flagship 'Make-In-India' endeavours of defence indigenisation. Through the BrahMos 'Missile Industrial Consortium' (MIC), the JV has significantly widened India's defence & aerospace ecosystem and incorporated higher indigenous technologies, components and sub-systems in the versatile BrahMos.

In 2022, BrahMos became India's first full-scale major weapon system to enter the international arms market. On January 28, we signed a historic export contract with the Republic of Philippines to deliver shore-based BRAHMOS anti-ship weapon system to the Armed Forces of Philippines. It was a watershed moment for us.

Prime Minister Narendra Modi has set a target of achieving $5 billion in defence exports by 2025 and BrahMos Aerospace aims high in exports by that time. How strong is your export business and what are the latest updates?

BrahMos has heralded a new chapter in India's defence exports front. It is the first weapon of such class and calibre to carve global footprint. The landmark export deal with the Philippines has emboldened our resolve to further widen our footprint internationally. There are several countries in the South East Asia, Middle East and Latin American regions which are strongly desiring to acquire the formidable BrahMos weapon system for their Armed Forces. So, the supersonic cruise missile is definitely very strongly positioned to fulfil India's defence export aspirations. BrahMos Aerospace in fact now leads from the front to realise India's target of achieving $5 billion in defence exports by 2025.

What are BrahMos's highlights of participation at Aero India 2023?

BrahMos Aerospace will take part in Aero India 2023 with full strength and display all advancements and progresses the JV entity has achieved in over the two decades of its illustrious journey. We would exhibit all BrahMos weapon variants, including the BrahMos -NG. The advanced BrahMos air-launched cruise missile (ALCM) system onboard the Sukhoi-30MKI fighter platform of the Indian Air Force would be a major highlight during the international aero show.

You have said that BrahMos Aerospace is capable of making hypersonic missiles and will be able to have its first such missile in five to six years. What are the latest updates?

We are very much capable of designing and developing the hypersonic variant of BrahMos missile. We are working on this front and are quite hopeful to achieve major breakthroughs in the coming years. BrahMos remains world's fastest tactical weapon having a top speed of Mach 2.8. We are now working on the more advanced BrahMos -NG (next-generation) variant which would have a higher speed of Mach 3.5. Then we are targeting to reach the 'ultra-high' speed which would be one of the defining features of hypersonic BrahMos -II. We intend to build 'technology clusters' in

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coordination with DRDO and NPOM along with our public & private sector defence industry partners and the academia to realise this ambitious goal of developing the hypersonic BrahMos missile variant in the next few years.

BrahMos will be taking part in NAVDEX 2023 in Abu Dhabi. What are the plans to explore business opportunities in the Middle East?

Some countries in the Middle East region have evinced interest in the BrahMos weapon system. We are offering all variants of BRAHMOS – land-based weapon complex, ship-based weapon complex, shore-based weapon complex and the air-launched cruise missile system – for export. Being a very versatile, flexible system, BrahMos can be seamlessly integrated on some of the military platforms of these countries (in the Middle East region). So, there are very strong business prospects for us in this region.

Could you talk about the latest updates of Brahmos-NG missile?

This new weapon is going to be a smarter derivative over its predecessor in terms of scale & size, speed, stealth and other parameters. BrahMos -NG would be designed for integration onto a wider number of modern frontline military platforms on land, sea, underwater and air. Its smaller and lighter dimensions would make it more agile and capable to undertake precision strikes from stand-off ranges against land and sea targets. We have started working on this new weapon variant and are planning to test the first prototype weapon in the next 1 to 2 years' time. The state-of-the-art BrahMos manufacturing centre being set up in Lucknow under the Uttar Pradesh Defence Industrial Corridor (UPDIC) project would cater to the series production of the new BrahMos -NG variant in the foreseeable future.

What is the current status of the manufacturing centre to come up in Lucknow, Uttar Pradesh as part of the UP Defence Industrial Corridor (UPDIC) Project? How will it boost your production and assembling capabilities?

This new unit is being set up to meet the growing demand for BrahMos. Work has been expedited with all necessary cooperation and support from the UP Govt and all other nodal agencies and officials associated with the project. We are quite hopeful to complete all construction and installation work for the new dedicated manufacturing facility by 2024. Once fully ready, the Lucknow unit of BrahMos would roll out existing BrahMos weapon systems. Subsequently, this dedicated facility would cater to the serial production, integration and delivery of the advanced BrahMos -NG weapon in the coming years. The new unit, once operationalised, would significantly bolster our existing manufacturing capabilities.

How does BrahMos support the indigenisation efforts of India? What is the current rate of indigenisation?

BrahMos has remained at the forefront of 'Make-In-India' programme. The JV, based on a very unique 'Missile Industrial Consortium' (MIC) model, has in fact reinvigorated the entire defence industrial ecosystem of India. We have involved a large number of small, medium and large public & private defence sector firms, laboratories and institutions in the design, development, integration and production of BrahMos and its numerous components, sub-systems etc. In close coordination with DRDO, we have also indigenised several critical technologies and systems for the missile over the years. The rate of indigenisation is quite high which has reduced the missile's overall production, maintenance and operation costs. Additionally, the weapon's functional and operational efficacy have been enhanced with the infusion of more advanced technologies and features which have been validated during successful test firings conducted in recent times.

The Ministry of Defence signed a contract for acquisition of additional dual-role capable Surface to-Surface BrahMos missiles under 'Buy-Indian' Category. Could you talk more about it?

We will design and deliver the new dual-role BrahMos surface-to-surface missiles (SSMs) for deployment on the future frontline maritime stealth combat platforms of Indian Navy. The new weapon variant would have enhanced features for superlative performance over its predecessor. It would also have higher indigenous content in terms of technology and other systems/ sub-systems.

What are the immediate goals ahead for Brahmos Aerospace? Could you share your vision for the company during your tenure?

The immediate goals include design & development of new, advanced BrahMos -NG missile variant. Work on this front has gained momentum and we are moving quite swiftly to test the first prototype weapon soon. The other priority area is to incorporate advancements in terms of technology and other indigenous features to make BrahMos even more lethal for our Armed Forces. Series production and swift delivery of BrahMos air-launched cruise missile system to the Indian Air Force is also going on in parallel. Then, at the exports front, we want to take forward the export potential of BrahMos to newer frontiers after signing the historic export deal with the Philippines in 2022. My vision, therefore, is centred on the organisation's overall growth, expansion and consolidation strategies in the longer run. ■

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Haryana Aims to be a Leading Hub in Aerospace and Defence

With its Aerospace and Defence Production Policy, Haryana aims to attract investment of US$ 1 billion over the next five years with a focus on promoting industrial development in the aerospace and defence sector and creating a complete ecosystem for the development of the sector. The plan is to establish Haryana as the leading aerospace and defence hub of the country by creating employment opportunities for about 25,000 people. "Haryana is a leader in India in many sectors including MRO, automotive etc. We aim to be a strong leader in aerospace and defence sector too. We intend to increase our presence in aerospace and defence manufacturing sector too," said Dushyant Chautala, Deputy Chief Minister, Haryana. Speaking to Aeromag, he talks about the state's ambitious growth policies in the aerospace and defence sector and the plans to attract investments.

Dushyant Chautala
Deputy Chief Minister, Govt. of Haryana

Could you talk about various initiatives by Haryana government to foster growth in aerospace and defence sector?

Haryana has taken numerous steps in this regard over the last three years. We are developing one of the largest airports in the country at Hisar. The construction of Hisar airport as an Integrated Aviation Hub, includes the construction of a cargo railway line, in addition to a passenger line near Raipur.

There are two FTOs being run by our government at Pinjore and Karnal. We have India's only sky-diving facility at Mahendragarh. The state government has handed over 25 acres of the land in Gurugram to the Centre for the development of a heli hub as a joint venture with Pawan Hans. The heli-hub has been envisioned as the first of its kind in the country with all aviation facilities for choppers at one place, and it will have many aviation facilities like heliport, hangers, repairs and other related services.

The government has recently released Haryana Aerospace and Defence Policy to support the growth in the sectors. The policy is in alignment with Haryana Enterprise and Employment policy (HEEP 2020) with special focus to support the industry urging more investment in the state's aerospace and defence sector

The policy envisages harnessing Haryana's inherent strength in auto components and automobile manufacturing sector. The objective of the policy is to attract investment of US$ 1 billion over the next five years with a focus on promoting industrial development in the aerospace and defence sector and creating a complete ecosystem for the development of the sector and to establish Haryana as the leading aerospace and defence hub of the country by creating employment opportunities for about 25,000 people.

We are also working on a drone production policy with the aim of tapping the potential in UAV industry. The state aims to be a home to more defence and aerospace production companies, especially in cargo, MROs and passenger traffic.

What are the incentives on offer in Haryana's industry sector?

There are many incentives for companies and those include stamp duty refund, electricity subsidy, state GST refund etc. The government is giving single window clearance in the industrial sector.

The financial incentives offered under Haryana Aerospace and Defence Production Policy are the following. 100% of net SGST will be reimbursed for 10 years in D category blocks to the extent of 12.5 % of FCI. 75% of the net SGST will be reimbursed for 8 years in C category blocks. 50% of the net SGST will be reimbursed for 7 years in B category blocks.

The aerospace and defence units in B, C and D blocks will be eligible for reimbursement of 100% stamp duty on sale/lease deed after commencement of commercial production within 5 years from the date of purchase of land. There is 100% waiver in electricity charges for 10 years in B, C and D blocks.

A credit guarantee scheme will be offered to students pursuing aviation/

aerospace related course in higher education. In order to facilitate research and innovation in the state, the units registered with the Department of Scientific and Industrial Research will be provided financial assistance @ 50% of the project cost subject to a maximum of Rs. 50 crore.

We are a leader in manufacturing and contribute to around 70% of India's automobiles- especially heavy duty vehicles, cars, tractor, and two-wheelers- manufacture. There is so much of untouched and unexplored potential and the government intends to tap it through industry-friendly initiatives.

Could you talk about Haryana's startup sector? What are the initiatives to nurture startups and MSMEs?

Haryana has a vibrant and industry-friendly startup ecosystem. There are around 250 Fortune 500 companies in Gurugram. Moreover, top 10 startups like Delhivery recognised by the GOI and globally now have their presence in Haryana. More startups are coming to the state.

We recently launched Haryana's startup policy to support new startups and universities with incubation centres. It aims to boost and nurture the vibrant startup ecosystem in the state and help entrepreneurs at different stages.

Under the startup policy, a business entity recognised as a startup by the Department for Promotion of Industry and Internal Trade (DPIIT) under the Union ministry of commerce and industry up to a period of 10 years from the date of its incorporation/registration and with an annual turnover not exceeding Rs 100 crore and being based in Haryana will be eligible to avail fiscal and non-fiscal benefits.

The fiscal incentives to incubators include

capital grant of up to Rs 2 crore to government host institutes and up to Rs 1 crore to private host institutes for setting up of incubation centres. A financial assistance of up to Rs 10 Lakh per incubator for existing incubators in universities and other government institutions for upgrading their facilities.

Connectivity is an important aspect when it comes to industrial prosperity. How well connected in Haryana?

Haryana is very well connected via road, rail and air. The Delhi airport is closer to Haryana than it is to Delhi. Once our new airport in Hisar is operational, it will be a big boost to cargo and passenger operation.

The aviation hub at Hisar will become fully operational from March next year, giving Hisar air connectivity with Amritsar, Srinagar, Jaipur, Indore, Ahmedabad, Agra, Varanasi and other places. A study will be conducted to see how our heli-hub can be connected with other places at a distance of two hours. Besides, the chopper traffic from Delhi's IGI airport could be diverted to this proposed heli hub in Gurgaon. It will be a one stop centre for North India's for helicopter connectivity.

How strong is Haryana's capabilities in MRO services?

The government aims to make Haryana a leading MRO hub (maintenance, repair and overhaul) in north India in the field of aerospace and defence equipment production. It will be beneficial for the civil and defence aircrafts and will also reduce the maintenance cost for all airlines.

We now have 7 major MROs facilities operating in the state and we intend to invite more companies. India's air connectivity is getting improved and there is a huge increase in the number of aircraft. They should not go abroad for MRO service when we have the best equipped-facilities and skilled labour along with easy availability of spare parts.

Being the Deputy CM, what is your vision for Haryana?

Haryana is a leader in India in many sectors including MRO, automotive etc. We aim to be a strong leader in aerospace and defence sector too.

Building a Better and Futuristic Karnataka

The proposed investment target of Rs.50000 crores in five years in Karnataka, which is an aviation hub, will undoubtedly help solidify its position further. The state's robust ecosystem in aerospace and defence sector is supported by a thriving social infrastructure. Speaking to Aeromag, Dr. Murugesh Nirani, Industries Minister, Government of Karnataka, said that Karnataka recognises the importance and the role of new-age tech in building a better and futuristic tomorrow.

Dr. Murugesh Nirani
Industries Minister, Government of Karnataka

Dr. Nirani, Karnataka has made major progress in attracting investments in industry in the last couple of years. What have been the key factors which have helped?

To ensure that we continue to maintain our leadership position and sustain growth, the Govt. of Karnataka has taken several measures to enhance investor friendliness in the state. The Industries Facilitation Act was amended, and Affidavit Based Clearance (ABC) System has been introduced. The amended act enables industries to start operations without obtaining approvals from different departments like trade licenses, building plan approvals, etc.

Karnataka state has 10 clusters established under Micro Small Enterprise Cluster Development Programme. These are in addition to other product-specific clusters available to a larger set of investors, e.g., Aerospace & Defence Park, EV Park, Consumer Durable Goods Park, Bulk Drug Park, etc. Professional consultants/ developers such as L&T, Aequs have been entrusted with parts of cluster development efforts. Multiple initiatives under the umbrella of decriminalisation of laws have also been undertaken. The programme team reviewed 286 State Acts and listed imprisonment clauses for Acts that have relevance to businesses.

Various structural interventions have been identified including Hybrid funding model, tiered pricing, Plug & Play Setup, Private Land Compendium, etc. Recently Karnataka successfully concluded Invest Karnataka 2022 – Global Investors Meet and received commitments of INR 9.8L Cr from investors across the world across sectors.

In the aerospace and defence sector, the state has attracted several key global players to make Bengaluru and Karnataka its home. What attracts companies? Is it skilled manpower availability or the fact that several aviation and aerospace giants like HAL, NAL, and ISRO make Karnataka a preferred destination for companies?

Karnataka has a strong ecosystem for the aerospace & defence sector, with several leading players present in the state. 67% of all aircraft & helicopters manufacturing for defence services is done in the state. Moreover, Karnataka contributes to 65% of the country's aerospace related exports from India. Our A&D policy offer the best-in-class incentives tailored for the requirements of each key sub sector.

As per the A&D Policy, ultra-mega enterprises (investment between INR 500 Cr & INR 1,000 Cr) located in Zone 3 will be eligible for a turnover-based Investment Promotion Subsidy of 1.85% for 7 years, up to 30% of value of fixed assets created by the unit. With a rich talent pool, the state offers the chance to augment research, design and development capacities

Even in the start-up sector in the aviation and aerospace industry, Karnataka has been ahead of other states. What are the key elements that attract Young Minds to work for the state and country in Karnataka?

Karnataka is the 4th largest technology cluster in the world in Bengaluru. Bengaluru continues to be an attractive destination for talent with around 80% of Fortune 500 companies having their Global Innovation Centres here. Karnataka is a global startup hub having 3rd highest number of startups globally. 37% of the startup funding raised in India is from Bengaluru. Karnataka is the highest in India in terms of funding, deal counts, VC & PE activity. Furthermore, Bengaluru also houses 40+ out of 105 unicorns and 3 out of the 4 decacorns in India. This robust ecosystem is supported by a thriving social infrastructure. Karnataka recognises the importance and the role of new-age tech in building a better and futuristic tomorrow.

As far as the aviation and aerospace sector is concerned, you have set ambitious goals to attract around Rs.50000 crores of investment in the next 5 years. Could you explain the same on how it will help in making the state an aviation hub?

Karnataka is already an aviation hub. The proposed investment target will help solidify its position further. For the same, we are considering the sector as special category and offering 5% additional subsidy to the sector. To put it in perspective, micro-enterprises in the sector in zone 1 (outside Bengaluru)

will get 35% subsidy instead of 30% offered in general. Micro-enterprises in zone 2 and zone 3 (in Bengaluru) will get 30% subsidy instead of 25%. There are five focus sub-sectors being identified for large enterprises, etc. with best-in-class incentives

Youth are looking for self-employment or attractive jobs, what are the kind of employment opportunities which come with the massive investment planned? What is your assessment of the talent pool that exists in Karnataka?

The kind of investment we have planned opens employment opportunities across the value chain of aviation sector. Setup by marquee names in the aerospace and defence sector will provide employment opportunities across levels. Investment by new age aerospace and defence firms will open employment avenues in areas such as 3D printing, composite manufacturing, AI aided surveillance etc.

There are opportunities for self-employment and creating employment thereof by setting up of startups. Karnataka has the best talent available and the same can be attributed mainly to three factors. The first one is the education-focused infrastructure with 50+ universities, 200+ engg colleges and 1,000+ ITIs, including institutes of excellence (IISc, IIT, Centre for AI and Robotics etc.). Approximately, 25% of India's aircraft and spacecraft industry is based in Karnataka manufacturing 67% of aircrafts and helicopters. Moreover, the presence of institutes like DRDO, ISRO makes it the destination for the most sought-after talent in the space.

You are the minister of Industries, who has been a successful industrialist in many sunrise sectors. Do that expertise and experience help you attract industry to the state, as you did with the success of Global Investors Meet?

I hope that helps strike a chord with the investor community. I have the unique advantage of having perspective of a businessperson as well as a policymaker. It helps me identify the opportunities in a sector, as well as understand and address any challenges that may occur.

While conducive political leadership is important, also crucial is the existence of a transparent and progressive thinking bureaucratic set-up. Do you think that the establishment of investor-friendly platforms like Karnataka Udyog Mitra has helped the industry?

It surely has helped the industry. Karnataka Udyog Mitra is a focused establishment with experienced and dedicated officials to support the investors in landing their investments in Karnataka, and act as the nodal agency through their journey. It has streamlined and digitalised process providing investors a single-window hassle-free platform to file investments.

Significant Achievements and a Promising Future: 30 Years of India-Israel Defense Relations

Indian Prime Minister, Narendra Modi and the Prime Minister of Israel, Benjamin Netanyahu.

By Tamir Eshel

For several decades India and Israel have established a long-standing relationship in the defense sector, with cooperation intensifying in the past 30 years. The relationship has grown from a buyer-seller relationship to a unique and comprehensive strategic partnership, with both countries collaborating on a wide range of defense projects and exchanging expertise in various fields.

This trusted partnership has always been a factor driving the growth of India-Israel defense cooperation. As two democracies whose heritage spans millennia, Israel and India's bilateral relations stand tall in the changing geopolitical landscape. This trusted partnership has always been a factor driving the growth of India-Israel defense cooperation. As two democracies whose heritage spans millennia, Israel and India's bilateral relations stand tall in the changing geopolitical landscape. From the terror attacks in Mumbai in 2008 to the COVID-19 pandemic of 2020, the two countries have stood together side by side. Israel proved to be a reliable partner, and its advanced defense technology and expertise make it a unique partner for India.

These bilateral relations are essential for both sides. For Israel, the stimulus is strategic. As one of the world's largest economies, India is an important ally that helps forge foreign relations in the region and beyond, and a market that can tap Israel's innovative technologies in many fields, from defense, security, and aerospace, to science, agriculture, healthcare, water management, and many other areas.

The history of India-Israel defense cooperation can be traced back to the early 1990s when India started purchasing defense equipment from Israel. Over the years, India has become one of the largest buyers of Israeli defense equipment, purchasing a wide range of products, including unmanned aerial vehicles (UAVs), radar systems, missile defense systems, and ammunition.

One of the significant milestones in India-Israel defense cooperation was the signing of a Memorandum of Understanding (MoU) on defense cooperation in January 2008. The MoU provided a framework for the two countries to collaborate on various defense projects and exchange expertise in multiple fields.

Joint defense programs between India and Israel include the development of unmanned aerial vehicles (UAVs), loitering missiles, electro-optics, radars, avionics, electronic warfare equipment, naval countermeasures, and communications systems. The two countries have also developed joint solutions for defense, security, cyber, and counter-terrorism operations,

exchanging expertise in various fields.

Keeping their commitment to the Make-in-India policy, Israel's defense enterprises have always respected India's demand for localization and indigenization. All of Israel's leading defense companies and some of the Small and Medium Enterprises (SME) have established joint ventures with local partners in India to position their products in the Indian market better. With activities covering various fields, that were pursued under JVs with Defense Public Sector Undertakings (DPSU) such as HAL, BEL, and BDL, and Private Sector Companies such as Kalyani, Adani, Tata, Alpha Design, Mahindra, Wipro, among others, opening manufacturing plants in Hyderabad and other locations.

The MoU also laid the foundation for establishing the Joint Working Group on Defense Cooperation, which has been instrumental in strengthening the defense relationship between the two countries. This task force works to identify new areas of defense cooperation, examined within the strategic perspective of the two countries. The group examines mutually-beneficial technologies and fosters deeper engagement between the two defense ecosystems.

The defense relationship between the two countries has been shaped by India's growing need for advanced defense technologies and Israel's expertise in developing cutting-edge defense solutions. But the pace of business was determined by India's complex regulations. In recent years, different rules regarding offset obligations and the mandatory level of domestic origin (known as 'Make in India') complicated collaborative programs as the Israeli companies grappled with how to deal with the regulations and limited the scope to scale and grow. In recent years the policy has evolved into the Atmanirbhar Bharat (self-reliance) initiative that aims to unlock the potential of the domestic industry and manufacturers to meet the country's growing requirements. The new policy is challenging and denies foreign players access to major Indian defense programs, on the other hand, it provides foreign companies a path for closer integration in the Indian market, offering up to 74 percent foreign direct investment in local companies. With a more substantial stake in JVs, Israeli companies are becoming assured of the intellectual property (IP) they transfer to the JVs they establish in India, thus overcoming a major roadblock that hindered some transfer of sensitive technologies in the past.

In conclusion, the past three decades have seen significant growth in India-Israel defense cooperation. The relationship has evolved from a commercial relationship to a comprehensive strategic partnership, with both countries collaborating on a wide range of defense projects and exchanging expertise in various fields. This cooperation is expected to grow in the coming years as Israeli defense companies expand their presence and adjust to India's self-reliance policy to address regional security challenges and tap the true scope of this market. It comes at a time when the military seeks new solutions addressing operational gaps unveiled in recent conflicts and lesson learned from the war in Eastern Europe. A clear lesson is a need for India to become self-reliant. However, self-reliance should also promote synergy in defense research and technology - another facet of what Israel and India have in common.

