2023 AERO INDIA

SHOW DAILY

13 February 2023

VAYU Day 1

Good to be back at Yelahanka!

LCA Tejas during rehearsals

Aero India's 14th edition starts off with two mega defence events being held within 4 months of each other. The dust had hardly settled after Defexpo in Oct'22 before preparations began on a war footing for this event. An incredible feat indeed for the organisers, DEO and Team, HAL and Team, IAF, RE Rogers and all others involved in putting the show together despite the odds! HAL, DRDO and BEL are among dozens of DPSU's leading the charge here at AI'23. Before we went to print, a total of 633 Indian exhibitors and 98 international exhibitors were registered to participate in one of the biggest editions of the series so far.

Rafale and Su-30MKI over the skies preparing for the big day!

DRDO/ADE Tapas UAV

DRDO has announced that the TAPAS UAV, designed/developed by Aeronautical Development Establishment (ADE) for tri-services successfully achieved a milestone flight test of 18 hours.

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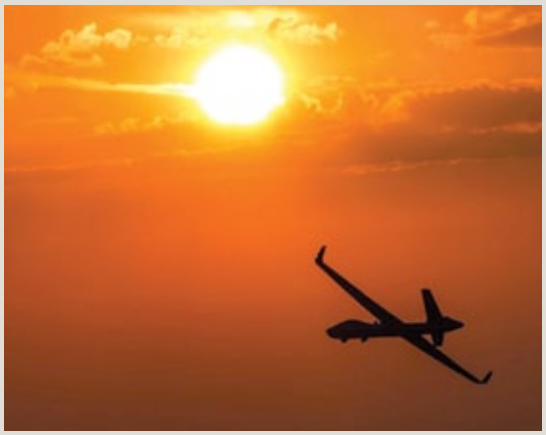
MQ-9A leased to India by GA-ASI completes 10,000 flight hours in 2 years

On 22 November 2022, a General Atomics Aeronautical Systems, Inc. (GA-ASI) MQ-9A Remotely Piloted Aircraft that is on lease from GA-ASI to India's Navy completed its 10,000th flight hour in support of India national security missions. The 10,000-flight hour mark has been achieved by two MQ-9As being operated by the Indian Navy during a period of almost exactly two years, with the maiden flight of MQ-9A taking place on 21 November 2020.

"The Indian Armed Forces have been impressed by the MQ-9A's over-the-horizon ISR support for surface units and Indian warships, as well as the exceptional endurance and operational availability of the platform," stated GA-ASI CEO Linden Blue. "Our MQ-9As have helped the Indian Navy to cover over 14 million square miles of operating area."

The MQ-9As are supplied to India by GA-ASI as part of a Company-Owned, Company-Operated (COCO) lease agreement.

GA-ASI and Bharat Forge in strategic partnership to manufacture aerostructures



In a major move to boost manufacturing in India, General Atomics Aeronautical Systems, Inc. (GA-ASI) and Bharat Forge Limited, India have announced a partnership to manufacture main landing gear components, subassemblies, and assemblies of remotely piloted aircraft. Part of the Kalyani Group, Bharat Forge is the largest repository of metallurgical know-how, design and engineering expertise, and manufacturing prowess in India.

"GA-ASI is eagerly looking forward to working with Bharat Forge in the critical field of aerostructure manufacturing," stated Dr. Vivek Lall, Chief Executive, General Atomics Global Corporation. "Bharat Forge's expertise in the field of forging is known globally, and their outstanding contributions in the aerospace sector has inspired us to work together for building the next generation of the world's most advanced unmanned aerial vehicles."

Mr. Baba Kalyani, Chairman and Managing Director, Bharat Forge Limited, states, "Aerospace is a high 'Technology Intensive' domain, which relies on Product Integrity, Reliability, and Zero Defect. This is a culture by itself and demands a strong focus on people and processes. As part of our aerospace growth strategy, our collaboration with GA-ASI is a strong testimony of our culture in Bharat Forge Aerospace to assimilate and demonstrate the same, as partners to General Atomics, in making India Atmanirbhar."

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SAAB TECHNOLOGIES

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Kalyani Rafael Advanced Systems rolls out 100th MRSAM missile kit

Kalyani Rafael Advanced Systems Pvt Ltd (KRAS), on 13 December 2022, rolled out the 100th Medium Range Surface to Air Missile Kit for delivery to the Indian Armed Forces. The kit is part of the MRSAM Air Defence Missile jointly developed by Rafael Advanced Defense Systems Ltd and DRDO and manufactured in collaboration with Indian industry comprising of both private and public sector players including MSMEs. The delivery of the 100th MRSAM Missile Kit takes place close on the heels of the delivery of the first firing unit to the IAF at Air Station Jaisalmer on 9 September 2021.

Dr BHVS Narayana Murthy, Distinguished Scientist and Director General Missiles & Strategic Systems handed over the 100th MRSAM Missile Kit to senior officers of the Indian Armed Forces in the presence of Mr Baba N Kalyani Chairman, and Managing Director, Bharat Forge Ltd and Maj Gen (Retd.) Yoav Har-Even, President & CEO Rafael Advanced Defense Systems Ltd, Israel.

Speaking on the momentous occasion