About the writer:

Tamir Eshel, the editor of Defense-Update.com is a senior defense analyst, with 45 years of specialty in modern defense systems.

MoD, L&T signs contract for 41 Modular Bridges, worth over Rs 2,585 Cr.

In a major boost to indigenisation of defence equipment under Prime Minister Narendra Modi's vision of 'Aatmanirbhar Bharat', Ministry of Defence has approved the proposal for indigenous manufacture of 41 sets of Modular Bridges for the Corps of Engineers of the Indian Army. These game-changing bridges have been designed and developed by Defence Research and Development Organisation (DRDO) and shall be produced by Larsen & Toubro (L&T) as DRDO-nominated production agency. The contract for the procurement of Modular Bridges was signed with L&T on February 08, 2023 at an estimated cost of over Rs 2,585 crore.

Each set of Modular Bridge shall consist of seven carrier vehicles based on 8x8 Heavy Mobility Vehicles and two launcher vehicles based on 10x10 Heavy Mobility Vehicles. Each set shall be capable of mechanically launching a single span fully decked 46-meter assault bridge.

The bridge can be employed over various types of obstacles like canals & ditches with quick launching and retrieval capabilities. The equipment is highly mobile, versatile, rugged and capable of keeping pace with wheeled and tracked mechanized vehicles.

The modular bridges will replace the manually-¬launched Medium Girder Bridges (MGB) that are currently being used in the Indian Army. The indigenously designed and manufactured Modular bridges shall have many advantages over the MGB such as increased span, less time for construction and mechanical launching with retrieval capability.

The procurement of these bridges will give a major boost to the bridging capability of the Indian Army on the Western Front. The project will showcase India's progress in designing and developing world class military equipment and pave the way for enhancing defence exports to friendly countries.

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Caetano Spuldaro Neto
Vice President, Sales & Business Development
Middle East & Asia, Embraer Defense & Security

The military aviation sector in India is recording a steady growth over the last few years and there is huge potential for aerospace manufacturers. How important is the Indian market for Embraer?

As fellow BRICS members, there are strong ties that bind India and Brazil. India is a key market for us, and Embraer has much to offer in the diverse fields of Defence & Aerospace, Civil Aviation and Business Aviation as well as Space.

There is a sizeable fleet of Embraer's defence aircraft, commercial aviation aircraft, and business jets operating in India and we look forward to growing our presence in the local ecosystem. We look forward to being at Aero India 2023 and connecting further with the Indian Defence industry and deepening our presence in the local ecosystem.

Could you share with us more on your association with Indian defence forces? What are the Embraer products in use in India?

In India, Embraer supplied its ERJ 145 platforms for the Indian Air Force's AWACS project (NETRA Airborne Early Warning & Control System). NETRA continues to be successfully operated by the Indian Air Force (IAF) and have been deployed for key missions. Embraer Legacy 600 jets are also operated by the IAF and Border Security Force for the transportation of government officials and VIPs.

There were reports that Embraer has been offering the C-390 Millennium to reinforce the medium/ heavy transport capability of the Indian Air Force (IAF). What are the highlight features of the aircraft?

The C-390 Millennium 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 C-390 Millennium is a twin-engine aircraft powered by IAE V2500 engines and it carries more cargo (26 tonnes) compared to other medium sized military cargo aircraft and flies faster (470kts) and further on a standard crew duty day.

The C-390 can carry out a wide range of missions using the same platform, from air-to-air/ in-flight refuelling (AAR) for fixed and rotary wing aircraft (denominate KC-390 for this configuration), humanitarian missions, medical evacuation, firefighting, airborne troop and cargo transport, search and rescue, among others, with simple and rapid reconfiguration between the different configurations

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using conversion kits. The aircraft was designed to operate on semi-prepared or damaged runways as well as in hostile environments, ranging from hot and humid to cold dry conditions. The C-390 is certified to operate from airfields having an altitude of up to 14,000 ft which can support IAF's operations from India's Northern sectors.

The C-390 Millennium is a proven aircraft and has already accrued more than 7,500 flying hours to date in very short time after its 2019 entry into service with the Brazilian Air Force (FAB). Five KC-390s are being operated by the FAB and more deliveries are underway. Recent numbers from the Brazilian Air Force's KC-390 Millennium fleet have shown a mission completion rate of 99%, demonstrating outstanding productivity in its category. The C-390 has orders from Portugal and Hungary, two NATO member countries. The Netherlands, also a NATO country, has selected the C-390 Millennium in 2022 over other competitors after a detailed comparative analysis and research.

The aircraft is also gathering a lot of interest from other parts of the world including Asia. Embraer's C-390 offers a versatile force-multiplier, and we are confident of the benefits the KC-390 Millennium will bring to the Indian Air Force.

What are the latest updates of the company's business in defence sector?

Known worldwide for the engineering excellence, technology mastery, and industrial capabilities that consistently result in aircraft, systems and solutions that achieve or surpass the levels of performance, reliability, maintainability, and longevity, Embraer Defense & Security has products and solutions operating in more than 60 countries. Embraer offers to the market unbeatable cost-effective solutions complemented by a global network of services and support. We are, more than ever, committed to providing our customers the best of solutions that are customised to their needs.

In recent years, Embraer Defense & Security has grown its portfolio as we recognise that the nature of customers' needs is ever-changing and growing. Our solutions have expanded to the air, land, maritime, space and cyber segments. Embraer offers integrated solutions for Intelligence, Surveillance, Reconnaissance and Monitoring, embedded systems, remote sensing solutions, and other critical defence technologies.

We seek to widen our global footprint by introducing our products to new customers, as well as strengthening our existing relationships with current operators of our platforms. We are also keen to see our flagship C-390 Millennium join the fleet of more air forces around the world. We can't wait for it to fly across India's skies!

India is actively supporting indigenisation in aerospace sector and Embraer recently said talks for manufacturing aircraft in India were progressing well. What is your take on this?

Embraer clearly understands that indigenisation has always been a key element of India's defence policy – focusing on "Make in India" and Atmanirbhar Bharat (Self-Reliant India). Embraer can help India to become a critical supplier in the global supply chain through its substantial offerings in units such as Defence, Commercial Aviation, Aerospace, enabling it to attain a higher level of self-reliance and achieve global exporter status.

We see India not as a customer but as a promising business partner. Embraer has been working very closely with partners and customers in the Indian Defence market for a long time – from the entry of the Legacy 600 with the government to the Indian Air Force's AWACS project. Through this experience, we understand the Indian defence market's objectives and vision.

We are always keen to build Embraer's presence to establish win-win partnerships to boost India's defence indigenisation ambitions. ■

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IAI to Showcase Latest Defense Solutions at Aero India

Israel Aerospace Industries (IAI), Israel's leading aerospace and defense company, will showcase its advanced technologies, industry-leading air-defense systems and ground-combat solutions (in Booths # 5.1 & 5.2, Hall F) at Aero India 2023, India's largest defense exhibition.

Boaz Levy,
President & CEO, IAI

IAI Heron TP takes off

IAI is leading a strategic transformation to provide fast direct access to IAI's superior solutions in full support of India's Atmanirbhar Bharat vision of a self-reliant country. IAI will sign several Memorandums of Understanding (MoUs) and joint venture agreements during the exhibition as it deepens its ties with the local defense sector.

For the past 30 years, IAI has built close partnerships in India developing and providing various strategic platforms to India, among them air and missile defense systems, unmanned aerial systems (UAS), satellites, radars, training platforms, and others. IAI's state-of-the-art systems and technologies have been in operational use in India's three military arms and other government agencies. Additionally, IAI works closely with the Indian Armed Forces to develop and produce advanced technologies in the air, land, and naval arenas.

Boaz Levy, IAI President and CEO: "We are very excited to be back in India for Aero India, which brings together some of our leading partners in the defense sector. We have been working closely with the Indian defense industry for more than 30 years and we look forward to further collaboration following the exhibition. We look forward to meeting our friends and partners while exhibiting our cutting-edge technologies to the Indian, Asian and global markets during this distinguished exhibition."

IAI's MRSAM missile during the test

During the show, IAI will be showcasing a wide array of aerial systems, including its Medium Altitude Long Endurance (MALE) strategic Unmanned Aerial Systems (UAS) Heron TP. IAI's advanced tactical loitering-munitions are designed for both ground and naval units, the Mini Harpy and the Rotem. In addition, IAI will exhibit an advanced GEO Mini Communication Satellite, whose development is based on IAI›s long heritage and the Dror 1, Israel's National Communication Satellite- MCS. IAI's Rampage- supersonic, long-range accurate air-ground assault rocket for the annihilation of high-quality targets. The Scorpius G (ground) is a ground-based EW system designed to detect and disrupt ground- and airborne threats. Aerial Refueling Tanker for the supply of Aerial Refueling and strategic transport aircraft. IAI's HAROP will be on display in Adanis' booth and the LORA and MRSAM will be in display in the BEL booth.

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RAFAEL: Novel Solutions to Future Challenges

RAFAEL is making strides in the sphere of new space and satellite technologies, from micro/nano satellites amongst many space-based solutions for effectively dealing with contemporary defence and intelligence challenges, says Brig Gen. (Retd) Ariel Karo, Executive Vice President, Marketing and Business Development, Rafael Advanced Defense Systems Ltd, while highlighting their I-Derby Missiles, the SPYDER Air Defence System, the RecceLite Reconnaissance Pod, the SPIKE Missile Family, the SPICE Family of Air-to-Surface Missiles, the BNET Tactical Communications system, and advanced versions of both Litening and RecceLite pods to be showcased at Aero India 2023

Brig Gen. (Retd) Ariel Karo
Executive Vice President, Marketing and Business Development
Rafael Advanced Defense Systems Ltd

Defence ties have been a mainstay in the bilateral relationship between India and Israel. How does Rafael contribute to this?

RAFAEL leads the way for years in cooperation and partnerships in India, whether through the creation of daughter companies or through cooperation agreements with large numbers of private and public companies located in India.

RAFAEL has been active for years in India as part of a long-term effort to invest in the supply of advanced defense systems while abiding by acquisition regulations. We at RAFAEL are convinced that our wide efforts with local companies create many new opportunities for both local industry and customers while maintaining a principle of self-reliance.

What are the latest highlights of Rafael's association with the Indian Armed Forces and companies?

We are unable to disclose information regarding specific systems in use. That said, RAFAEL has a wide range of cutting-edge systems in use in India Armed Forces in all three military branches for over 30 years.

South Korea's military is now considering the purchase of Sky Spotter Israeli system that detects unmanned aerial vehicles (UAVs).

Could you share more details? How do you look at Asian market for your products?

SKY SPOTTER is a passive electro-optical early warning system with a high probability of detection and a very low false alarm rate, enhancing the capability of air defence radar detection systems. SKY SPOTTER provides supplementary aerial operational awareness and neutralizes legacy radar threats.

This system provides passive sensing, detection, tracking, and identification of aerial targets. SKY SPOTTER remains unaffected by classic radar challenges such as multipath, clutter, background, EW & CM, and low RCS-stealthy targets. Likewise, the system

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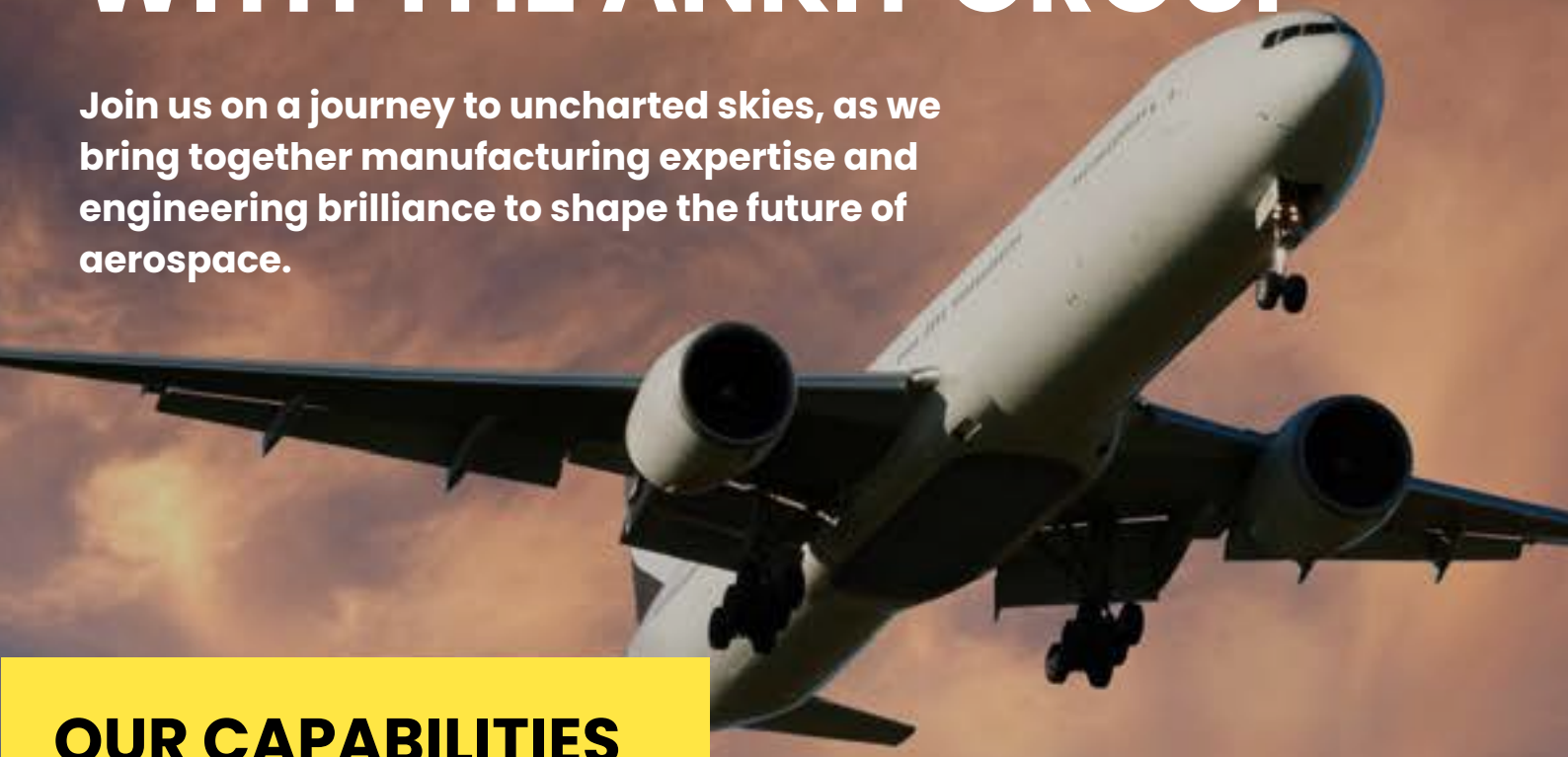

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tracks multiple targets simultaneously, providing 24/7 persistent surveillance. This is done by corroborating multiple sensors to achieve highly accurate azimuth, elevation, and range.

Rafael upgraded the Spyder system to counter tactical ballistic missiles. Could you elaborate on the system and its recent upgrade?

The introduction of this feature is the product of RAFAEL's Counter-TBM SPYDER program which involved researching and analysing the lessons learned from recent and ongoing armed conflicts involving extensive use of tactical ballistic missiles. The program has brought about a practical upgrade to the SPYDER system which is equipped for implementation. In response to urgent operational requests from a number of existing customers throughout the world, the program will extend the capabilities of the SPYDER's effectors as well as the implementation of various Counter-TBM derivatives across the system.

The SPYDER Air Defence System is the only Israeli-made air defence system that has been incorporated into the aerial defence array of NATO. SPYDER is a quick reaction, low-level surface-to-air missile system designed to counter attacks by aircraft, helicopters, UAVs, and precision-guided munitions. The system provides effective protection of valuable assets and first-class defence for forces located in the combat area. SPYDER's open architecture allows external components to be easily integrated and flexibly combined, affording different configurations with various ranges and capabilities based on customer needs and priorities. Its autonomous capabilities can detect threats while on the move and enables a 360° launch within seconds of the target being declared hostile, in all-weather, multi-launch, and net-centric capabilities. All the SPYDER systems have multiple target engagement capabilities for handling saturation attacks.

SPYDER systems incorporate the most advanced air-to-air-missiles with proven performance: Rafael's PYTHON-5 dual waveband IIR missile, I-DERBY active radar BVR, and the I-DERBY ER long-range missile, each of which can be used for air-to-air missions. The SPYDER-SR and SPYDER-ER variants provide 360° slant launching missile systems that provide quick reaction, lock-on-before-launch (LOBL), and lock-on-after launch (LOAL) capabilities while extending the range of defence to up to a 40 km radius. The SPYDER-MR and SPYDER-LR offer medium and long-range target interception through vertical launch while pushing the defence envelope up to an 80 km radius. The most recent variant, SPYDER All-in-One, incorporates an integrated radar, Toplite EO/IR sensor, and launcher onto a single platform to address a defence force's individualized, operational needs.

How successful has been KRAS, Rafael's JV with Kalyani Group, in achieving its missions? What are the latest updates on KRAS' operations?

RAFAEL is active in tens of countries, producing and exporting advanced systems and capabilities to various customers worldwide. We at RAFAEL believe that our work in the local market, through our partnerships and daughter companies, will bring additional opportunities for significant exports in the near future.

Geospatial Imagery Systems market is set to witness huge growth in the next decade. Being a top player in the sector, could you talk about your operations and products? What are the plans to tap the potential?

RAFAEL is making strides in the sphere of new space and satellite technologies, in our portfolio there are a few examples of this, from our micro/nano satellites amongst others. For example, RAFAEL's LiteSat which provided 24/7 tactical ISR from space. This is just one of RAFAEL's many space-based solutions for effectively dealing with contemporary defence and intelligence challenges. LiteSat delivers near real-time results with an outstanding imaging resolution of 30 cm. We at RAFAEL continue to push the envelope, creating novel solutions to future challenges.

Recent trials proved that Rafael's footprint system's navigation capabilities for GPS-denied environments. Could you talk more about the system?

FOOTPRINT is a navigation system designed for dismounted soldiers that enables highly accurate, fully reliable, and continuous real-time, self-positioning information in GPS-denied environments. The system can be integrated together with any existing communication system and includes an extremely efficient SWAP (Size Weight and Power) form factor that includes multiple types of measurement units which all feed data into the system algorithms. FOOTPRINT utilizes RAFAEL's algorithms and data fusion from multiple sensors, to provide an accurate 3D location for the soldier which allows for optimal situational awareness and orientation even in the most complex settings.

Could you share the highlights of Rafael's participation at Aero India 2023?

Systems showcased at the upcoming Aero India 2023 conference include I-Derby Missiles, the SPYDER Air Defence System, the RecceLite Reconnaissance Pod, the SPIKE Missile Family, the SPICE Family of Air-to-Surface Missiles, and the BNET Tactical Communications system. Likewise, advanced versions of both Litening and RecceLite pods will be presented together with RAFAEL's local partners.

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PBS Aims at Deeper Roots in Indian Aerospace Industry

PBS India has already achieved significant success in its efforts to become a respected partner to key companies in the Indian defence and aerospace industries. PBS recognises the growing role of India in the worldwide economy, and intends to strengthen its presence in India by expanding the business. Speaking to Aeromag, Ravi Hazarika, Chief Commercial Officer, PBS India, talks about the company's operations, highlights of its participation at Aero India and the future plans.

Ravi Hazarika, *PBS INDIA Sales Director with* ***Petr Motyl Hazarika,*** *PBS INDIA Director.*

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

The PBS Brand has a quite long history in India, it was registered in 1955. But it is only in recent years that business activity has really picked up thanks to the Indian company PBS India and important successes have been achieved. The business is steady growing and new partnerships are formed. PBS India is now an established company in the Indian aerospace and defence market. We work with many Indian defence companies and agencies, for example with DRDO, HAL, Deep Engineering, JSR Dynamics, and L&T Defence.

We regularly participate in major aerospace and defence exhibitions. Last year, it was DefExpo in Gandhinagar, this year is PBS India preparing to showcase its capabilities at Aero India that will be held in Bengaluru. And of course, PBS India, together with our partners at Deep Engineering Industries, is actively offering replacements of old APUs used in Mi-17 helicopters for technologically superior PBS APUs and providing MRO for Mi-17V5. PBS India aims to improve the combat readiness and service life of the MIL Mi-17 fleet operated by the Indian Air Force by supplying our APUs which proved to be more reliable in harsh weather conditions and provide a much better operating envelope.

What new products will you present at Aero India?

PBS TJ 200 turbojet

We will bring some of the most successful turbine engines from the PBS jet engine portfolio, but most importantly we would like to introduce the newest engine in the PBS portfolio, the PBS TJ200 turbojet. It is a brand new, clean sheet design turbojet engine, the most powerful one in the range of PBS jet engines. It is designed primarily as a propulsion unit for modern UAV and UCAV systems. It is a compact engine of a simple design, fuel lubricated, equipped with BLDC starter-generator, electric metering fuel pump and electronic control system of FADEC type.

TJ200 will represent the most powerful propulsion unit from the PBS turbojet engine family. Another new engine in the range is a PBS TJ150 engine variant equipped with pyro ignition, designed primarily for missiles and other applications requiring air start. There's always something going on in the engine development department at PBS.

What's new in APUs?

We would like to showcase our ability to offer our partners a mutually interoperable APU and ECS, especially for medium helicopters. However, we are also able to offer these technologies, for example, to manufacturers of heavy UAVs. There are many PBS products well-suited for Indian aircraft, helicopter and UAV programmes. If we look at some individual HAL products, for example the HJT-36 jet

trainer, it is quite similar to the successful Aero Vodochody L-39, for which PBS Group has designed and supplied a turbine starter, environmental control system, and various valves and filters. Our advantage is that we can rely on the development base of our parent company PBS, which has been a leading manufacturer of products and equipment for the international aerospace industry for almost 50 years. The ability to carry out in-house development, manufacture and testing of aircraft products in accordance with global aerospace standards is well known.

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

It is simple, PBS India shares the know-how and capacities of the whole PBS Group, which boasts a 200 years history and 50-year experience in design, manufacturing, and testing aircraft turbine systems. Therefore, any requirements of the Indian Government or the Indian MoD would be backed up by the whole group. This would inevitably result in independence on foreign companies and an increase in speed when it comes to the development of crucial systems for various types of civil or military aircraft, which I believe would prove quite beneficial. We are ready and willing to support the Indian aerospace industry.

What do you see for the future of PBS India?

PBS recognises the growing role of India in the worldwide economy, as well as the fact that it will very soon become the most populated country on our planet. So PBS India definitely intends to strengthen its presence and plans to expand the business in the country. We would like to build a bigger presence in our "Indian home town" Bengaluru and grow our business in India. That will create more jobs and increase our sourcing demands for locally produced materials, services and work force as more production, service, and after-sales support capacities will be allocated in India. And of course, we are interested in working with young talent from this beautiful country. PBS India is growing and we are happy to be a reliable partner for Indian defence industry. ■

PBS TJ150

Prime Minister Hails HAL's Tumakuru Factory, Unveils Light Utility Helicopter

Prime Minister Narendra Modi dedicating to the nation, Hindustan Aeronautics Limited Helicopter Factory at Tumakuru in Karnataka in the presence of Defence Minister Rajnath Singh, Karnataka Chief Minister Basavaraj Bommai.

Prime Minister Narendra Modi dedicated HAL's New Helicopter Factory to the nation at a function at Gubbi, Tumakuru, in Karnataka. He hailed HAL's efforts in strengthening 'Aatmanirbharta' in the defence sector by building India's largest helicopter factory. From drone manufacturing to building Tejas fighter, naval carrier and transport aircraft, India is now producing everything indigenously, he said.

HAL is manufacturing Tejas for the Indian Defence Forces and is the centre of global attraction. The factory will produce hundreds of helicopters and generate business to the tune of rupees four lakh crores besides generating direct and indirect employment boosting the regional economy, he added. The PM said that after laying the foundation stone in 2016, it was a momentous occasion to see the factory operational today. He unveiled a Light Utility Helicopter (LUH) produced by HAL.

Defence Minister Rajnath Singh congratulated HAL and said that the inauguration of the Tumakuru factory is a big milestone in India's journey towards 'Aatmanirbharta'. The Tumakuru factory will boost India's defence services.

Chief Minister Basavaraj Bommai said HAL is one of the leading companies and is the pride of Karnataka. He welcomed its presence in Tumakuru.

The Tumakuru factory will become a one-stop solution for all helicopter requirements of the country. With the establishment of facilities like Heli-Runway, Flight Hangar, Final Assembly Hangar, Structure Assembly Hangar, Air Traffic Control (ATC) and various supporting service facilities, the factory is fully operational. This factory is being equipped with state-of-the-art Industry 4.0 standard tools and techniques for its operations.

The Light Utility Helicopter (LUH), initially being built in this factory is an indigenously designed and developed 3-ton class, single engine multipurpose utility helicopter with unique feature of high manoeuvrability. Initially, this factory will produce around 30 helicopters per year, and it can be enhanced to 60 and then 90 helicopters per year in a phased manner.

The factory will also produce Indian Multi Role Helicopter (IMRH) and undertake Maintenance Repair & Overhaul (MRO) of helicopters in the future. ■

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Lockheed Martin to Showcase Advanced Systems at Aero India

Lockheed Martin will showcase its vast range of advanced defence capabilities and solutions at Aero India. The company's exhibit will showcase its most innovative capabilities on offer to the Indian Armed Forces including the F-21 fighter aircraft, C-130J transport aircraft, MH-60R "Romeo" multi-mission helicopter, JAVELIN Weapon System, and S-92 multi-role helicopter among others.

William Blair
Vice President & Chief Executive, Lockheed Martin India

"We are excited to participate at Aero India 2023 to showcase our advanced capabilities and address our customers' biggest challenges for the 21st Century. Our participation will be focused on engaging with our customers while creating opportunities for the local industry to feed into the global supply chain and manufacture in India, for India and for the world," said William (Bill) Blair, chief executive, Lockheed Martin India Private Limited. "We continue to strengthen and grow our presence and partnerships in India for strategic security and greater self-reliance in the defence sector. We have a high degree of confidence in the manufacturing and technical capabilities of the Indian industry which is reflected through our two joint ventures and multiple associations with public and private companies of all sizes including MSMEs."

The prime attraction at the Lockheed Martin booth will be the F-21 fighter aircraft cockpit demonstrator that will be available for defence and aerospace customers and partners to "fly" the jet for themselves, experiencing its unmatched performance. The F-21 fighter aircraft, which is on offer to the Indian Air Force (IAF) for the Multi-Role Fighter Aircraft competition, is configured with the latest sensors and mission avionic systems that couple onboard and off-board data information into an effective, easy to manage combat situation display.

The Indian Navy's most recent rotary wing acquisition, MH-60R "Romeo" SEAHAWK® helicopter, will occupy a prominent place at Lockheed Martin's Aero India display. The MH-60R is the most capable and mature Anti-Submarine (ASW)/Anti-Surface Warfare (ASuW) multi-mission helicopter available in the world today. The first three MH-60R helicopters were delivered to India in 2021 and are being utilized to train Indian pilots and crew members in the U.S. In July/August 2022, the Indian Navy accepted the delivery of another three helicopters at Kochi International Airport and they will be initially based at Naval Air Station INS Garuda in Kochi. A total of 24 MH-60Rs will be delivered in country over the next few years.

The world's most versatile one-man portable and platform-employed anti-tank precision weapon system, JAVELIN also will be part of Lockheed Martin's exhibit at Aero India. Using "fire-and-forget" technology, the weapon guides itself to the target, allowing soldiers and platform assets to reposition out of harm's way once the missile is fired.

Boosting Lockheed Martin's presence at the show will be the C-130J Super Hercules aircraft and the S-92® multi-role helicopter, both of which represent a strong legacy of partnership with the Indian defence industry.

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BOEING for Deeper Bond

Salil Gupte, President, Boeing India, while recounting their deep commitment to supporting the growth potential in India's aerospace and defence sector, tells us more about how Boeing Defence India is leading their investments in services infrastructure, building of local capabilities, workforce training and partnerships, aimed at ensuring the Indian armed forces are always mission-ready, and operate their assets at peak condition.

Salil Gupte
President, Boeing India

Boeing has been a major partner of India's aerospace sector for almost eight decades as the mainstay of the country's armed forces. How strong is Boeing's operations in Indian defence sector?

Boeing's commitment to India is deep and far-reaching, far ahead of any foreign OEM in the defence and aerospace sector. Our vision has always been to bring the best of Boeing to India and take the best of India to the world. Boeing has always been committed to supporting the considerable growth potential in India's aerospace and defence sector including for aircraft, infrastructure expansion, and services. Today, India operates 11 C-17s, 22 AH-64 Apaches (with six more on order), 15 CH-47 Chinooks, 12 P-8Is, 3 VVIP aircraft and two Head of State aircraft, all Boeing platforms. We regularly engage in discussions about the value our portfolio can deliver to develop capabilities they require for the execution of their missions.

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

Furthermore, in 2021, we launched the Boeing India Repair Development and Sustainment (BIRDS) Hub. It is an initiative to bring together

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ecosystem partners to shape India as a strategic destination for aerospace engineering, maintenance, repair and sustainment services. This is a one-of-its-kind initiative that seeks to provide customers with best-in-class solutions, efficient turnaround times, and optimal economic value, all available in-country. Partnership is Boeing's key to success and we believe it makes more sense to partner with local Maintenance, Repair, and Overhaul (MROs) that are already established and have great capabilities. Through such partnerships, Boeing is working with customers and local industry to develop MRO facilities in the region, to support India's aspiration to become an MRO hub for the region.

Indian civil aviation sector is on the path of growth to be among the largest civil aviation markets in the world. How does Boeing intend to tap the potential in Indian market?

India's aviation market is growing at 7% and we need some 2,200 airplanes over the next 20 years. In India, single-aisle airplanes such as the 737 family will continue to serve growth in domestic as well as regional markets, such as short-haul flights from India to the Middle East and Asia Pacific regions. Airplanes like the 737 MAX family will provide immediate solutions to combat growing fuel costs with up to 20% lower fuel consumption and emissions than the previous generation aircraft. The 737 MAX family including the 737-7, 737-8, 737-9 and 737-10, provides sustainable versatility, low costs, high performance, capacity and efficiency, and is the largest family of aircraft that can address an airline's requirement for a diversified short- to long-haul fleet. They offer a winning low-cost combination to airlines. With more than 5,200 orders, the 737 MAX is the fastest-selling airplane in Boeing's history. The 737 MAX family is designed to offer the greatest flexibility, reliability and efficiency in the single-aisle market.

Having the right widebody airplanes with the highest performance capability, cost efficiency and sustainability footprint will enable India's widebody market to grow from about 50 airplanes today to 240 airplanes by 2040 (as per Boeing CMO 2022 forecast). The 787 Dreamliner is the only complete widebody family enabling airlines to open new routes and expand their network and have maximum payload with unmatched efficiency. The 787-10 has the lowest unit costs in this market segment to capture additional demand with minimal incremental cost. The 787-8, in service with Air India, has proved to be an excellent mid-sized aircraft with the lowest trip cost of any widebody airplane. The 787 Family (-8/-9/-10) offers India airline customers with capability, flexibility and profitability to grow in international markets.

The 777-9 will provide the highest capacity of any large widebody airplane with the lowest unit costs and the lowest emissions per seat in large markets such as India-Europe/U.S./Canada where demand in large markets is expected to continue to grow 6% or higher per year. The 777-9 will replace the 777-300ER with 20% better fuel economics per seat than the current 777-300ER. ■

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CSIR-National Aerospace Laboratories– Propelling Indian Aerospace Industry

National Aerospace Laboratories (CSIR-NAL) is India's premier R&D establishment with the mandate for the development of Civil Aircraft and Aerospace Technologies. CSIR-NAL is a constituent of the Council of Scientific & Industrial Research (CSIR) under the aegis of the Ministry of Science & Technology. Currently, the laboratory has taken up major aircraft programmes like two-seater flying trainer (Hansa-NG) and Multi-Role Light Transport Aircraft (19 seat SARAS-Mk II) to enhance the air connectivity under Govt. of India's UDAN scheme. The aircraft programs aim to meet the country's civil aviation requirements and to synergize the multidisciplinary expertise of the laboratory meeting the objectives of Atmanirbhar Bharat.

Dr. Abhay A Pashilkar, Outstanding Scientist is currently the Director, CSIR-National Aerospace Laboratories, Bengaluru, India. In an interview with AeroMag Asia, Dr.Pashilkar speaks about CSIR-NAL aircraft development programmes. Excerpts from the interview:

Dr Abhay A Pashilkar
Director, NAL

Being the only government aerospace research and development laboratory in the country's civilian sector, how has NAL provided significant value added inputs to all the Indian national aerospace programmes? What are the major achievements?

Currently, the laboratory has taken up major civil aircraft programmes like indigenous two-seater flying trainer (Hansa-NG) and Multi-Role Light Transport Aircraft (19 seat SARAS-Mk II) to enhance the air connectivity under Govt. of India's UDAN scheme. It is also leading the Project Definition Phase of the Regional Transport Aircraft (RTA) for preparation of the Detailed Project Report (DPR). The aircraft programmes aim to meet the country's civil aviation requirements and to synergise the multidisciplinary expertise of the laboratory meeting the objectives of Atmanirbhar Bharat. NAL has also taken up the development of High Altitude Platforms (HAP) for applications like broadband communication, surveillance, earth observation, climate research etc.

CSIR - NAL has been involved in all the major strategic aerospace programmes in the country, notably the Light Combat Aircraft (Tejas) of Aeronautical Development Agency (ADA). The major technologies provided for the success of

the LCA-Tejas include: Fly-by-wire control system, Fresnel lens optical landing system for LCA navy, and Composite structures. The laboratory has also contributed to the Satellite and Launch Vehicle Programs of Indian Space Research Organisation (ISRO), and the Missile Programs of Defence Research and Development Organisation (DRDO).

CSIR-NAL significant contributions both in civilian and strategic sectors have resulted in the development of new technologies and systems which are also interest to industries. To mention few key technologies and systems developed / being developed that are of interest to industries include: UAVs for agriculture & health applications, Carbon fibre airframe components using innovative and cost effective fabrication technologies, Flight Control system for fighter aircraft, Wankel engine for UAVs, radomes for airborne and weather applications, indigenous autoclaves for composite manufacture, Electronic Target System for the marksmanship training for locating bullet hits on targets for the strategic sector, DRISHTI- an airport runway visibility assessor systems, AWMS- Airport Weather Monitoring System, Multi-Zone hot Bonder for composite repair, ARINC 818 IP core for high speed avionics solutions, Chromate free anodizing process for aerospace aluminium alloys,

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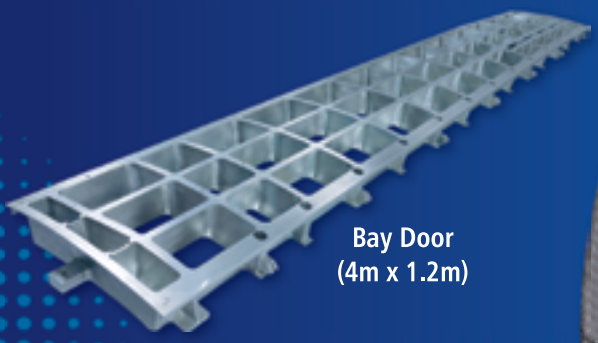

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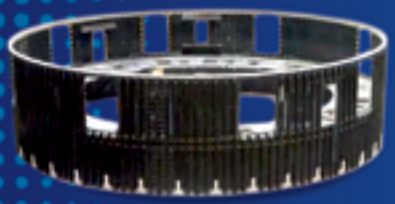

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NAL FOQA flight data analysis system, etc.

What are the latest updates on indigenous flying trainer aircraft Hansa New Generation (Hansa-NG)?

HANSA-NG is one of the most advanced flying trainer powered by Rotax Digital Control Engine with unique features like Just-In-Time Prepreg (JIPREG) Composite lightweight Airframe, Glass Cockpit, Bubble Canopy with wide panoramic view, electrically operated flaps, etc. HANSA-NG is designed to meet the Indian flying club needs and it is an ideal aircraft for Commercial Pilot Licensing (CPL) due to its low cost and low fuel consumption. We have already received more than 80 nos. of LoIs (Letter of Intents) from various flying clubs.

Hansa-NG aircraft had a successful maiden flight on 3rd September 2021. The aircraft has completed 58 flights including sea-level trials at Puducherry; over 70 hours of flying is completed. Flight testing towards DAY & NIGHT VFR certification is completed. The aircraft is expected to get the Type Certification by DGCA during Aero India 2023.

We will be showcasing the HANSA-NG with a fully loaded cockpit with comfort hosiery, Bubble canopy with wide panoramic view, digital glass cockpit demo at Aero India 2023 so that the flying club instructors/owners can get a feel of the aircraft and we are looking forward to the conversion of existing LoI into firm orders. CSIR-NAL has issued RFP to establish the production partnership model with industries to provide end-to-end solutions to our launch customers like sales, leasing and support after sales. In this event, we will also look for firms who are keen to partner with CSIR-NAL for not only taking up production, but also after sales support. CSIR-NAL has signed MoU with IGRUA to be the launch customer for the Hansa-NG aircraft.

NAL has now come up with an upgraded version of the airboat Jaldost Mk-II. Could you talk more about it?

JALDOST is an Aerospace technology based spin-off societal product for cleaning water bodies. Our laboratory has developed and demonstrated JALDOST, an airboat based weed clearing system for lakes and water bodies to BBMP officials at Ulsoor Lake, Bangalore in association with industry partner M/s SVES. After witnessing the demonstration, BBMP lake authority officials have advised CSIR-NAL for a newer version of JALDOST Mark-II with higher engine power, automatic weed collection and dumping facility with increased overall dimensions to cater for more efficiency and effectiveness.

The Mark-II has now been successfully designed and built with mechanised system to pick up the floating trash as well as rooted aquatic weeds and excess vegetation. It is capable to move on lower depth even in shallow waters and enabled to transfer the collected wastes directly to ground vehicle. Closed pontoon type stainless steel hull makes it inherently unsinkable. The JALDOST Mk-II has got on board trash storage capacity by volume 14m3 (by weight up to 4 tonnes), collection width 7 feet, and cutting depth up to 3 feet below water. The system is having the capacity to clean the water area of approximately 1 acre in 8 hrs (5400 sqft per hour) depending on the type of vegetation. CSIR-NAL is in talks with BBMP Lakes Authority for deployment and successful commercialisation through industry partner.

What are the highlights of the NAL's participation at Aero India 2023?

NAL currently has taken major steps in technology innovations like intermediate modulus grade carbon fibre, carbon prepreg, special coatings for aerospace applications, Cf-SIC composites, Just-In-time-Pre-preg, thermoplastic composites, ARINC 818 IP core and all electric hybrid VTOL with fixed wing cruise UAV 'NAL QPlane' It has a wing span of 4m, MTOW 35 kg with 5 kg payload. It is being designed to have an endurance of 120 min, range 30 km and ceiling altitude of 5000 m (ASL). A protoype of the UAV will be displayed in the Aero India 2023.

The laboratory is showcasing the indigenous technologies like Display of indigenous Trainer aircraft Hansa NG, Mock-up (with advanced interior ergonomics & cockpit) of Regional Transport Aircraft (RTA) for commuter regional connectivity, and other key technologies like Octocopter drones, Carbon Fibers & Prepreg, Wankel Engine, Composite structures for aircraft, Stealth technologies, etc., in Aero India 2023, and will attract business propositions from industry and appreciations of indigenous development by public visitors for furthering the government initiative of Atmanirbhar Bharat.

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Schiebel India presents its unrivalled CAMCOPTER® S-100 at Aero India

The main differentiator compared to Schiebel India competitors, is that it is a mature and proven capability - being deployed by several maritime customers all over the world, the S-100 has tens of thousands of embarked maritime flight hours under its belt, with several thousand deck landings in demanding environmental conditions.

Jajati Mohanty
CEO, Schiebel India

The CAMCOPTER® S-100 is the only tactical VTOL UAS in its class with extensive operational experience. It is in use with a number of Navies and Armies on five continents on land and at sea, as well as with international agencies, such as the European Maritime Safety Agency (EMSA). The S-100 was deployed for Coastguards and other governmental institutions for ISR requirements on behalf of EMSA in the following countries: Croatia, Finland, Denmark, France, Romania, Estonia, Sweden and Spain. In 2022, the S-100 was further operated for maritime surveillance in Skagen (Denmark), Mangalia (Romania), as well as on the Icelandic patrol vessels ICGV Thor and ICGV Freyja. The UAS was responsible for fisheries inspection, ship, port and environmental protection, as well as supporting Search and Rescue (SAR) operations.

The S-100 can be operated with either aviation gasoline or kerosene, making it ideally suited for the maritime environment. Its small footprint and the absence of launch or recovery equipment lets the S-100 be easily maneuvered, stowed and maintained in confined spaces or in ships' hangars. Extensive use of carbon fibre composite materials, titanium, stainless steel and special coatings protect the system against corrosion. Operation is possible from any ship with a small helicopter landing deck or suitable clear space, even in challenging weather.

The S-100 can also successfully operate in environments where GPS is not available (or denied), with missions planned and controlled using a simple point-and-click user interface. Its carbon fibre and titanium fuselage provide capacity for a wide range of payload/endurance combinations up to a service ceiling of 5,500 m / 12,000 ft. The high-tech unmanned helicopter is supported by Schiebel's excellent customer and training services.

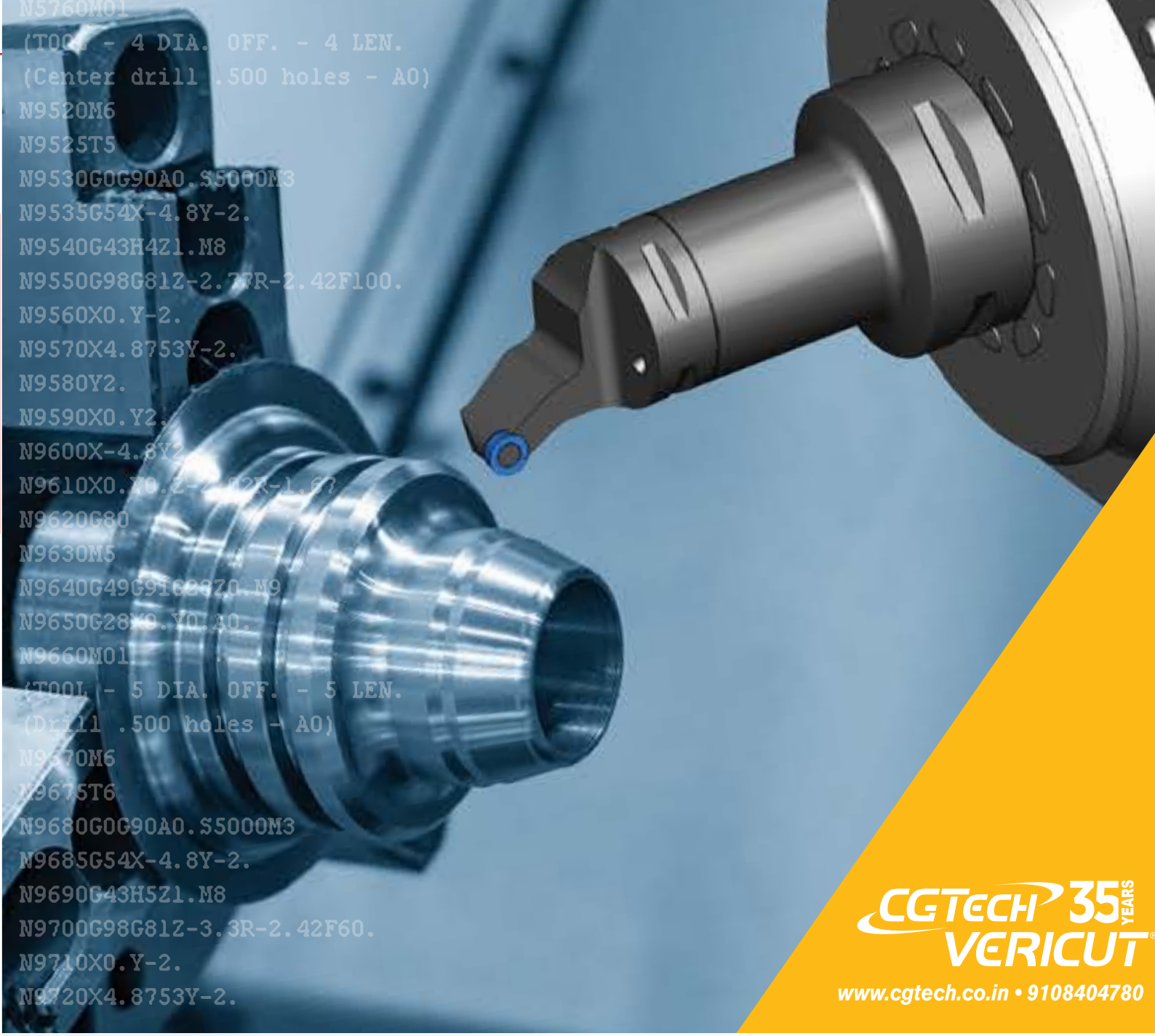
The Indian Navy has been on the lookout for tactical UAS for quite some time and has been monitoring the options available in the global market from catapult launch and hybrid VTOL to pure rotary VTOL solutions. The Navy has firmed up its requirements and has shared the same with potential bidders for procurement programmes like NSUAS (Naval Shipborne Unmanned Aerial Systems). The Make in India mandate will further ensure the setting up of required infrastructure by Indian companies to meet the tactical UAV requirements for the Navy and other defence forces.

India has more than 7000 km of coastline dotted with various oil and gas platforms and other seaborne assets. Globally both the military and civil domain has accepted and is using unmanned systems extensively for ISR by various Coastguards and Logistics/ SAR by the oil and gas industry. Schiebel is looking at upstream tactical logistics for the oil and gas industry along with mid-stream pipeline monitoring. We are in discussion with various organisations towards these requirements and expecting that it will result in more footprints in the Indian market.

India in addition has some difficult high altitude terrains which is specific and inherent to the Indian sub-continent and not seen anywhere else. The S-100 with its heavy fuel engine is a very suitable and robust logistic solution for the last mile connectivity of Indian Army. The permutation and combination of the various payloads available for the S-100 can be a game changer for the Indian Army in terms of its capability of sustained ISR in terms of endurance and tactical airlift for meeting urgent and immediate logistic requirements.

The most important factor, when operating UAS is that no human life is in danger, compared to flying with a manned helicopter, which is only one reason why the interest keeps growing.

The S-100 offers a wide range of capabilities to its customers. The flexible set-up of multiple payloads with a combined weight of up to 50 kg enables the S-100 to perform multiple missions. Capabilities on land and at sea include maritime surveillance, search and rescue, emission monitoring, accident and disaster assistance, border security, environmental change detection, convoy protection,



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Schiebel has set up an office in India and partnered with VEM Technologies for the local production of the CAMCOPTER® S-100. This partnership will manufacture the CAMCOPTER® S-100 along with its payload under the Buy (India) category with up to 60% indigenisation content. The endeavor would be to create necessary skills for integration and testing in India such that a robust eco-system is created which can sustain the platform for 15 years and above based on the technology obsolescence.

India has a very unique mountainous terrain which needs specialised solutions. The S-100 provides a very suitable and apt answer to the vagaries of nature in the Himalayan region. This includes handling of heavy cross-winds in high altitudes and operations in subs-zero conditions when most of the standard battery operated solutions fail. The S-100 has been actively operating in the Arctic Circle and hence is well capable of handling the extreme cold. The Indian Army has also started looking into engine based solutions for tactical UAS and this is the space where S-100 excels. The CAMCOPTER® S-100 has been successfully utilised and operated in mountainous regions around the world and is easily capable of handling flight operations at 8000 ft. In order to meet the additional heights at Leh & Ladakh our next model namely S-300 presently under design & testing will be available.

Given the S-100 is a mature platform with a running serial production and a wide customer base, Schiebel invests a large part of its Research and Development budget into the extension of its already very large portfolio of payloads. Most recently, at the annual NATO exercises "REPMUS 2022" and "Dynamic Messenger 2022" in Portugal, the CAMCOPTER® S-100 demonstrated three of its capabilities namely:-

- **Anti-Submarine Warfare**
- **ISR & SAR**
- **Logistic delivery (Medical)**

The world premiere was the Anti-Submarine Warfare (ASW) suite: the S-100 was equipped with the Thales BlueScan sonar data processing system in the main payload bay and with a Wescam MX-8 EO/IR sensor (the same as on PGZ-19R Orlik fixed wing UAV) in the secondary one. The demonstrated scenario was the surveillance and protection of approaches to a strategic port. With a barrier of sonobuoys already laid, the S-100 was deployed to monitor data from the sonobuoys and relayed it to a command post ashore, permitting the detection and classification of possible enemy submarines.

After a quick reconfiguration to the typical ISR suite with Overwatch Imaging PT-8 Oceanwatch and Wescam MX-10 camera-based sensors, the S-100 also demonstrated the ability to automatically detect and identify small objects on shore and at sea in various sea states, as part of ISR and SAR missions or supporting amphibious operations.

The CAMCOPTER® S-100 thereafter also delivered medical supplies from the port to a ship nearby, using its underslung cargo delivery net.

At REPMUS 2023, already in preparation, Schiebel intends to present another set of innovative configurations, further developing the platform's multi-mission capabilities.

In terms of anti-jamming, the experience with the OSCE Special Monitoring Mission in Ukraine between 2014 and 2022, led Schiebel to implement techniques and procedures in order to keep the systems operational in spite of powerful jammers used by the Russian Army. The monitoring missions provided many opportunities for the anti-jamming system to be utilised, tuned, upgraded and modified in the process of creating a very robust and strong system capable of handling anti-jamming situations.

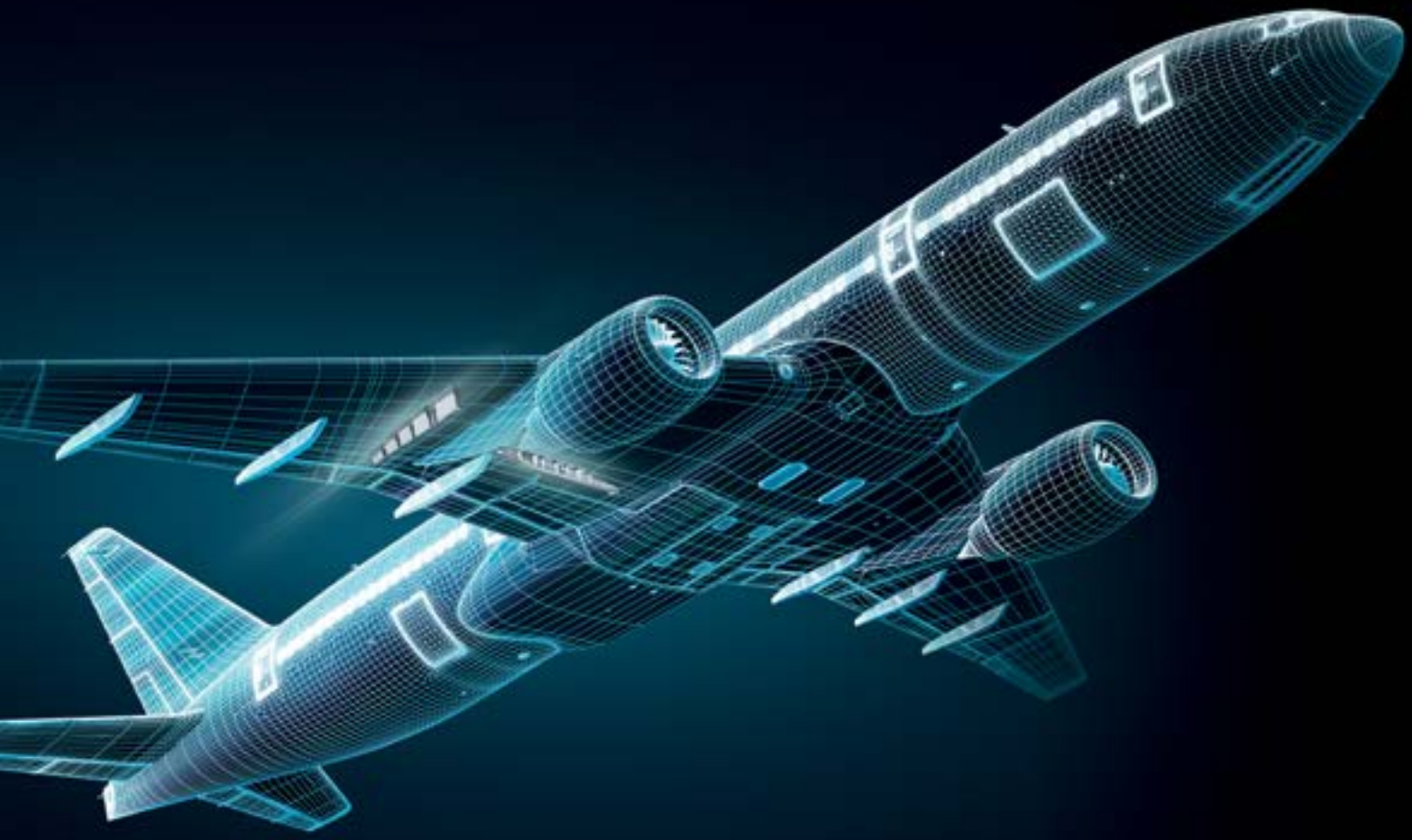
Just recently the S-100 was operated by the Royal Thai Navy extensively as the "eye in the sky" for supporting the Search and Rescue (SAR) efforts after the capsizing of the HTMS Sukhothai in the Gulf of Thailand. Another client which uses the S-100 successfully for search and rescue is the UK Coastguard, where it compliments manned helicopters, providing not only a reliable "eye in the sky" but also making popular the Manned Unmanned Teaming concept.

Equipped with a wide-area search camera or a radar, the S-100 as a mission-proven asset increases the versatility and effectiveness of its search capability. These accurate automated functions can significantly reduce search times, while the radar guarantees all-weather surveillance. Once the S-100 has detected and identified the target, such as a lifeboat or man overboard, it can dispatch life vests or other life-saving equipment. Simultaneously, the S-100 passes the coordinates on to the manned helicopter, which then initiates rescue. SAR perfectly demonstrates the interoperability between manned and unmanned assets.

The CAMCOPTER® S-300 UAS - the bigger brother of the S-100 – was presented for the first time at Euronaval in Paris, in October 2022. The S-200 is 4.8 meters long, 1.9 meter high and 0.9 meter wide. It can fly at a maximum speed of 220 km/h (cruising speed 100 km/h). The S-300 is able to carry up to 340 kg (fuel including) and its maximum take-off weight can reach 660 kg. It can fly up to 24 hours with a 50 kg payload (or 4 hours with 250 kg).

The ground component, including the control system for the S-300, will be the same as for the S-100 version. This in turn means, that by using a single control system, it will be possible to select the S-100 or S-300 platform according to the needs and tasks to be carried out. Ships or other platforms adapted for operation with the S-100 will be ready for immediate interoperability with the S-300 version, without any additional work on the communication and control systems. ■

Can we stop lighter planes being a weighty issue.



The number of passenger aircraft is set to double to more than 40,000 by 2030. Twenty-first-century long-haul aircraft have a take-off weight of up to 500 tonnes. The task of lifting these goliaths into the air economically is about more than keeping the weight of materials and components down – our future needs require stepping up process reliability and quality when machining them too. This is presenting suppliers to the aviation and aerospace industries with a huge challenge. Having a tool partner that keeps costs firmly on the ground is therefore crucial.

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MBDA showcases latest missiles during Aero India

MBDA, longstanding partner to the Indian Air Force, is showcasing the newest missiles in Indian service during Aero India 2023, as well as the systems that could help equip all branches of the Indian Armed Forces in the future.

MBDA and L&T MBDA Missile Systems Ltd - Hall B, Stand B3.1

At the centrepiece of the company's presence in Aero India, are the weapon systems that arm the IAF's Dassault Rafale aircraft. These highly potent set of weapons from MBDA give the IAF an air combat capability. The Meteor beyond visual range air-to-air missile, which is widely recognised as a game changer for air combat. The Meteor is powered by a unique rocket-ramjet motor that gives Meteor far more engine power, for much longer than any other missile. This means it can fly faster, fly longer, and manoeuvre more than any other missile – giving Meteor the ability to chase down and destroy agile hostile fighters at even the furthers of ranges. As a result, Meteor has a no-escape zone many times greater than any other air-to-air missile.

India's Rafales are also be equipped with the SCALP deep-strike cruise missile from MBDA to strike hardened and protected targets deep inside hostile territory. The IAF's Rafales are also be equipped with MICA, a potent air combat missile the Indian Air Force knows very well as it is also part of the upgrade package for the IAF's Mirage 2000 aircraft. MBDA is a longstanding industrial collaborator for India, with MICA being a prime example - L&T MBDA Missile Systems Ltd, MBDA's joint venture with Larsen & Toubro, is showcasing the work it performs in Coimbatore on MICA missiles and MICA missile launchers – delivering Make in India projects in support of Atmanirbhar Bharat.

MBDA is also proposing all these potent weapons, as well as the famous Exocet AM39 air launched anti-ship missile for the Rafale M for the new Indian aircraft carrier.

MBDA is not new to partnership with the Indian Armed Forces and Indian industry, indeed it has been delivering battle-winning capabilities to the Indian Air Force and collaborating with Indian industry for over 50 years. Throughout this history, there have been two guiding principles: to provide the very best technologies to the Indian Air Force, and to work in true partnership in support of the Indian Defence Industry. The company then is fully committed to the 'Make in India' programme, which aligns with MBDA's long-term strategy.

Other examples of technological edge equipping the Indian Air Force include the ASRAAM within visual range (or dogfighting) missiles. ASRAAM is providing the IAF's Jaguar fleet with a step-change in air combat performance – a capability that will soon also enhance the IAF's new Tejas LCA Mk1A. With its large rocket motor and clean aerodynamic design, ASRAAM has unrivalled speed and resultant aerodynamic manoeuvrability and range. ASRAAM gives it a high kinematic capability that delivers superior end-game performance for within visual range air combat. MBDA also has agreements in place with Bharat Dynamics Limited for ASRAAM to be assembled in India to support Make in India.

The Mistral ATAM system has been successfully integrated on the Advanced Light Helicopter (ALH) and final integration is being done on the Light Combat Helicopter (LCH). Utilisation of the Mistral missile on India's helicopter platforms also provides a bridge to their use in a ground based VSHORAD role, where the missile is fully compliant with India's requirements and outperforms the capabilities of its rivals. Again, MBDA and BDL have signed an agreement for the establishment of an assembly line for Mistral missiles in India.

MBDA has an excellent track record providing both operational and industrial capabilities in partnership with the Indian Air Force and Indian Defence Industry. The strength of these two pillars makes it a long-term true partnership, and one that should only continue to get stronger. ■

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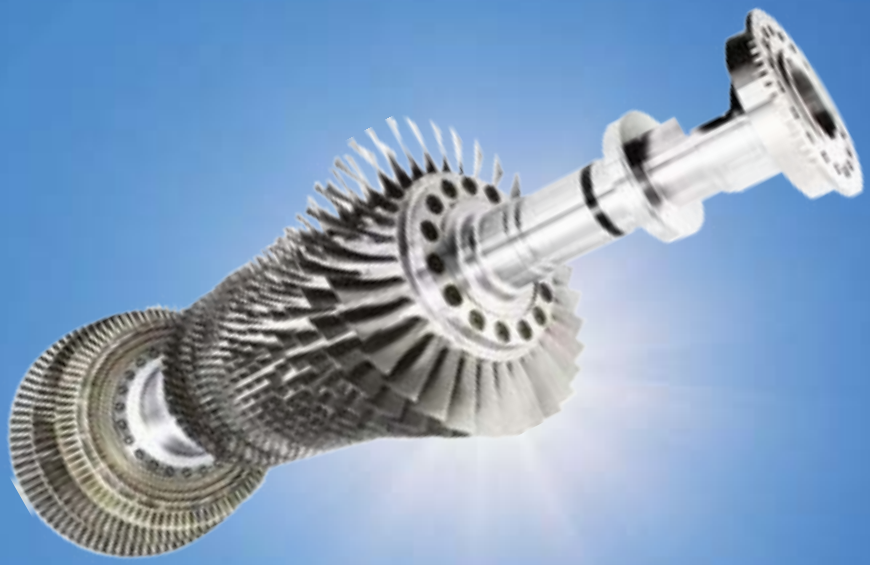

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Rosoboronexport Showcases its Might at Aero India


Mi-171Sh

Rosoboronexport JSC, a subsidiary of Rostec State Corporation will exhibit the state-of-art aircraft, helicopters, and modern aerial weapons at Aero India 2023. All major Russian Air, Land and Naval systems were on display at the show.

Rosoboronexport is Russia's only state-controlled intermediary in the area of exports and imports of the entire range of military and double-purpose products, technologies and services. The company is actively involved in pursuing national policy of the Russian Federation in the area of military technical cooperation with foreign countries.

Rosoboronexport has added new Russian military products to its export catalog, expanding the range of weapons and military equipment promoted on the global market.

At the exhibition, Rosoboronexport will showcase Su-57E multirole fighter, The Ka-226T light multipurpose helicopter, Ka-52 Combat Scout Attack Helicopter, Mi-171Sh military transport helicopter, Mi-28E Combat Helicopter, and Tor-M2E Air Defence Missile Systems.

Su-57E

Su-57E is a 5th generation fighter that provides covertness of combat operation due to low signature level in the radar field, ensures continued supersonic cruise flight, and solves the whole range of fighter and strike tasks that are assigned on tactical aviation.

It is designed for execution of a wide range of combat tasks while operating against aerial, ground and surface targets day-and-night with the use of the up-to-date progressive guided and unguided weaponry.

The fighter is equipped with the most advanced avionics suite, armament and self-defense complexes. Advanced intelligent support of the fighter and a high level of automation ensures effective piloting of the aircraft and execution of the whole range of combat tasks with one pilot.


Su-57E

Ka-226T

The Ka-226T day/night light multipurpose helicopter is capable to conduct aerial reconnaissance and targeting, patrol, drop small reconnaissance and sabotage groups, transport cargo and passengers, and evacuate the wounded. The baseline helicopter can accommodate a variety of modules with special equipment. The helicopter can be converted into patrol, search & rescue, medical, transport/freight, passenger, and corporate.

The Ka-226T's airborne equipment provides safe flight control both along air routes and in off-the-airway regulated and unregulated airspace, day and night, and in adverse weather

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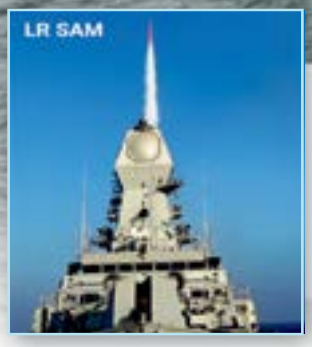

- BEL is the lead integrator of LR SAM Systems
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- The system is capable of simultaneously tracking multiple seaborne targets

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Azadi Ka Amrit Mahotsav

KA-52

conditions. Lighting equipment of the Ka-226T's cockpit enables the pilot to fly the helicopter at night, including using night vision goggles. The effectiveness of patrol and search missions at night can be enhanced by using TV/thermal imaging equipment. The helicopter can carry various types of special and optional equipment.

It also has advantages like operability in any geographical and climatic conditions, day and night, and in adverse weather conditions, versatility (module replacement takes two hours), compactness that enables landings on unprepared small-sized sites, high hovering accuracy during rescue operations, high hovering ceiling, excellent maneuverability and handling, easy operation and low maintenance, maximum safety and single-engine flight and landing capability.

Ka-52

Ka-52 is a Highly-maneuverable helicopter armed with a powerful armament complex and is capable to execute any combat task with high efficiency.

It is designed for destruction of tanks, armored and non-armored vehicles, enemy's manpower and adversary helicopters in the front line or in tactical depth. The helicopter provides transfer of target reconnaissance, target distribution and target designation data to interacted helicopters and command posts of Ground Forces.

Ka-52 has high combat survivability and combat power, it can be operated round-the-clock, it has a wide range of aerial weapons, and it is the only helicopter in the world that is equipped with the Ejection & Shock absorbing System.

Mi-171Sh

Mi-171Sh is the most modern version of the Mi-17 military helicopter with improved flight and operational characteristics, high survivability, and flight safety as well as a powerful unguided and guided armament complex.

It is designed to perform delivery of manpower, transportation of cargoes and materials inside the cargo cabin or on the external sling as well as for airdropping of tactical troops, air landing of reconnaissance and sabotage groups and destruction of ground objects.

The helicopter can be operated for medical evacuation, delivery of emergency medical healthcare onboard, provision of the search and rescue missions in combat conditions. Mi-171Sh features high transport capabilities, it can be effectively employed in special operations, it is self-sufficient and has an out-of-hangar storage capability.

Mi-28NE

The Mi-28NE is designed for round-the-clock search and engagement of enemy's manpower, armored and non-armored equipment at the frontline and in tactical depth, destruction of enemy's air attack low-speed targets as well as for cover and fire support of tactical landing troops.

The helicopter has high combat survivability in the air due to effective armor protection of critically important systems and aggregates. Mi-28NE can be applied in mountainous, hot and humid climate conditions, moreover, it provides capability of landing on unpaved sites that are located at altitudes of up to 4000 m.


Tor-M2E

Tor-M2E

"Tor-M2E" ("Tor-M2K", "Tor-M2KM") Air Defense Missile System(ADMS) is designed to defeat fixed- and rotary-winged aircraft, aerodynamic unmanned aerial vehicles, guided missiles, and other elements of precision munitions at medium, low and extremely low altitudes in contested air and jamming environment.

ADMS is distinguished by high firepower, noise immunity, short time for putting into combat readiness, and the possibility of autonomous use of a combat unit.

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CSIR-NAL

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

HANSA-NG

SARAS Mk2

Trisonic Aerodynamics

Experimental Aerodynamics

CFD

Structural Technologies

Acoustic Testing-Satellites

Aerospace Electronics & Instrumentation

Technology is our Core Value

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Almaz-Antey all set to create a big impact at Aero India

Almaz-Antey will display a number of products that have proven themselves in the global market. For the first time, India will also see the 98R6E Abakan theater ballistic missile defence system at Aero India.

Almaz-Antey Air and Space Defense Corp will take part in the 14th Aero India International Aerospace Exhibition at Bangalore from February 13 to 17, 2023. At its booth, Almaz-Antey will display a number of products that have proven themselves in the global market. Among the highlights will be models of the long-range S-400 Triumph and medium range S-350E Vityaz surface-to-air missile systems.

S-400, S-350E

The S-400 Triumph is designed to provide effective defence against air strikes, strategic, cruise, and theater ballistic missiles, as well as medium-range ballistic missiles in conditions of heavy fire and ECM.

The S-350E Vityaz SAM system is designed to defend administrative, industrial and military facilities against massive strikes by various types of modern and advanced air attack weapons, including multiple targets coming simultaneously from several directions, at extremely low to high altitudes. The S-350E can operate independently or be integrated into the customer's air defence system.

In addition, guests at the exhibition will be able to see the Tor family of short-range air defence missile systems (Tor-M2K, Tor-M2E, Tor-E2, the Tor-M2KM autonomous combat module mounted on the Indian TATA chassis, etc.)

98RGE Abakan

For the first time, India will see the 98R6E Abakan theater ballistic missile defence system designed to defeat modern and advanced tactical and theater ballistic missiles. The system consists of the 98L6E multifunction radar and 51P6E2 launchers (up to four). It is a reliable means of fighting the most dangerous ballistic targets and allows engagement of threats both as part of an AD system and on its own.

Visitors to Aero India will come across models of airborne radars Kasta-2E2, Gamma-DE and Podlyot-E. These are successfully used for detection, coordinating measurement, tracking, identification of air targets and future air attack weapons - including stealth - in conditions of active and passive jamming, as well as heavy fire.

Naval systems

Specialists of the group will also inform the visitors about naval air defence systems. Almaz-Antey's booth will provide information on the Shtil-1, Resurs, and Rif-M

sea-based SAMs, Moskit-E and Moskit-MVE ship-based missile systems, and Podzagolovok-24E ship electromagnetic compatibility system.

In addition, Almaz-Antey will display the REDIKOM mobile maintenance and diagnostic shop.

Those visiting the booth will also get acquainted with the characteristics of the Adjutant versatile target practice system complete with reusable targets imitating major advanced air attacks.

'India a great partner'

"India has one of the largest, strongest and most modern militaries in the world. Our Indian partners traditionally display great interest in the developments of our corporation which have repeatedly demonstrated and confirmed their outstanding performance, efficiency, reliability and competitiveness," said Almaz-Antey's Deputy Director for International Business Vyacheslav Dzirkaln.

He emphasized that the entire credit for this goes to the significant innovative, research, engineering and production potential of the enterprises and organizations that are a part of the corporation.

According to Vyacheslav Dzirkaln, the top agenda of the Almaz-Antey delegation at Aero India 2023 is to enlighten potential partners about the corporation's capabilities to develop, manufacture, maintain, extend the service life as well as modernize and recycle manufactured products.

A group of 60 high-tech enterprises, Almaz-Antey is one of Russia's largest integrated defence facilities employing 140,000 people. Its products have been delivered to over 50 countries. Almaz-Antey conducts self-sustained foreign business involving military products, spares, maintenance and modernization of earlier supplied equipment.

Surpassing Global Benchmarks

Jayasuriya Aero is looking forward to stupendous growth with their networking and client growth as their products are not only meant for building aircraft but also for MRO processes, says S. Kalai Arasu, Founder CEO and Managing Director, Jayasuriya Aero, Chennai. Currently, his team is working on Mechanical LRUs-related model designing and hydraulic system development for rotary, fixed wing aircraft and helicopters. Excerpts from an insightful interview:

S. Kalai Arasu
Founder CEO and Managing Director, Jayasuriya Aero, Chennai

Could you talk about the major achievements and core strengths of your company?

We have been in Aerospace industry, manufacturing airworthy products since 2002 and embarked on many achievements in our growth journey. One of our major achievement is the continuous patronage extended by our clients which highlights our dedication towards delivering quality products and customer satisfaction. Some of the other achievements are:

Own two manufacturing units accredited with AS 9100D and NABL in Chennai.

Indigenously developed over 150 series of parts covering more than 20,000 individual part numbers which have been approved by CEMILAC, DRDO for use in various airborne platforms.

Received "Award for Excellence in Indigenisation of Aerospace Standard Parts" from ISRO during the SIATI's silver jubilee celebrations in 2016.

Received "Best Import Substitution Award 2018" instituted by AIDAT (Aerospace Industries Development Association of Tamil Nadu) from DRDO during their annual day function in Chennai in 2018.

Received "Best in Indigenisation of Aerospace Components" by Aeronautical Society of India during their 70th AGM in Bengaluru in 2020.

Our company is also certified by CEMILAC, DRDO and DGAQA for the Design and Development of Standard Parts, Expendables, Mechanical LRUs.

Our core strength is our dedicated team with high calibre who not only handle the complete operations but also contribute to product research and development with innovative ideas. The state-of-the-art facilities offers a One Stop Solution for Client Services ensuring manufacturing, testing, and quality assurance activity under one roof. Our planning and relationship with the material suppliers have ensured the supply of raw materials including critical Aerospace Grade materials without any interruption or shortage. Currently, my team is working on Mechanical LRUs-related model designing and hydraulic system development for rotary, fixed wing aircraft and helicopters.

Please give us an overview of various products, technology, and services you offer to the Indian aerospace and defence sectors.

Jayasuriya Aero is into manufacturing and supply of airworthy products involved in the building of military aircraft and space vehicles. We developed In house facilities all under one roof comprising Design and Development, Manufacturing using latest CNC machines, Heat Treatment Process, Special Process – Chemical and Electro Plating, NDT and NABL accredited Lab for testing.

Our products range from Back Shells, Hydraulic / End Fittings, Unions, Adaptors, Latches, Hinges, Trigger Locks, Spring Hinges, Studs, Pins, Collars, Self-Locking Nuts, Jo Bolts, Threaded Rivets, Cotter Pins, DIN Bolts and Screws with various configurations, Floating Anchor Nuts, Nylon stop Nuts, Tab Lock Washers, Titanium Fasteners, Clamps, Worm Clips, Sheet Metal Parts, etc.

We feel proud in serving our national Aerospace and Defence sector with the supply of our products that matches and even supersedes international standards.

How do you assess India's market potential for your company and its products? Could you give an overview of your business in India in terms of sales, clients, etc?

Currently, the Indian Aerospace industry - Defence and Civil Aviation sectors are showing significant growth in terms of activities and commercial aspects. Even Indian Government is thrusting on self-reliance on defence production and exports. With this upward growth trend, Jayasuriya Aero is looking forward to stupendous growth with our networking and client growth as our products are not only meant for building aircraft but also for MRO processes.

Our list of clients are Indian Aerospace companies including HAL, IAF, ISRO, Aeronautical Development Agency, DRDO labs like RCI, DRDL, CVRDE etc., BrahMos, CSIR, Bharat Electronics, Bharat Dynamics Ltd., Indian Navy, Autonomous Engineering companies like BHEL, private ones like L&T and Godrej. Our products are also being used in various aircrafts and helicopters

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such as LCA, IJT, SU 30, ALH, LCH, LUH, Jaguar, Cheetah / Chetak, HTT 40; BrahMos Missiles and ISRO's launch vehicles Chandrayaan and the human space programme 'Gaganyaan'.

In terms of Sales, Jayasuriya Aero is aiming at increasing its network with the domestic civil aviation industry as well as with exports and contemplating a growth of 50% YOY.

What are the initiatives to support Atmanirbhar Bharat programme and thereby promote Aerospace and defence production India?

India is the land of innovation and creativity. And the current Aerospace and Defence industry is providing ample opportunity to many MSMEs and others to strengthen and contribute to national defence and technology. In our own humble way, we too are contributing to the "Atmanirbhar Bharat" program. Our Design and Development team enabled us to manufacture more than 150 series of aerospace standard products which covers more than 20,000 individual parts in an indigenous manner matching the quality and functionality deliverance of international standards with added cost benefits.

Defence PSUs still struggle to import critical spares with lesser quantities, owing to lack of indigenous technology / know how in our local market, where our Indian MSMEs aspiring to upgrade their technology and manufacturing skills, can be much instrumental in meeting the requirement. Keeping in view of this critical scenario, Jayasuriya Aero is equipping to meet the challenges and prove success.

"Atmanirbhar Bharat" program is helping all Indian MSMEs to showcase their penitential and raise up to the next level with the support of revised Defence procurement policies, thereby expediting the approvals by the Defence Certifying agencies.

Could you share with us your vision and priorities for your company to achieve further growth? What are the aims to be achieved in the coming years in terms of investment and infrastructure?

Our Vision is to realise the market potential currently available and also prioritise our plan in investing better machineries and improved processes to match the ongoing current and future requirements. We are also in the final stage of signing MOU with IIT Madras Research Park for mutual usage of facilities which will make us to support our Aerospace Industries from design stage to productionise faster to meet the required airworthy quality requirements.

What are the highlights of your participation at Aero India 2023?

We wish to showcase our potential and calibre which matches to the needs of Aerospace Industries, in particular to the global companies seeking support from Indian MSMEs like Jayasuriya Aero.

We are also looking for networking and venturing into civil aviation industry who look for Airworthy components manufacturer like us.

Also, we welcome Investors who understand the nitty gritty of Aerospace part manufacturing and willing to support the scalability. ■

LCA Tejas at the centre stage of 'India Pavilion' at Aero India

A full scale LCA-Tejas aircraft in Final Operational Clearance (FOC) configuration will be at the center stage of "India Pavilion" at Aero India 2023.

The 14th Edition of Aero India will have a separate "India Pavilion '' which is based on Fixed Wing Platform theme to showcase India's growth in the fixed wing area including the future prospects for the same.

India Pavilion will showcase the growth of India in developing an eco-system for Fixed Wing platform which includes the demonstration of various structural modules, simulators, systems (LRUs) etc. of LCA-Tejas aircraft being produced by Private Partners. There will be a section for Defence space, New Technologies and a UAV section which will give an insight about the growth of the nation in each sector.

LCA Tejas, a single engine, light weight, highly agile, multi-role supersonic fighter. It has quadruplex digital fly-by-wire Flight Control System (FCS) with associated advanced flight control laws. The

aircraft with delta wing is designed for 'air combat' and 'offensive air support' with 'reconnaissance' and 'anti-ship' as its secondary roles. Extensive use of advanced composites in the airframe gives a high strength to weight ratio, long fatigue life and low radar signatures. Tejas is equipped with state-of-the-art features like glass cockpit, zero-zero ejection seat, inflight refueling probe, Jam proof AESA Radar, UEWS with SPJ, CMDS, HMDS DashV, BVR missile capability and many more which make the aircraft more lethal. LCA has come a long way in terms of development and presently available in Air Force fighter & twin seater and LCA Navy fighter and twin seater. Other variants like LCA LIFT (Lead in fighter trainer) and MK-2 are being developed for LCA Tejas. Some of the uniqueness of the aircraft :

- **One of the smallest & lightest aircraft in its class**
- **Excellent flight safety record**
- **Available in all four variants to meet all customer needs**
- **Composite constitute 90% by area & 45% by weight**
- **Supersonic at all altitude with minimalistic RCS**
- **Quad-redundant fly by wire aircraft**
- **Payload carrying capacity upto 30% of AUW (all up weight)**
- **Open architecture enabling customized weapon integration**
- **Maintenance friendly with low operating cost.**

■

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Forging Ahead in Innovative Technologies

The Aerospace Division of Bharat Forge Limited, the flagship company of the Kalyani Group, a technology driven global leader in metal forming, while becoming the "Go To" supplier for Critical Aero Engine and Aircraft mechanical components for global OEMs, is set to showcase their readiness to add value across each segment of the Aerospace value chain, starting from raw material manufacturing to assembly and testing, and releasing IoT enabled prototypes and micro turbines. Guru Biswal, CEO – Aerospace Business Division, Bharat Forge, elaborates in an interview on the context of Aero India 2023. Excerpts:

Guru Biswal
CEO – Aerospace Business Division, Bharat Forge

General Atomics Aeronautical Systems (GA-ASI) is joining hands with Bharat Forge aerostructure manufacturing sector creating a high-end drone manufacturing environment. Could you elaborate on this association and its objectives?

The purpose of the association is to provide a ready-made platform for OEMs to use our manufacturing capabilities to their advantage. We are a fully digitally-enabled manufacturing facility that can enable critical manufacturing and assembly within the shortest time for qualifying the products. We have a capable team that can undertake activities that are important to the business such as absorbing high-end technology for the landing gears and industrialising the same with a strong process capability for zero defect product realisation. In addition, it is a testimony to the vision of our Hon. Prime Minister for Make-in-India.

What are the highlights of your participation at Aero India this year? Can we expect any major announcements or deals?

Our participation in the Aero Show this year is to showcase our readiness to add value across each segment of the Aerospace value chain, starting from raw material manufacturing to assembly and testing. We wish to send a message to global customers on our capabilities, along with domestic customers for indigenisation of mechanical aircraft items, especially for critical rotating parts of engines and structural parts of Under Carriage.

Our major announcements shall be in line with "Support to end users at IAF through spares, and support to OEMs for raw material, and releasing IoT enabled prototypes and our micro turbines."

What are the main objectives of the company in the next five years?

The main objective of our Aerospace Division in the next five years shall be to become the "Go To" supplier for Critical Aero Engine and Aircraft mechanical components for global OEMs, develop gas turbine design and manufacturing competency in the country, develop products and technology to meet the requirements of the end customer, especially the users in the country to support the existing legacy systems, develop competency in design, manufacturing, assembly and testing of Under Carriage and transmission products, and lastly develop and qualify Aero grade Steel for global requirements on international standards.

How does Kalyani Group support India's vision of increasing defence exports? How strong is the company export business?

The larger part of our production is for exports in our traditional business. This has been made successful only because of our strong technological base. We have believed in creating our own technologies, and the same values and vision are extended to all our businesses including defence and aerospace. A large part of our aerospace revenue is from exports and that has been possible due to our strong hold on technology and quality systems, which are very significant in the business. Having established ourselves as a preferred supplier for global OEMs, we have also expanded hugely to meet the requirements of domestic customers.

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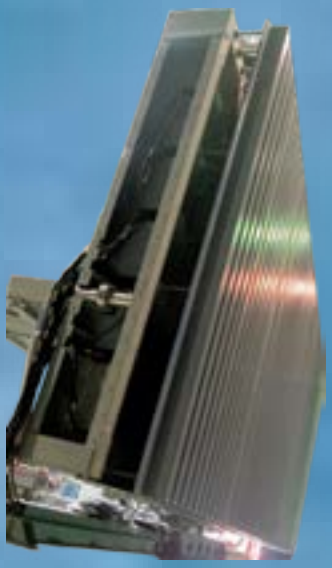

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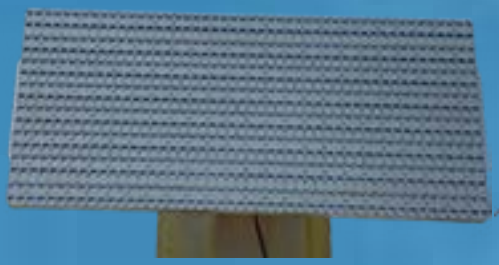

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In the Vanguard of Indigenisation

Aerospace Engineers Pvt Ltd, which has emerged as a quality supplier of high-precision rubber, metallic, non-metallic, and composite parts, electro-mechanical LRU's, and missile sub-assemblies, now have long-term contracts with Boeing, Honeywell, Egyptian Armament Authority, Collins Aerospace, Apollo Aerospace & Eaton for supply of critical aviation components. R Sundaram, MD & CEO, Aerospace Engineers Pvt Ltd, gives us incisive insights into their success saga in this interview, in the context of Aero India 2023

R Sundaram
MD & CEO, Aerospace Engineers Pvt Ltd

Aerospace Engineers was started in the year 1988 as a micro enterprise and grew progressively too small and then to medium enterprise as now. Could you share the major achievements in the recent past?

AEPL was founded to specifically cater the growing needs and demands of the Aviation Industry. We strongly believe in indigenisation and our first milestone was the development of the canopy seal for the SU-30 aircraft. Over the last three decades, we have developed more than 15,000 parts through indigenisation out of which 12,000 are non-metallic. We are a technology driven company designing, developing and manufacturing components and sub-systems for the aviation, defense, and healthcare industry.

Now, we are a one–stop solution provider with various enhanced capabilities to support the growing needs of the Global market. Our broad range of capabilities include a world–class NABL (ISO 17025) certified in–house facility, NADCAP approved chemical processing facility, FOD free area and our highly experienced design and production team.

We are proud to claim that AEPL has emerged as a quality supplier of high-precision rubber, metallic, non-metallic, and composite parts, electro-mechanical LRU's, and missile sub-assemblies.

Could you elaborate on your activities in the AUV sector, which has huge potential in India?

We have a separate and dedicated division called the Autonomous and Under Sea Systems Division (AUSD) to address the growing strategic needs of the Naval forces with state-of-the-art facilities with a focus on autonomy and artificial intelligence for the naval sector.

We have won an iDEX challenge for the development of underwater navigation for AUVs (Autonomous Underwater Vehicle).

Further, we are signing an MoU with GRSE for collaborating and bringing out our mutual strengths and expertise to fulfil the growing needs in this segment.

The company has recently setup its new facility in Hosur. What are the highlights, features and capabilities of the facility?

Presently, we have two units at Hosur. Unit II in Hosur focuses on Integration of assemblies, sub-assemblies related to aviation. Additionally, we have taken over the existing manufacturing facility of Taneja Aerospace & Aviation Limited (TAAL) at Hosur as our Unit - III, which majorly focuses on the structural assemblies & components, sheet metal fabrication, for aviation and space applications. It is equipped with CNC turning & milling machines, hydraulic stretch forming machine, shearing machine, rolling machine, CNC press brake, rubber press forming and an assembly shop. We also have a composite component manufacturing facility

which has pre–preg cutting machine, autoclave and pre- curing oven.

Chemical processing facility is accredited with NADCAP for heat treatment of aluminium & steel components, anodizing, cadmium plating, chemical milling & environmentally controlled paint booth.

Additionally, we have a mechanical testing lab & CMM inspection facility at Unit – III.

The company has signed a long-term contract with Boeing to manufacture and supply critical aviation components and parts for the global aerospace major. Could you talk about this and other foreign collaborations?

We trust in building value through continual and long term partnerships. We have signed a long term contract with Boeing for supply of critical aviation components. We are also approved by PRI for Qualified Manufacturer List (QML) and progressing on various components for Qualified Part List (QPL). Recently we got qualified with the BAC 5071 and AEPL is now added to the prestigious Boeing QPL for supply of Vertical fin seals for B737 program.

We have signed other long term contracts with Honeywell, Egyptian Armament Authority, Collins Aerospace, Apollo Aerospace & Eaton for supply of metallic & non-metallic components.

Previously, we were majorly supplying components to support for MRO of Helicopters & Aircraft domestically and now we have extended our support by exporting the metallic & non-metallic components and repair of Cowling to our esteemed customer M/s. Glotech and under negotiation with other customers.

Private sector has a key role in boosting India's aerospace and defence exports. How strong is the company's export operations?

We are happy in contributing to Hon'ble Prime Minister's mantra Atma Nirbhar Bharat by enhancing its aerospace & defence exports to global players like Boeing, Airbus, Honeywell, Egyptian Armament Authority, Collins Aerospace, Apollo Aerospace & Eaton. We strategically plan and maintain buffer stock of metallic & non-metallic raw materials and finished components to support our global customer priorities.

Could you talk about the company's participation at Aero India 2023?

We are very proud to participate in the Asia's biggest biannual Airshow & Aviation Exhibition Aero India 2023. This airshow is very encouraging as we are signing MoU with GRSE & BEML. We look forward to more collaborations and business opportunities to cater to the growing domestic and global requirements. ■

Exponential Force Multiplier

Bharat Electronics Limited (BEL), a Navratna PSU under the Ministry of Defence, Government of India, which made its mark as the premier manufacturer of state-of-the-art electronic products and systems for the Army, Navy and Air Force, has been continuously exploring opportunities in allied non-defence business domains. Bhanu Prakash Srivastava, CMD, BEL, in this Special Interview for the Aero India 2023, speaks about a wide bouquet of new initiatives that would play a key role in driving BEL's growth in the coming years.

Bhanu Prakash Srivastava
CMD, BEL

Please tell us about your participation in Aero India this year...

BEL will showcase state-of-the-art products and systems spanning every domain of its business at the 14th edition of Aero India 2023. The products and systems to be on display have been clustered as 'Communication', 'Electro-Optics and Laser', 'EW and Avionics', 'Homeland Security & Smart Cities', 'Medical Electronics', 'Naval Systems', 'Network Centric Systems', 'Radar and Fire Control Systems', 'Tank Electronics and Gun Upgrade', 'Weapon System', and 'Outdoor Display Products'. In addition, BEL will also showcase its R&D capabilities by launching / demonstrating some of its new products and technologies. The company has set up an Experience Centre at its stall to showcase its Voice Analysis Software and Augmented Reality/ Virtual Reality for Universal Simulator.

The highlight of BEL's outdoor display will be Weapon Locating Radar (mountain version), Akash Air Defence System, Ant-Radiation Decoy System, Surveillance Radar, Air Defence Fire Control Radar, Automatic Manpack SATCOM Terminal, Anti Drone System and Mobile Communication Terminal. The entire set of state-of-art equipment on offer will be a force multiplier for any Defence force and civilian requirements.

Can you brief us about BEL's financial performance; what has been the impact of the pandemic on your growth?

BEL continues to be a profit-making PSU, despite challenges posed by the pandemic, global chip shortage and stiff competition. FY 2021-22 saw the company registering a record turnover of Rs. 15,044 Crores, a growth of 9% over the previous year. BEL became the first Defence PSU to cross the landmark market capitalisation figure of Rs. 80,000 Crores, and declare the highest ever dividend of 450%. The company has increased its authorised capital three-fold to Rs.750 Cr and issued bonus shares in the ratio 2:1.

This year, we are confident of continuing the good show and achieve a revenue growth of 15 per cent and EBIDTA Margin of 21%-23%.

On this occasion, I would like to share with you the good news that the Ghaziabad Unit of BEL has won the twin honour of CII EXIM Bank Business Excellence Award (2022) and the Jury's Commendation for Role Model Organisation. The Award is the highest level of recognition in the CII-EXIM Bank Award for Business Excellence, established by the Confederation of Indian Industry (CII) and Export Import Bank of India in 1994 with the aim of enhancing the competitiveness of India Inc.

Please tell us about BEL's exports. What are the major products and who are the customers?

BEL recorded an Export turnover of 33.30 Million USD during FY 2021-22. Major products exported included Coastal Surveillance System, Trans-Receive (TR) Modules, EO-IR Payload System, Compact Multi-Purpose Advanced Stabilization System (EOS CoMPASS), Solar Hybrid Power Plant, Data Link, Electro-Mechanical parts, Low Band Receivers (LBREC), Medical Electronics, Spares for Radars, etc.

BEL is fast expanding its global presence, putting its best foot forward to give a thrust to exports worldwide. All-out efforts are being made to tap new markets across the globe, including the Indian Ocean Region (IOR) and friendly foreign countries (FFCs).

The Government is encouraging defence exports through many policy initiatives and has set a target of Rs.35,000 Crs by 2025. BEL has

identified Exports & Offsets as one of its thrust areas and has drawn up plans to offer its select products and systems to various export markets.

Some of the other products and systems which are being promoted for exports include Homeland Security solutions, Smart City solutions, Border Protection Systems and Coastal Surveillance System. Having established a Coastal Surveillance System (CSS) for a few neighbouring countries, BEL is interacting with the Ministry of External Affairs for supply of CSS to other friendly countries.

BEL is also focusing on Offset as a potential avenue for revenue generation. BEL is interacting with many foreign OEMs to meet Offset obligations in various programmes of the MoD. BEL has identified contract manufacturing (build-to-print and build-to-spec) for foreign OEMs and partnerships in the form of Transfer of Technology of the latest systems and solutions as areas of emerging export opportunities. Efforts are also on to establish long-term supply chain relationship with global players.

Tell us about your initiatives to diversify into the civilian business ?

Defence, being the mainstay of BEL, has traditionally been contributing to around 80% of the Company's annual sales revenue. BEL, however, has been continuously exploring opportunities in allied non-defence areas. The Company aims to increase its non-defence share in the overall business in the coming years.

Some of the areas BEL is focussing on in non-defence include solutions for Civil Aviation sector including Air Traffic Controller Radars, Anti Drone systems, Space / Satellite Electronics, Satellite Assembly & Integration, Unmanned Systems, Solar Business, Railway and Metro solutions, Software as a Service, Network & Cyber Security, Energy Storage products for Electric Vehicles (Li-ion & Fuel Cells, Charging Stations, etc), Homeland Security & Smart City businesses, Smart Meters, a range of Medical Electronic and health care solutions, Artificial Intelligence, Communication Radios & Networks, Composite Shelters & Masts, etc. This wide bouquet of businesses in non-defence would play a key role in driving BEL's growth in the coming years.

In recent years, the Government of India has stressed on the need to involve the MSMEs, private industry and start-ups in the Defence sector. What are BEL's initiatives to promote such initiatives?

The Defence Sector is being opened up for private sector participation with the evolution of Defence Procurement Procedure. In this changing business scenario, BEL is focusing on enhancing interactions at various levels and building long-term relationships with customers, emerging Strategic Partners and other key stakeholders in the Indian Defence industry as a trusted and committed partner.

Be it the efforts that the Company has been putting in to engage in collaborative R&D in addition to augmenting its own R&D set up — its recent attempts to outsource work to Indian private industries and MSMEs, or the path breaking decision to go in for Public-Private partnerships to execute turnkey projects, BEL is leaving no stone unturned to ensure that it is in sync with the Government's larger goal of indigenisation and self-reliance.

BEL has formulated a long-term Outsourcing and Vendor Development Policy and has been taking several initiatives in order to broaden the domestic vendor base by implementing online vendor registration and e-procurement processes including GeM. This is in line with the 'Make in India' initiative where enhanced thrust has to be put to develop domestic players. Make in India Display Cells have been established at all Units of BEL. The procurement from MSMEs by BEL has been over 20% in the previous years. BEL also takes part in various events organised by the Government of India to promote MSMEs.

Startup India is a flagship initiative of the Government of India, intended to build a strong ecosystem that is conducive for the growth of startup businesses, to drive sustainable economic growth and generate large-scale employment opportunities. BEL has identified several areas for partnership with start-ups in new emerging areas including Machine Learning, Cyber Security, Artificial Intelligence, Embedded Computing and other latest technologies which can be used for Defence electronics applications.

Strategic Strokes and Synthetic Lubricants

AVI-OIL has been supplying high performance aviation lubricants to the Defence and Aerospace sectors including the Air Force, Navy, Army, and a host of other customers in the Defence and commercial airline space. The thrust for growth will now focus on the Civil Aviation and the Industrial and Automotive segments as well as synthetic lubricants, says V K Mathew, CEO, AVI-OIL.

V K Mathew
CEO, AVI-OIL

Until the advent of AVI-OIL, high performance lubricants to the Defence Services, Civil Aviation and the Industrial sector were being imported. How successful has the company been in attaining self-reliance and achieving its objectives?

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

If not for Avi-Oil, these strategic products would have had to be imported. The emergence of AVI-OIL complements the efforts of the Defence and Aerospace industry by providing strategic products for self-reliance and the industrial sectors' need for efficient, energy-conserving and eco-friendly lubricants.

Could you shed some light on to your operations in defence and aerospace sector? What are the latest updates?

Avi-Oil was founded in 1993 as a joint venture between Indian Oil, NYCO and Balmer Lawrie. Since then, AVI-OIL has been supplying high performance aviation lubricants to the Defence and Aerospace sectors including the Air Force, Navy, Army, and a host of other customers in the Defence and commercial airline space.

In the military sector, the defence forces have largely indigenized their requirement of aviation lubricants and are currently being serviced by Avi-Oil. In Civil Aviation, the scenario is different with imports still playing a major role.

We have been manufacturing these high-performance lubricants at our factory in Faridabad for the last 24 years. While indigenously manufacturing these products in India, Avi-Oil has always laid emphasis on the quality of its products. To achieve this, we have established a modern state-of-the art laboratory for Quality Assurance. The Quality Management System of AVI-OIL is certified to comply with the International Standards ISO 9001:2015 and SAE AS 9100:2016. The company provides technical support to customers for evaluation and re-inspection of the products and assists our customers on lubricant applications and usage.

How strong is Avi Oil operations in civil aviation sector? What are the various products and who all are major clients?

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

Our Products are approved by major OEMs like Safran, CFM, GE, Rolls Royce, Pratt & Whitney, and Pratt & Whitney Canada etc. and air framers like Airbus, Boeing, Bombardier, ATR, Eurocoptor, Dasault Aviation, Embraer and many others.

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

For Power Plant applications, we have the TURBONYCOIL range of synthetic turbine oils designed specifically to meet the stringent requirements of aircraft powered by turbine engines. We have the HYDRAUNYCOIL range of Hydraulic fluids (both synthetic and mineral based) for shock strut applications. We have NYCOGREASE GN greases for various Airframe and Landing applications like Landing Gears, wheel bearings, anti-seize assembly and dismantling compounds and other multi-purpose applications. We also have NYCOLUBE synthetic and mineral lubricating oils for instruments, transmissions, protective fluids, and general applications.

Our global strategy is to increase the footprint for the civil aviation market along with developing new technologies to support the shift of the aviation industry to a more sustainable operational environment. A recent strategic partnership signed between NYCO and Air France is a

DAC approves AoN for 3 capital acquisitions worth Rs 4,276 Cr.

A meeting of Defence Acquisition Council (DAC), held on January 10, 2023 under the chairmanship of Defence Minister Rajnath Singh, accorded Acceptance of Necessity (AoN) for three capital acquisition proposals, amounting to Rs 4,276 crore. All the three proposals - two of the Indian Army and one of the Indian Navy - are under the Buy (Indian-IDDM) category.

The DAC accorded AoN for procurement of HELINA Anti-Tank Guided Missiles, launchers and associated support equipment which will be integrated to the Advanced Light Helicopter (ALH). This missile is an essential part of weaponisation of ALH for countering enemy threat. Its induction will strengthen the offensive capability of Indian Army.

The DAC also accorded AoN for procurement of VSHORAD (IR Homing) missile system under design and development by DRDO. In view of the recent developments along the Northern borders there is a need to focus on effective Air Defence (AD) weapon systems which are man portable and can be deployed quickly in rugged terrain and maritime domain. Procurement of VSHORAD, as a robust and quickly deployable system, will strengthen the Air Defence capabilities.

Further, the DAC granted approval for procurement of Brahmos Launcher and Fire Control System (FCS) for the Shivalik class of ships & Next Generation Missile Vessels (NGMVs) for Indian Navy. With their induction, these ships would have enhanced capability of carrying out maritime strike operations, interdicting and destroying enemy's warships and merchant vessels.

clear commitment to develop and support this sustainable ambition.

AVI-OIL is well positioned to provide domestically produced products to shorten lead times, provide better cost economics and far superior technical services on the ground.

Customers like Air India, Vistara, Star Air, Air Asia are already benefiting from our products and services, and we hope to widen this basket.

Considering the need to reduce pollution, what are Avi Oil's eco-friendly initiatives in esters and lubricants?

AVI-OIL's products contribute to reducing the environmental impact in several aspects. The use of bio-sourced raw materials is obviously an important area to focus on. Additionally, a number of these products will show biodegradability features, as well as no toxicity to the aquatic environment, making some of them compliant with environmental standards like the European Ecolabel. These are key features in any application where the lubricant may be released to the environment or the ocean, accidentally or by design.

Such products, even though they display a good environmental profile, will also demonstrate excellent technical performance, making for further improved environmental impact through extended lifetime in operation, frictional benefits and increasing energy efficiency.

What are highlights of the company's participation in Aero India 2023? Can we expect any new announcements or deals?

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

our prowess in this strategic arena.

While we will be present at this exhibition through our booth where we will be displaying our products, we look forward to welcoming our customers to our booth as well as having meetings with them. Our Sales and Technical teams will be available for discussions.

We are now in our 30th year and this is an excellent occasion to reiterate our commitment to the vision of Self-reliance in Aviation Lubricants to the Indian Defence Forces and look forward to partnering with Commercial airlines for their lubricant requirements.

What are your vision and priorities for Avi Oil? Are there any expansion plans or immediate goals to be achieved in the future?

While our initial objective of ensuring the nation's self-reliance in the strategic area of Aviation Lubricants has largely been met, we must now look forward to the future.

Our thrust for growth will focus on the Civil Aviation and the Industrial & Automotive segments. In Civil Aviation, despite the COVID-19 pandemic being a dampener, the market is quickly returning to pre-COVID levels and we would like to take benefit of the growing opportunities arising out of this.

In the Industrial and automotive sector, the use of synthetics in lubricants is currently very low. This is an evolving market, and we expect to play a major part in this arena as and when the share of synthetic lubricants rises. The industry is certainly changing, and we have seen this happen globally and it is only a question of time when this happens in India too.

Our short-term plans are to consolidate our existing business with the Defence forces in India and drive up the financial indicators of Turnover and profitability. In the medium term we hope to become a bigger participant in the Civil Aviation sector and the Industrial and Automotive segments, making us one of the leading synthetic players in the country.

At our plant in Faridabad, we have a lubricant blending unit and an ester manufacturing facility which are adequate to meet our current marketing plans. We still have spare capacity for the present and remain flexible to add capacity as required.

Walter Milling Tools Set New Standards in Aviation Industry

One of the most innovative sectors in terms of the development and use of new materials is the aircraft industry. German aircraft manufacturers alone invest ten percent of their sales in research and development (source: BDLI). An important motive for the investments: Regulatory requirements for aircraft emissions and energy efficiency are becoming increasingly stringent. New, lighter materials and new construction methods are an important approach to solving this problem. Tool manufacturers such as the machining specialist Walter are keeping up with the high innovation dynamics in the industry. For example, Walter maintains intensive partnerships with research institutes such as the Institute for Production Management and Technology at the Technical University of Hamburg. Together with the Technical University of Hamburg, they developed the BLAXX M3255 spherical milling cutter for titanium-aluminum alloys.

While aluminium alloys are primarily used in the fuselage and wings in aircraft manufacturing, titanium alloys such as TiAl6V4 or Ti5553 are used anywhere that high rigidity is required. This includes, for instance, chassis components (such as struts), Structural components and landing flap guides. High machining rates are also required for these components. Thanks to their hardness and low heat conductivity, titanium workpieces pose extremely high requirements for machining tools, particularly when it comes to processing reliability. Faster wear on the cutting edges and relatively low cutting parameters mean that roughing titanium structural components is a time-consuming task. At the same time, demand is increasing dynamically. Companies who succeed in significantly reducing their machining time per component will, therefore, gain a significant advantage over their competition.

Milling tool adjusting screw: Time savings of over 20%

The modified BLAXX M3255 porcupine milling cutter from Walter offers users a tool that can produce titanium components significantly faster and completely reliable. The tool concept is based on the proven Walter BLAXX porcupine milling cutter and was developed as the solution to one specific request. Dr Matthias Lange,

who leads the Additive Manufacturing and Machining department at Premium AEROTEC, required a process structure that would allow his staff to machine titanium structural components much more efficiently. Premium AEROTEC is a world leader in the production of complex structural components. Almost half of the time they spend machining a titanium structural component is spent on roughing; as a result, the milling tool and machining strategy are key elements in developing an approach to reduce their machining times. Over the course of around 20 months, Walter experts worked together with a team from the customer's business and the Institute of Production Management and Technology at Hamburg University of Technology, under the leadership of Professor Wolfgang Hintze and Dr Carsten Möller, to develop a solution. The refined, reworked BLAXX porcupine milling cutter allowed the customer to reduce their machining time by around 22% compared to the starting point. The joint project focused on cooling, chip removal, cutting material analysis, the macro- and microgeometry of the indexable inserts, the insert seat and the cutting data. The innovative new geometry of the milling body and indexable inserts ensures that the maximum number of teeth engage in the material. This results in an exceptionally high cutting efficiency alongside optimum process reliability, whether milling corners, contours or pockets or full slotting 1/2 x D. The soft-cutting geometry of the indexable inserts produces positive cutting behaviour, enhanced by short machining times at maximum metal removal rates. Heat management is always difficult when working with titanium alloys due to their low heat conductivity; here, optimised coolant supply to each cutting edge alleviates this problem. The chip clearances guarantee safe chip removal, even at high cutting speeds. Tangential and axial toothing on the milling body ensures that the indexable inserts are securely clamped. This concept guarantees excellent stability even in low diameter ranges. Each indexable insert has either two or four cutting edges. This ensures that each insert yields maximum cutting efficiency. Due to the tangential arrangement of the indexable inserts, the M3255 tooling system is also ideally suited for machining forged components; the edge zone (forged skin) on these components can be extremely challenging for tool cutting edges.

EMUGE-FRANKEN: Committed to Precision and Innovation

EMUGE-FRANKEN India Pvt. Ltd. has become a dominant player in its field of cutting tools and tool holding systems in India and one of the major end-to-end solution providers for complete threading, milling, holding and allied machining solutions.

EMUGE-FRANKEN India Pvt. Ltd., a 100% subsidiary of EMUGE-Werk Richard Glimpel GmbH & CO KG, Fabrik fur Praisionswerkzeuge, Germany, was incorporated in 1998. It commenced its commercial operations in India in the year 2000 from its manufacturing set-up located at Village Kondhanpur, District Pune, with aim to make tools in India for the Indian market with German quality.

Today, EMUGE-FRANKEN India Pvt. Ltd. holds a state-of-the-art manufacturing facility with modern machinery and inspection equipment of the highest standards, thus assuring best quality and consistent performance of the tools manufactured. With a trained team of sales and application engineers located across India and partnering with around 35 channel partners, it has a wide-spread network across India.

Over the years, EMUGE-FRANKEN India Pvt. Ltd. has become a dominant player in its field of cutting tools and tool holding systems in India, with a product basket offering Taps, both cut and forming, in high-speed steel and carbide, Thread Milling Cutters, Solid Carbide End Mills, Tap & Tool Holders along with accessories, thus making them one of the major end-to-end solution provider for complete threading, milling, holding and allied machining solutions. They also provide support services for high-end clamping systems and other advanced tooling solutions designed and supplied by their principals, www.emuge-franken.in

Since its foundation in the city of Lauf an der Pegnitz in 1920, EMUGE-FRANKEN has been committed to precision and innovation. Since 100 years EMUGE-FRANKEN has consistently created technological milestones in the threading, drilling, gauging, clamping and milling technology with the brand names EMUGE and FRANKEN.

EMUGE as a part of the EMUGE-FRANKEN group, develops and manufactures precision tools for thread production and for the clamping of tools and work pieces. Headquartered in the city of Lauf an der Pegnitz, 16 km south-east of Nürnberg, it was established in 1920, and has since then been committed to precision and innovation.

FRANKEN, as a part of the group, has been developing and manufacturing milling tools and offers a wide range of high-performance tools for modern production. The manufacturing plant is located in Rückersdorf, Germany.

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Strategic Thrusts, Rewarding Forays

Operating under three major business verticals viz. Defence & Aerospace, Mining & Construction, and Rail & Metro, BEML Limited plays a stellar role in the country's Integrated Guided Missile Development Project by supplying ground support vehicles. Aerospace Manufacturing Division manufactures Ground Support Equipment such as Aircraft Towing Tractor, Aircraft Weapon Loading Trolley, Multi-Purpose Weapon Loader and Crash Fire Tender. BEML is in the process of exchanging MoUs and ToTs with premier defence organizations, DPSUs, leading private industries, MSMEs and Startups, says Amit Banerjee, CMD, BEML, in this interview in the context of Aero India 2023, Bangalore.

Amit Banerjee
CMD, BEML

AK Srivastava
Director Defence Business, BEML

Could you talk about the latest updates on how BEML supports the Integrated Guided Missile Development project by supplying ground support vehicles? What are the products and services offered?

BEML is supporting the nation's Integrated Guided Missile Development project by supplying ground support vehicles to various projects, viz. Akash – surface to air missile, Pinaka – surface to surface rockets, Prithvi – surface to surface missiles, A1P, BRAHMOS etc.

Could you elaborate on the world-class test track set up by BEML at its KGF complex?

BEML has established world-class test track for testing High Mobility Vehicles (HMV) and Armoured Recovery Vehicle (ARV). The details are furnished as below:

Speed test – Minimum 60 km / Hour

Cross Country test to achieve Run test minimum 30 km / Hour Speed

Parking Brake Test
Gradient Test
Side Slope Test
Trench Crossing
Step Climbing
Dozing Test
Towing
Winch Test
Night Vision Device
GPS Test facility

BEML aims high in aerospace sector after foraying into it over the last few years. What are the major achievements and the new updates?

Aerospace division, Mysore is AS9100D accredited with NADCAP certification for special processes. Established facilities in the areas of manufacture of Rocket motor casings for various missile systems. Being lead vendor of DRDL, we have supplied more than 150 rocket motor casings for Akash program. Also associated in the development of integrated rocket motor casing for QRSAM program and delivered 10 No's each to BDL and DRDL.

Has recently associated with ISRO for design and fabrication of launch vehicle structure of GSLV Mk-III. Required infrastructure has been established at Bangalore Complex and the realization of structures are under progress and in final stages of completion.

Also associated with IIT-Kanpur for design and development of tactical UAVs. Technology demonstrators have been manufactured and functional trials are in progress.

Being a DPSU, BEML plays a major role in fulfilling India's dream of being a defence exporter. Could you share the highlight of your exports and the plans to promote it?

For improving the geo-strategic reach and increasing exports, BEML is working on various business opportunities in Defence, Mining & Construction and Rail & Metro segments in SAARC and Africa.

On Defence export front, BEML team visited Bangladesh for having discussions with Bangladesh Army for supply of BEML Defence equipment (Aircraft towing tractor and Heavy recovery vehicle) under Defence Line of Credit to Bangladesh.

BEML has submitted the offer to MoD of India for various Excavators

and All Terrain Trucks against Nigerian Armed Forces requirement of Defence equipment.

BEML is planning to establish a branch office in Kenya and registered its branch office in January 2021 for export promotion and marketing of entire spectrum of exportable platforms/ subsystems/ components manufactured by Indian Defence Industry both from public and private sector. BEML is in process of appointing representative in Kenya.

BEML has floated open ended Global EoI for appointment of authorized representatives and service provider for marketing BEML products and is in the process of appointing representative for Defence products in Bangladesh.

BEML has registered with Defence Portals of Foreign Countries like the Philippines, Korea and Singapore.

With above strategy, BEML is looking for opportunities to export High Mobility Vehicles, Aircraft towing tractor in the area of Defence and Rail coaches, Metro Cars, Maintenance vehicles in the area of Rail & Metro business in addition to export of Mining & Construction equipment.

What is the rate of indigenization at BEML? Could you talk more about the Atmanirbhar initiatives, private participation, association with MSMEs and startups?

BEML has given major thrust to Self-Reliance and already achieved indigenization levels of over 90% in the mainline Mining & Construction products, Rail coaches & EMU's, over 80% in High Mobility Vehicles (HMV) and over 65% in Metro cars. Further efforts are underway to reach higher levels.

BEML Limited is fully committed to "Make in India" policy of the Government and has indigenously designed, developed, and manufactured various Defence products in collaboration with Government / DPSUs / Indian Private Industries and Startups.

Further, BEML has taken-up Defence projects by involving Indian Government / DPSUs and Indian Private Industries to enhance the self-reliance in Defence production.

BEML is continuously making efforts to reduce the import content through localization. In this direction, BEML has initiated Product indigenization through License Agreements, Joint Ventures & Transfer of Technology (ToT) with foreign OEMs, Continuous indigenization of products through re-engineering and extensive R&D efforts, indigenously conceptualizing, designing, developing, manufacturing, and supplying Defence equipment based on customer requirements and uploading of items in Srijan Portal, to reduce the import dependency.

Also, BEML has undertaken several Artificial Intelligence based projects in cooperation with OEMs in order to acquire/implement the modern technology.

On front of supporting MSMEs, BEML Limited is procuring materials required for production and for others through Micro & Small Enterprises (MSEs). 358 items which are reserved are being procured exclusively from MSEs. Appropriate weightage has been given for MSEs in the MoU from the year 2015-16 onwards. As per the directive of Government, minimum 25% (notified from 9th November 2018) of procurements have to be procured from MSEs amended from 20% earlier. Provided a minimum 3%

reservation for women owned MSEs and 4% for SC/ST Enterprises. Further, MSE procurement data is uploaded on "MSME SAMBANDH" portal on monthly basis. During the year 2021-22, Company has procured 32% of Goods & Services from MSEs.

How strong is the order book position of BEML at present?

As of end Q3 of C.Y. to our current order book position of over Rs. 8500 crore. Further, orders over Rs. 2000 crore for Defence projects is under pipeline. Also, upcoming tenders for Metro cars and Vande Bharat trains are the prospects for which we are high to grab.

How does BEML rely on latest technologies in its R&D and up skilling?

As a manufacturing Company and to sustain the market we are continuously working on development and upgradation of new products. Under Mining & Construction, we have taken up the design & development of 21 cu.m. Rope Shovel required for Mega Coal Projects. In Defence, Keeping in view of emerging trends in technology and also in line with the unfolding business scenario, R&D has put in place, plan of action to develop series of products / aggregates such as Development of High Mobility Vehicle (HMV) (8x8 Cross Country Vehicle), Self-propelled mine burrier 8x8, Bar mine layer 8x8, Upgrading of Axles for higher load carrying capacity with ABS feature for use on chassis for special projects, Upgradation/Overhauling of Armoured Recovery Vehicle pilot project and Development of Trawl Roller & Track Width Mine Plough for demining operation. Under Rail & Metro, Rail Grinding Machine for maintenance of Rail Tracks is under production.

The Company is also working with industry partners to leverage technology for the benefit of customers such as introducing AI features in machines, additional safety features etc. Till date following AI based products were developed:

Mobile Medical Health Diagnostic System

Sleep / Fatigued operator alert system on Dump Trucks

Predictive maintenance of Mining equipment through big data analytics and Machine learning algorithms

360° Surrounding View Monitoring System

Automation of water sprinkling system

Lighting Control system on HEMM

What all will be the highlight of BEML's participation at Aero India 2023? Can we expect any major announcements or deals?

- **BEML is showcasing the capabilities in the areas of:**
- **Assembly and integration of UAVs**
- **Fabrication of Space vehicle structures**
- **Manufacture of airframes and missile modules**
- **Design, Development and Productionization of GHE/ GSEs for LCA Tejas aircraft**

BEML is in the process of exchanging MoUs and ToTs during Bandhan ceremony with premier defence organizations, DPSUs, leading private industries, MSMEs and Startups

Thales to showcase cutting-edge Technologies at Aero India

Thales to showcase its cutting-edge technologies across Defence, Aerospace and Space, bringing a special focus on its progress towards 'Make in India for India and for the world'at Aero India.

"As we celebrate 70 years in India, Thales is eager to pursue its long-standing commitment to partner with India in its big ambitions including the 'Aatmanirbhar Bharat' vision. We are fully committed and mobilised to continue supporting the modernisation and indigenisation efforts that are underway in the Indian aerospace and defence sector " said Ashish Saraf, Vice President and Country Director – India, Thales.

Thales' Make in India' program is growing every year, helping Indian industry to play a greater role in world markets. The Group has steadily built advanced in-country capabilities across manufacturing, critical systems and services in India through local teams and collaborations.

Working today with 75 suppliers, generating more than 1900 indirect jobs in India, Thales has expanded locally with joint ventures and partnerships, such as with Bharat Dynamics Limited to manufacture 60% of the Laser Beam Riding MANPAD (LBRM) system, a top product that Thales will display at the show alongside other defence equipment with local content.

Thanks to its growing indigenous engineering capability, Thales in India now counts more than 1800 employees including 1400 engineers in its two global Engineering Competences Centres, located in Bangalore and Noida. These centres focus on hardware, software and systems engineering capabilities for both the civil and defence sectors, serving global needs. In support of this expansion, Thales HR executives will be present during the public days to meet the Indian engineering talent at the Show and share exciting career opportunities with them.

Thales provides a wide range of products and services to aid the Indian armed forces in achieving operational superiority. Building on the four major pillars of digital technology: connectivity, big data, artificial intelligence and cybersecurity, Thales's solutions ensure mission readiness and simplify complexity so that military personnel can focus on strategic and operational decision-making.

In support of Indian Navy, Thales will showcase Sonoflash, a new generation of sonobuoy that strengthens anti-submarine warfare capabilities.

Lotus Microwave Technologies: Substantial Gains on Import Substitution

Lotus Microwave Technologies, found in 2013, by a group of Engineering Professionals with expertise in Defence aerospace and Space products, has an overall experience of 200+ man years. They have built specialized teams focusing on Design, Development and Supply of RF & Microwave products for Defence Aerospace and Space sector for Radar, EW, Missile & Other enterprise and Scientific applications. They have successfully developed 350 plus products through their dedicated R & D facility, enabling import substitutions and truly supporting the 'Make in India' initiative by the Government of India.

An ISO 9001-2015 certified company, they have excellent reputation in industry as RF Component, Sub-System and supplier and a value added system integrator. They are capable of designing and manufacturing Build to Spec (BTS) / build to print (BTP) RF and Microwave products and assemblies assuring required customization.

They are also known for a Rapid Turn-around partner for critical, time sensitive applications. A registered MSME organization, their object is to build sustainable and technically advanced products which can place India ahead on the globe in Defence, Aerospace and Space applications.

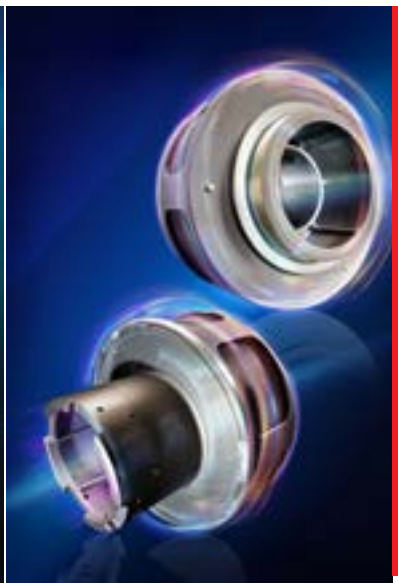
T V Dasaratha Rami Reddy
MD, Lotus Microwave

Their Major Products are:

- Solid State Power Amplifiers
- Transmit-Receive Modules
- Exciters
- Up/Down Converts
- RF Over Fiber Link- Upto18GHz (Up to 32 Ch)
- Synthesizers
- RF Simulators
- Antennas
- Waveguide (From WR 1500 To WR 28)
- Monopulse Tracking Feeds
- High Power RF Domes, RPF Pickup Probes
- Radomes
- High Power Cable Assemblies

The organization has grown from two engineers to 60 Plus able staff with a majority of them on technical side, capable of handling multidimensional RF and Microwave Products with vast experience in the domain. They also have strategic partnerships with complimentary verticals spread across and able to exhibit collaborative strength to the market.

Need for Supply Chain Resilience? Look to FAA Approved Alternatives



HEICO Corporation (NYSE: HEI, HEI.A) is a successful technology-driven aerospace, industrial, defense and electronics company with global businesses that have provided customers with innovative cost-saving solutions for over 64 years.

HEICO Parts Group (HPG) is the world's largest independent supplier of FAA-approved PMA parts for virtually every engine platform and ATA chapter, holding over 11,000 FAA approvals, and producing more than 500 new, highly engineered parts each year.

Continuing supply chain disruptions and cost pressures caused by COVID-19 has had a significant impact on aviation parts availability worldwide. Airlines are aggressively focusing on supply chain robustness and seeking operational cost-saving opportunities. HEICO's focus on providing an alternate sources is a natural way to increase supply chain robustness. HIECO's FAA-approved PMA parts and DER repairs provide aftermarket savings and parts availability for airline customers in these stressful times.

Through the COVID downturn and the resultant ramp back up, many operators have sought out HEICO's FAA-PMA parts as a solution to an AOG issue. Once they have resolved that particular AOG issue, the airlines recognize that PMA parts and DER repairs provide supply chain resilience and cost savings at the same time. HEICO is continuously working with these airline partners to find even more cost saving HEICO parts.

HEICO believes that the airlines in India have an opportunity to do the same by embracing HEICO's FAA-PMA offerings.

- HEICO is a strategic source for high-reliability aircraft parts, at attractive prices which result in substantial cost saving for airlines
- If a lease contract does not allow the use of FAA PMA, an airline should contact the lessor and request their allowance. In our experience, and especially with the current competitive environment, many lessors will moderate their positions if specifically asked.
- HEICO can assist in the effort to develop and implement a PMA policy if an airline does not already have one in place.

HEICO's success stems from the ability to create true leverage for loyal airline customers. While other companies may hold PMA, HEICO is unique in its size, financial strength and breadth of product offerings.

Since 2002, HEICO's customers have saved over $2 billion by using HEICO parts and repairs. HEICO projects to save airlines an additional $1.3 billion over the next 3-5 years.

Layers of Innovation in Additive Breakthroughs

Ankit Patel, CEO, Ankit Group, takes us through their saga of success from specialized fasteners, fluid fittings, machine components, four and five axis components and special small assemblies to the successful development of Additive Manufacturing to manufacture the Grid Fin for use in ISRO's Gaganyan mission

Ankit Patel
CEO, Ankit Group

Ankit Aerospace is one of India's leading aerospace component manufacturers specializing in the production of complex machine parts, fluid fittings, and small assemblies. Could you share the success story briefly?

When the Ankit Group started in the aerospace industry in the late 90s, there were very few private players making parts for the aerospace industry. We were forced at that time to invest heavily and bring all our manufacturing in house. Today, that has been our key reason for the success since we are able to manufacture the complete component in-house, including our heat treatment, surface treatment, and non-destructive testing processes.

The other key aspect in our success has been our people. Getting into the aerospace industry early, the key aspect was, "how do we find talent that understands the aerospace requirements?"

We realized quickly that we had to do it ourselves. We started with strong training programs where we recruited young ITI, diploma holders, and engineers and taught them the skills and specifications required for the aerospace industry. We found that it was easier to train young, enthusiastic engineers rather than taking people from another industry and retraining them.

Lastly, we have followed our customers' ambition for growth. As our customers have got more complex assemblies, complex parts and programs in India, we partnered with the customers to make sure that the technology they require was available in the country through us, and we could manufacture and supply the parts to them as required.

What are the range of products and services offered by the company?

We have different product lines that we offer today in the aerospace industry. Our legacy products have been the fasteners made of super alloys and high-strength materials like Titanium, Nickel alloys, high-strength steel as well as stainless steel and aluminum.

We also manufacture fluid fittings which is our new line of products. These are qualified product listed used in 3000 psi - 5000 psi pressure requirements in an aircraft and spacecraft.

We also make a portfolio of bushings, specialized four and five axis machined components. We have just acquired a company which manufactures plastic injection molded parts for the aerospace industry with materials such as PEEK and ULTEM. And lastly, we have been able to develop large-scale Additive Manufactured structural components (3D printed Titanium components) for space applications. The large components are as big as 2 meters by 1.5 meters in dimension.

How does the company associate with Indian DPSUs? How does the company support India's Atmanirbhar initiatives?

The Ankit Group works with several Indian Defense PSUs, HAL being one of our most valued partnerships to date. We developed the main rotor bolt for the helicopters which was tested and perfected over seven years and across 10 million load cycles. We also manufacture components for the LCA, and have special technology transfer in place to make licensed parts for use in LCAs. We also work with BDL for the missile program and manufacture very high-strength Titanium and Inconel fasteners for use in high-temperature applications.

Additive Manufacturing can also be used in fulfilling defense needs, and for products that need to be manufactured, tested and manufactured faster. Ankit Fasteners has a Joint Venture with Lisi Aerospace, and through this, we have been able to access technologies and bring them to India to support the aerospace and defense programs.

One of the big challenges we face currently is raw material sources, and up until now most of the raw material is sourced from abroad. To support the Atmanirbhar initiative, we have identified phases over five years to help source materials from India. The first step in this initiative for us is to finish the raw material, and over time move to sourcing and processing as well, an investment we are proud to make.

How strong is the company's export business?

Export is a key part of our business and today, we export about 75% of our products. As we build technologies for the domestic market and get better at it, it has opened up export markets for us as well. Our main export markets

are the US and Europe. Over the last years, the export business cycle and the domestic business cycle, provide a natural hedge against market's ups and downs. So, therefore our goal is to balance both the export business as well as domestic business.

Could you shed some light onto your R&D, production capabilities, and quality standards?

Quality processes are key investments that we make upfront. Today, we have all of the requisite aerospace approvals including being NADCAP certified for seven processes. We have qualified product approvals from various OEMs and also invest in Environmental approvals as well as approvals for our cybersecurity systems. All of these quality standards help us reduce the quantum of bad parts that make it to a system. A quality first focus also helps us standardize our processes.

With respect to R&D, over the years, our customers would give us the requirement, and we would develop and test the processes needed to fulfil this requirement. The main rotor bolt manufactured and tested over seven years for HAL is an example of this process. More recently, we work with our customers right from the design phase and then test the processes needed for manufacturing the component, which is what we have done in the case of Additive Manufacturing for manufacturing the Grid Fin for use in ISRO's human space programme.

Going forward, we intend to help our customers with both design and manufacturing the parts according to requirements of the end application.

Could you share the details of the company's participation at Aero India 2023? How do you look at the expo to explore business opportunities?

Aero India is a very important event for us as it gives us an opportunity to showcase our new developments to our customers. Over time, it has also become the place to meet all our customers, colleagues, and friends in the industry.

Strategically, participation helps us understand where the market is headed. There have been years where the show was very focused on domestic defense. There have been years where the show was focused on foreign OEMs. This gives us a good understanding of where we need to invest going forward. This year, we have two major announcements to make during the show.

The acquisition of R K Polymer Industries Pvt Ltd's plastic injection moulding business unit now allows us to add to our process capabilities and expands our portfolio of offerings for the aerospace industry.

A proud moment for us is the successful development of Additive Manufacturing (3D printing) to manufacture the Grid Fin for use in ISRO's Gaganyan mission. We have not only helped pioneer a new manufacturing process for the industry as a whole, but also reduced material use by up to 75% in this context. For the first time in history, the Grid Fin which is a critical part of the human space program would be tested with Additive Manufacturing anywhere in the world.

So we are excited to showcase these developments at Aero India 2023.

What are the main objectives of the company ahead? Could you share your expansion plans?

Going forward, we have three lines of business in the aerospace industry. The first line that we've been doing for the last 20 years is small and medium complex parts which includes specialized fasteners, fluid fittings, machine components, four and five axis components and special small assemblies. We continue to invest on the fastener capacity, development and fluid fittings and have also recently opened up a larger new facility of an additional 30,000 sq. ft. to be able to manufacture more fluid fittings.

The second line of business is the acquisition of engineered plastics for the aerospace where we are making a significant investment to expand capacity to meet the requirements of the aerospace industry.

The third development project and investment is in Additive Manufacturing of large-scale structures with the success of the trial with ISRO. It gives us the confidence to take on a larger role in investing in this technology, and to further develop complex Additive Manufactured parts for the aerospace industry.

Ilyushin offers latest versions of military transport aircraft, aerial tanker

The Ilyushin Il-76MD-90A is a deeply upgraded modification of the renowned Soviet-designed Il-76 military transport aircraft and comes with a host of advanced features. Meanwhile, the brand-new Il-78MK-90A tanker has improved aerial refueling equipment, can carry more fuel and has a longer life

Rostec's United Aircraft Corporation (UAC) is engaged in continuous expansion of its brand-new Ilyushin Il-76MD-90A heavy military transport aircraft in service. Late in November 2022, the company announced the handover of another Il-76MD-90A to the Russian Ministry of Defense. The previous plane was delivered in October. The export-oriented version of the aircraft is the Il-76MD-90A(E).

Improved features

The aircraft features improved main specifications compared to the previous variants of the Il-76. In particular, the flight range and the payload capacity have been increased, as well as the accuracy of flight navigation and landing. Moreover, the quality of radio communications is improved in the latest version of the aircraft. The ability of the aircraft to successfully perform tasks in harsh environments - including mountainous areas - is also enhanced by the ability to operate from unpaved airfields. The plane can be converted into ambulance or fire-fighting versions.

"The Il-76MD-90A is a deeply upgraded modification of the renowned Soviet-designed Il-76. It has received a new engine, an improved wing structure and a 'glass cockpit'. The aircraft also features an extended flight range and payload capacity. In fact, it is a new aircraft meeting all modern requirements, which will become the base of Russian military transport aviation," said Sergey Chemezov, the CEO of Rostec.

One of the main differences with the Il-76's previous models is the use of more powerful PS-90A-76 turbofan engines. These engines provide improved take-off and landing as well as cruising performance; increased payload; longer flight range and better efficiency. They also reduce fuel consumption and meet high environmental standards for noise and emissions.

Brand-new aerial tanker

The UAC also has also created the brand-new version of the Il-78 aerial tanker – the Il-78M90-A. Its export variant is the Il-78MK-90A. The Il-78-90 tanker has improved aerial refueling equipment, can carry more fuel and has a longer life. It can refuel up to four aircraft on the ground and one or two aircraft in the air. Apart from its main mission, it can be converted into a transport plane. When converted, the Il-78MK-90A carries a 60 t or up to 225 servicemen. During the conversion process, the fuselage fuel tanks and outboard refueling units are dismantled.

As the Indian Air Force (IAF) has already acquired and deployed Ilyushin's military transport aircraft and fuel tanker of the previous modifications, Indian participants at the Aero India 2023 expo in Bangalore would have a special reason to learn about the latest offerings from UAC.

AEROMAG ASIA

a magazine dedicated to aerospace & defence industry

Airshows and Defence Exhibitions

SL NO	Event	Date/Year	Country
1	LAAD Security 2023	**11-14 April,2023**	Rio De Janeiro, Brazil
2	IMDEX ASIA-2023	**3-5 May,2023**	Singapore
3	DEFEA-2023	**9-11 May,2023**	Athens, Greece
4	LIMA -2023	**23-27 May,2023**	Langkawi, Malaysia
5	Milipol Asia-Pacific 2023	**18-20 May,2023**	Singapore
6	Paris Airshow-2023	**19-25 June ,2023**	Paris, France
7	Army Expo-2023	**14-20 Aug,2023**	Moscow,Russia
8	DSEI-2023	**12-15 Sep,2023**	London,UK
9	Seoul ADEX-2023	**17-22 Oct,2023**	South Korea
10	Defence & Security-2023	**6-9 Nov,2023**	Bangkok, Thailand
11	INDO PACIFIC-2023	**7-9 Nov,2023**	Sydney, Australia
12	MILIPOL PARIS-2023	**14-17 Nov,2023**	Paris, France
13	EDEX-2023	**4-7 Dec,2023**	Cairo, Egypt
14	World Defence Show-2024	**4-8 Feb,2024**	Riyadh, Saudi Arabia
15	Singapore Air show-2024	**20-25 Feb,2024**	Singapore
16	DIMDEX-2024	**5-7 Feb,2024**	Doha, Qatar
17	MILIPOL Asia-Pacific-2024	**April, 2024(TBC)**	Singapore
18	DSA Malaysia-2024	**6-9 May ,2024**	Kuala Lumpur, Malaysia
19	Eurosatory-2024	**17-21 June, 2024**	Paris, France
20	Asian Defence & Security (ADAS)-2024	**25-27 Sept ,2024**	Manila, Philippines

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Rosoboronexport offers new joint aviation projects to India

Alexander A. Mikheev
Director General, Rosoboronexport

"Rosoboronexport is a permanent exhibitor at Aero India, where the Russian display traditionally stands out for its scale and the range of exhibited products for the Air and Air Defense Forces.

The exhibition gives us an excellent opportunity to showcase modern Russian-made weaponry and discuss the areas for further bilateral cooperation with India," said Alexander A. Mikheev, Rosoboron export Director General. "The military-technical cooperation between Russia and India is an example of industrial partnership with a number of completed and ongoing joint projects for all services of the armed forces. Today we are offering new points of cooperation within the joint development and production of high-tech products on the premises of Indian enterprises under the national Make in India program in compliance with all localization and technology transfer requirements." Russia's collective display, located in Pavilion B, includes the stands of Rosoboronexport, United Aircraft Corporation (a unit of Rostec), and Almaz-Antey Air and Space Defense Corporation. Delegations of Russia's major enterprises manufacturing products related to the thematic areas of the exhibition will also be working at Aero India. In addition, a wide range of various Russian military helicopters will be demonstrated at Aero India 2023. Among them are the upgraded versions of the Ka-52E and Mi-28NE attack helicopters and the Mi-171Sh military transport helicopters, which are in strong demand on the world market and in the Asia-Pacific region today.

Visitors to the Rosoboronexport display are invited to see Russian unmanned aerial vehicles, including the Orion-E reconnaissance/strike UAV, the Orlan-10E reconnaissance UAV and the Orlan-30, a new product launched in 2022. In the air defense segment, Rosoboronexport is showcasing the entire range of assets that can operate both independently and as part of an echeloned air defense system. Russia's collective display exhibits the S-350E Vityaz air defense missile system, the Viking, Tor-M2KM, Tor-M2E SAM systems, and the Pantsir-S1 self-propelled anti-aircraft gun/missile (SPAAGM) system. In addition, the company will offer the Igla-S and Verba man-portable air defense systems. Russian-made anti-drone systems, including Repellent, RLK-MCE, RB-504P-E and RB-504A-E, will also be on display. ■

Elbit Systems to present a range of military solutions at AeroIndia

Elbit Systems will present a range of defense, military solutions that address current and emerging operational needs with cutting edge technology at AeroIndia.

The company's stall located in Hall C, Stand 7.6 as well as at the stalls of the local partners and JVs will have both visual and interactive displays of our solutions. Elbit Systems is a trusted partner of the Indian Ministry of Defence and the Indian Armed Forces, with a technological legacy of close to 70 years and is well known for its groundbreaking military solutions that have supported dramatic changes on the battlefield.

Elbit Systems is committed to supporting the Indian Government's vision of "Atmanirbhar Bharat" and "Make in India" policies to help develop a sovereign defense industrial base. We continue to empower our long-standing partners and JVs with technology transfer for indigenous design, development and manufacturing for both Indian and for export customers.

The company's comprehensive solutions portfolio includes:

- Unmanned Aerial Systems (UAS)
- Aerial and Ground Precise Guided Munitions, Weapon systems and Advanced Fuses
- Advanced Chaff and Flares
- Electronic Warfare (EW) and SIGINT Systems
- Advanced EO/IR systems and DIRCM
- Avionic Systems and Helmet Mounted Displays
- Software Defined Radio (SDR) & C4I applications, Data-links and Satcom
- Satellites and Advanced payloads for Space-based ISR applications
- Land and Naval solutions including Artillery, Cannons, Turrets, Armored Vehicles and USVs. ■

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HITS: Flying High

A pioneering private institution in India to offer engineering education, Hindustan Institute of Technology & Science (HITS) was recognized as a Deemed to be University by UGC in 2008 and received the Category-II status from MHRD which empowers it with academic autonomy. They have over 7,000 students enrolled in the wide spectrum of Undergraduate, Postgraduate, Diploma, Research & Doctoral Programs in dive-se fields of Engineering, Technology, Architecture, Management, Law, Fashion Design, Aviation, Applied Sciences, Allied Sciences, and Arts and Sciences. Orient Flights Aviation Academy (OFAA), the first private flying training school in the country, is targeting to complete another 300 CPL by 2028 and to expand maintenance base along with flying base to multiple airports, says Dr. Anand Jacob Verghese, Chairman of Hindustan Group of Institutions, and Chairman & Managing Director Orient Flights Aviation Academy.

Dr. Anand Jacob Verghese
CMD, Hindustan Group of Institutions & Orient Flights Aviation Academy

Hindustan Institute of Technology & Science (HITS) has been a leading prestigious and recognised institution in India since 1985. What are the major milestones in the success journey?

Our success story begins from the time of inception as we were the pioneer private institution in India to offer engineering education. Since its inception in 1985, HITS is committed to bring forth enquiring minds, inspirational teaching, pioneering research, global ambition and social purpose. Our Institution was recognized as a Deemed to be University by UGC in 2008 and we also received the Category-II status from MHRD which empowers us with academic autonomy.

We today have over 7,000 students who are enrolled in the wide spectrum of Undergraduate, Postgraduate, Diploma, Research & Doctoral Programs in diverse fields of Engineering, Technology, Architecture, Management, Law, Fashion Design, Aviation, Applied Sciences, Allied Sciences, and Arts and Sciences.The technical courses at UG and PG levels are approved by AICTE. NBA has certified seven undergraduate programs offered for 2022-25.

We have 9 Engineering Programs with IET Accreditation from 2022 - 2024

In the 2022 Ranking List, the National Institutional Ranking Framework (NIRF)

has ranked us in the 151-200 band in the overall category, between 101-150 in the university category and 152nd position under the engineering institutions. Our Architecture programme has achieved the top 27th position and the School of Management is placed between the band of 102-125.

Could you talk about the wide spectrum of programmes offered by HITS, facilities, placement rate, infrastructure etc?

We offer programs in Engineering, Technology, Architecture, Management, Law, Fashion Design Aviation, Applied Sciences, Allied Sciences, and Arts and Sciences. The learning community comprises students from several foreign countries besides those from India.

NBA has certified seven undergraduate programmes offered for 2022-25 - Aeronautical Engineering, Computer Science and Engineering, Aerospace Engineering, Electronics and Communication Engineering, Electrical and Electronics Engineering, Information Technology and Mechatronics Engineering.

We have signed 130 MOUs with Industry and other organizations and recently signed an MOU with Royal Enfield and opened a National Training Centre in the HITS campus. We have also initiated programs with Tamil Nadu Skill Development Corporation (TNSDC).

HITS has been awarded many Patents, Funded Research Projects from leading organizations like Department of Science and Technology (DST), Defense Research and Development Organization (DRDO), Naval Research Board (NRB) and many others. We also have 7 Agreements signed for Twinning / Dual Degree programs and Semester exchange programs with 15 universities.

Recently we had added Centers of Excellence in Satellite Technology and in Underwater Robotics.HITS boasts of an excellent library facility with complete digital access to online databases like SCOPUS, IEEE, Springer, Science Direct, Nature, etc.

Orient Flights Aviation Academy (OFAA) stands as one of the best Pilot Training Institutions in India for the last three decades.

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How successful has the academy been in achieving its missions?

Orient Flights Aviation Academy (OFAA), formerly known as Orient Flight School (OFS), started in 1994 at Pondicherry Airport.

We are the first private flying training school, started by our visionary founder chairman Dr. K C G Verghese, to meet the growing requirements of pilots by the aviation industry and his mission is "To provide aspiring students world class standards of training to obtain CPL, to guide and assist them to achieve Airline Transport Pilot License." Till date we have produced more than 500 Commercial Pilots in India.

India's Regional Connectivity Scheme is being implemented, but there is an acute shortage of trained pilots. How does OFAA offer a solution to this issue? How do you intend to tap the potential in the sector?

At present OFAA has got 10 aircraft in our fleet (2 - Cessna 152, 6 - Cessna 172, 1- Piper Seneca and 1 – Tecnam P2006T) and making good number of flying hours. Though our performance is good, we are working on to enhance our flying hours and number of CPL produced, by increasing our fleet size and adding more operational bases in different geographical locations to tackle adverse weather conditions of prolonged monsoon and summer to fly more and produce more number of CPL in India.

OFAA has introduced the latest in flight training technology with the modern fleet of aircraft. How strong is OFAA's fleet? What are the operational highlights?

OFAA has got 8 Cessna 152 & 172 (2+6) which is more trusted by FTOs worldwide and more stable aircraft for beginners in flying with modern avionics system Garmin G-1000. For twin engine rating, we have got one Piper Seneca PA 34 and one Tecnam P2006T with avionic system Garmin - G1000. Also we have 2 flight simulators ALSIM – AL250 which helps students to improve their confidence in flying.

Our fleets are capable of giving VFR, IFR and Night flying to get CPL with multi engine and IFR rating. Our world class ground training helps our students to clear all technical and RTR exams easily.

Could you elaborate on OFAA's infrastructure, courses, faculties, syllabus and Training facilities including simulators?

OFAA have got 28 years of experience in flight training and created more than 500 CPL holders serving worldwide including Air India, Indigo, Go Air, Air Asia, Vistara Airlines and many more Airlines. Apart from that, many of them flying private jets for VIPs and in general aviation flying Charter aero plane. OFAA have 2 flight simulators ALSIM – AL250 which helps students to improve their confidence in flying.

Orient Flights Aviation Academy is equipped with the best-in-class training aircraft. We have a fleet of 10 Aircraft which include 8 Single Engine Aircraft – 6 Cessna 172, 2 Cessna 152 and 2 Multi Engine Aircraft – a Piper Seneca PA 34 and a Tecnam P2006T. Also, our aircraft have got a modern Garmin G1000 avionics systems.

The other strength of OFAA is our own fully equipped Maintenance facility with very efficient workforce. OFAA is giving Ground training and flying training for SPL it is a 7-weeks training which include Theory, 5 Hours VIRTUAL Flying in Simulator and Joy Ride in Cessna 172 / 152.

POP (Pilot Orientation Program) ,PPL (Private Pilot License): This is 6 months course and the Private Pilot License (PPL), is a qualification that permits the holder to act as a hobby pilot of an aircraft and he cannot be paid for his/her work. This training includes 40 hours of flying in Single Engine Aircraft + 10 hours in Simulator.

CPL (Commercial Pilot License with Instrument rating with Multi Engine Rating): This course comprise of 200 hours flying (185+15 Single and Multi Engine respectively) and ground classes.

Could you share the expansion plans of OFAA? What are the immediate goals to be achieved over the next five years?

OFAA's immediate goals and preparations under pipeline are to increase the fleet of our FTO and expand our training base to multiple airports, so that we can increase our flying hours and the number of CPL produced. Our target is to complete another 300 CPL by 2028. Also, we are expanding our maintenance base along with flying base to multiple airports.

RAVI THERMAL ENGINEERS : Manufacturer of Special Furnaces

Ravi Thermal Engineers specialise in manufacturing custom built furnaces and kilns [other than melting] to ensure maximum economy in overall cost. Ravi Thermal furnaces use Ceramic flibre wherever feasible, to reduce the mass and improve the quality of the insulating layer.

Furnaces built by Ravi Thermal are coated with ENECOAT, a Silicon Carbide based ceramic coating which has an emissivity of 0.8 at temperatures above 800C. This means that 80% of the heat incident on the walls is re-radiated into the chamber, thereby reducing the heat transmitted through the walls to tha atmosphere.

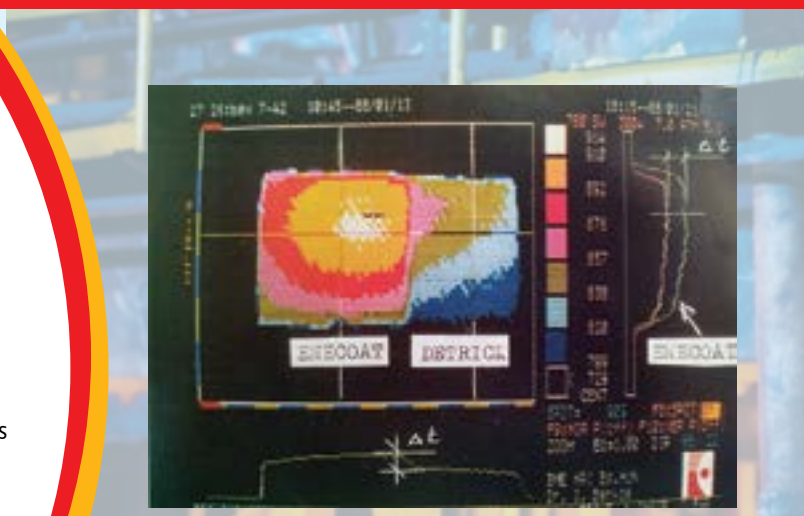
Bulk of the heat transfer at high temperatures is through radiation. If the quantum of heat radiated by the furnace walls increases, the heating time gets reduced. This is achieved by increasing the emissivity of the furnace wall and hearth.

The facts detailed above help customers to achieve higher production with economy in energy input.

It is easier to repair fibre lined furnaces than refractory lined ones.

It is possible to convert refractory lined furnaces into fibre lined ones and the cost can be recovered in less than a year.

The company offers its services in implementing the changes suggested herein.



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Airbus to recruit engineering, IT talent at Aero India

Airbus will host a public 'meet-and-greet' event aimed at recruiting engineering and information technology (IT) talent at the Aero India air show in Bengaluru on 16 and 17 February, 2023.

Aspiring candidates can meet Airbus executives at stand number CR7.1 in Hall C, where they can explore career opportunities in airframe design, avionics, aircraft systems simulation, data analytics, cybersecurity and cabin engineering. Candidates will also get a chance to interact with senior Airbus officials to find out more about the company's already extensive and growing footprint in India and South Asia.

"Airbus is a top destination for the very best of India's engineering and information management talent with a passion for aerospace," said Suraj Chettri, Director – HR, Airbus India and South Asia. "As a company, we believe in encouraging an atmosphere of ownership where employees feel valued, respected and professionally fulfilled. This is why Airbus is recognised as a great place to work for and was recently awarded Top Employers certification by the Top Employers Institute, a global independent authority, recognising excellence in people management and HR policies."

The talent scouting event at Aero India is part of Airbus' ramp-up for 2023 when it intends to recruit more than 13,000 people globally. The new hires will be instrumental in supporting Airbus' industrial ramp-up, decarbonisation roadmap and preparations for the future of aviation.

Peaks of Excellence in ODM Plus Solutions

SFO Technologies, the flagship company of NeST Group, which has been delivering Electronics Manufacturing Services (EMS) and Original Design Manufacturing (ODM) solutions for the last quarter century, incorporating Manufacturing 4.0 technologies in its wake, is now all set to unveil five airborne LRUs designed and developed by them for the indigenous aircraft programmes. SFO now has the distinction to be the Development and Production Partner for Power Management Systems for both the fighter and transport aircraft programmes. SFO aspires to be a Tier 1 supplier to a select group of international aerospace and defence OEMs, says N. Jahangir, Vice Chairman & Managing Director, NeST Group, in this interview in the context of Aero India 2023.

N. Jahangir
Vice Chairman & Managing Director, NeST Group

SFO Technologies has been catering to the aerospace and defence industry for over three decades. What are the major milestones in the success journey?

SFO became a Tier 2 supplier to civil aircraft program in 2016 and military programs in 2009. We became a significant offset partner for the Rafale Fighter Aircraft program in 2020. Our debut into the domestic aerospace and defence business was delayed since our operations were established in SEZs, where government regulations favoured the export business. We had our first taste of success in 2016 when we associated with DRDO on their first contract for the design and development of SONAR Power amplifiers.

In 2015, our first airborne design flew on board a French military aircraft, thanks to a Tier 2 French customer. It took us a few years longer to enter domestic aircraft programs. In this aspect, 2020 was an important year for us, as we won three contracts for CABS's Development and Production Partner for the 5th Generation Stealth Fighter program, and one contract with NAL for the Saras MKII program. As well, we were awarded contracts to develop military-grade lasers for CHESS and high-power power converters for LRDE.

Could you talk about the areas in defence and aerospace where the company has proven expertise in? What are the products and services offered?

SFO is a broad-spectrum, vertically and horizontally integrated player.

We have demonstrated ability in delivering projects from idea to volume manufacturing and long-term support.

Aside from our high-end design and development capabilities, we also have cutting-edge production facilities in Electronics, Cable Harness, Sheet Metal, Plastics, Machining, Magnetics, Photonics, and Fiber Optics, as well as high-level product integration.

A broad array of projects is currently being undertaken in the Aerospace and Defense domain, including Aircraft Power Management Systems, High Power Lasers, High Power Digital Amplifiers, High Power Converters, Fiber Optic Communication Systems, Fiber Optic Sensor Systems, Smart Displays, among others.

What are your operations in LRU Simulation, test bed development, Flight Data Analysis and Aircraft Performance?

We have extensive capabilities in circuit level, LRU level, and structural level simulations and analysis. There are state-of-the-art tools being used, including Mentor Hyperlynx, ANSYS Fluent and CFX, PLECS, PSpice, etc. Test engineering at SFO develops complex test systems for all of our products, including those that are built to specifications and those that are custom-made.

SFO is a pioneer in Flight Data Analysis and Aircraft performance analysis in India. This capability was acquired in 2008. We offer the analysis package as a software product, as well as offering the analysis as a service. We have interfaces for practically every type of aircraft, and our engineers regularly provide the service of downloading recorded flight data from aircraft and analysing and making reports.

How does the company associate with Indian Armed Forces and DPSUs?

- **SFO enthusiastically supports our Armed Forces, both directly and through the DRDO and DPSUs.**
- **Products including subsystems manufactured by us are regularly imported from our customers for the Armed Forces.**
- **We have deployed security equipment to protect the Army and Navy's nationwide data networks.**
- **We also support indigenization efforts across all armed forces.**

How strong is the company's operations in export sector? Could you shed some light on to your foreign collaborations?

SFO's main source of revenue in general, as well as in the A&D

arena, is exports. As previously said, we began with exports due to the advantages of our business being located in special economic zones. Currently, SFO contributes significantly to the offset commitments of most international OEMs supplying India.

We are unable to share specifics due to confidentiality agreements, but chances are that parts and sub assemblies supplied by us will be found in the majority of systems and equipment imported into the country today.

SFO has instituted an efficient ecosystem to mitigate the risk in supply chains, ensuring on-time delivery schedules, security of supplies, component management services, and adherence to compliance requirements. Could you elaborate?

SFO is pretty strong when it comes to setting up a novel supply chain ecosystem which has been functioning well even amidst the Covid pandemic, proving its robustness. Our major suppliers, distributors, consolidators, and logistics service providers have always been quite helpful to us, each one of them acting as an extended arm of SFO.

What are the highlights of the company's participation at Aero India 2023?

For the first time, SFO unveils five airborne LRUs designed and developed for the indigenous aircraft programmes. SFO is proud to be the Development and Production Partner for Power Management Systems for both the fighter and transport aircraft programmes.

For the first time, we are proud to announce that that we have conceived and developed the five airborne LRUs for the indigenous aircraft programmes.

We are also honoured to be the Power Management Systems Development and Production Partner for both the fighter and transport aircraft programmes.

What are the immediate goals to be achieved by the company in defence sector?

SFO aspires to be a Tier 1 supplier to a select group of international aerospace and defence OEMs.

We'd been serving Tier 1 firms for a long time and were being considered as a design and manufacturing provider by various OEMs.

However, things did not go as planned because to global events, particularly Covid. Considering the improved conditions now in place, we anticipate a significant rebound.

Maiden Landing of LCA Navy and MIG-29K Fighter Aircraft Onboard INS Vikrant Hailed

As part of the aviation trials, landing of the indigenous LCA (Navy) and MiG-29K Fighter onboard INS Vikrant, India's first Indigenous Aircraft Carrier, was carried out on February 6, 2023 by Indian Naval Test Pilots.

Admiral R Hari Kumar, Chief of the Naval Staff, hailed the successful landing and take off of the LCA Navy on INS Vikrant as "a momentous step forward towards the realisation of our collective vision of Aatmanirbhar Bharat."

The maiden landing of the Mig-29K also heralds the integration of the fighter aircraft with INS Vikrant," he said.

INS Vikrant is the first indigenous Aircraft Carrier and the most complex warship ever built by our country. It is a matter of pride that the ship has been designed in-house by Indian Navy's Warship Design Bureau and

constructed by Cochin Shipyard Limited. The ship had sailed for maiden Sea Trials on August 4, 2021. Since then, she has undergone sea sorties for trials of Main Propulsion, Power Generation equipment, Fire Fighting systems, Aviation Facility Complex equipment etc. The Carrier was commissioned into the Indian Navy on September 2, 2022. The Hon'ble Prime Minister of India, Narendra Modi was the Chief Guest.

The construction of the Carrier is a big boost to the 'Aatmanirbhar Bharat' vision of the Government of India. The Carrier has been undertaking extensive Air Operations with Rotary Wing and Fixed Wing aircraft since December 13, 2022 towards Air Certification and Flight Integration Trials for achieving the ultimate aim of being 'Combat Ready'.

The landing of LCA (Navy) on deck has demonstrated 'Aatmanirbharta' in India's capability to design, develop, construct and operate indigenous Aircraft Carrier with indigenous Fighter Aircraft. It is indeed a landmark achievement being the first time that trials of a prototype aircraft, indigenously designed and produced by Aeronautical Development Agency (ADA) and Hindustan Aeronautics Limited (HAL), has been successfully undertaken on an indigenous Aircraft Carrier. Further, the landing of MiG-29K onboard INS Vikrant is also a significant achievement as it marks the successful integration of the aircraft with the indigenous carrier as well as further enhances the Combat Readiness of the Navy. ■

Bharat Dynamics Limited – The Force Behind Peace


Akash Weapon System

Bharat Dynamics Limited (BDL) was established as a Defence Public Sector Undertaking under the Ministry of Defence Government of India on 16 July 1970 in Hyderabad, India to manufacture missiles for the Indian Army. Over the years, the Company has evolved into a multi-product, multi-located enterprise serving the multiple defence requirements of the Indian Armed Forces.

BDL manufactures Anti-Tank Guided Missiles (ATGMs), Surface- to- Air Missiles, Air-to-Air Missiles, Air-to-Surface Weapons, Launchers for ATGMs, Test Equipment, Underwater Weapons and Counter Measure Systems. BDL also provides its services for Refurbishment & Life Extension of vintage missiles. The Company is also making in-roads into new areas such as drone delivered pay loads like Bombs and Missiles, Mines etc.

After establishing itself as the backbone of India's missile armoury with advanced missile systems and buoyed by 'Make in India' policy and 'Ease of Doing Business' approach of the Government of India, BDL is shifting gears to take a leap from making weapons for Indian Armed Forces to manufacturing weapons for armed forces of friendly countries of the world by leveraging indigenous technology.

BDL offers a distinct array of products for export to friendly nations. These include Anti -Tank Guided Missiles (Man Portable Anti - Tank Guided Missiles, Amogha - III Nag, Konkurs - M), Surface-to-Air Missiles (Akash Weapon System), Air-to-Air Missiles (Astra Weapon System), Air- to- Surface Weapons (Smart Anti - Air Field Weapon & HELINA), Torpedoes (Light Weight Torpedo & Heavy Weight Torpedo) and Counter Measure Systems (Counter Measures Dispensing System & Anti - Submarine Warfare Suite).

BDL has already forayed into the Export Market by exporting Light Weight Torpedoes to a friendly foreign country. The Company is also in receipt of leads from several countries for its exportable products.

To cater to the growing demands and need to offer state of the art weapons to the Armed Forces, BDL is augmenting the resources for infrastructure developments and emphasis is being given to optimally invest for modernization requirements. Thrust is being given to explore tie-up with foreign OEMs for new weapons for potential Transfer of Technology, in addition to DRDO programmes.

BDL has three manufacturing units, out of which, two are located at Hyderabad and Bhanur in Telangana and one at Visakhapatnam in Andhra Pradesh. BDL is setting up three additional units, one at Ibrahimpatnam in Telangana, second one at Amravati in Maharashtra and third one at Jhansi in the UP Defence Corridor.

Giving a new impetus to its endeavours to enhance its current market position, BDL has adopted key strategies focussing on the following.

Expanding Infrastructure

The Company intends to continue to invest in infrastructure. The upcoming manufacturing facilities at Jhansi, Ibrahimpatnam and Amravati will enable the company to cater to the growing demand of its customers. These manufacturing facilities shall be utilised to manufacture SAMs and other new generation missiles and armament.

Automation

BDL has been constantly upgrading its manufacturing technologies and processes to state-of-the-art including industry 4.0, Robotics operated workshops, latest Surface Mounted Devices assembly lines and maintains highest quality standards

in its products by adopting to best QA practices. The pursuit results into reduction in production cost, benchmarking of productivity norms and modernization of management system and less dependence on imported technology. The Company intends to automate its production systems where feasible to increase the productivity.

Focus on Research & Development

BDL intends to increase its R&D activities to develop innovative products for its customers. BDL's R&D expenses have also grown up significantly over the past few years. The Company believes that development of new products will enable it to diversify its offerings and mitigate product dependencies. The Company has also established the missile development group with the objective to design and develop missiles. BDL is developing Artificial Intelligence based products. Thrust is also being given to efforts towards Innovation of in-house developed products. Synergy is being maintained between the industry and academia to sustain balance between experience and knowledge industry.

Improving Processes

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

New Generation Weapons

BDL intends to leverage its experience to develop weapons such as new generation SAMs, ATGMs, Air to Air Missile System and heavy weight torpedoes which will enable the Company to further increase its revenues. 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 on indigenization as a measure to achieve self-reliance in its manufacturing and offer competitively priced products to its customers. In the foreign collaboration programs that BDL has entered into, the company has been successful in indigenizing several 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.

During its over five decades of journey, BDL has graduated from being a missile manufacturer to a Weapon System Integrator. While BDL is relentlessly contributing to make the Indian Armed Forces self-reliant, it is also to endeavouring to export its 'Made in India' products to friendly countries to safeguard their boundaries with futuristic weapons.

The quest for technological excellence has been the guiding principle of BDL and living up to the sobriquet, 'THE FORCE BEHIND PEACE'.

Konkurs - M Anti-Tank Guided Missile

Nag Anti-Tank Guided Missile

Counter Measures Dispensing System

Astra Weapon System

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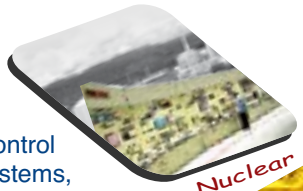

Nuclear

- Radiation Detectors, Control and Instrumentation Systems, SCADA Systems and Power Electronics Equipment.

Defence

- Electronic Surveillance and Warfare Systems, Command and Control Systems, Radio Communication Equipment and Electronic Fuzes.

Aerospace

- Antenna Systems, V-SAT Networks, Cockpit Voice Recorders, Inertial sensors and Actuators.

Security

- Integrated Security Systems, Electronics Jammers and Encryption equipment.

IT & e. Gov.

- Telecommunication equipment, IT and e-Governance solutions.

Health Care/Medical Systems

- Remote Health Monitoring System Tele-ECG, Cancer Hospital Information Management System

All Facilities under one roof

Manufacture and qualification of electronic products for strategic sectors

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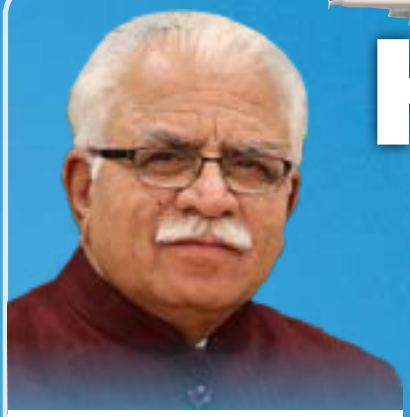

Mr.Manohar Lal Khattar
Hon'ble Chief Minister of Haryana

Mr. Dushyant Singh Chautala
Hon'ble Deputy Chief Minister of Haryana

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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.

SCAN
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As enshrined in our Constitution, "to strive towards excellence in all spheres of individual and collective activity so that the nation constantly rises to higher levels of endeavour and achievement" is the fundamental duty of every citizen of India.

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

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

Dr. E. V. Ramana Reddy, IAS
Additional Chief Secretary to Government, Commerce and Industries Department


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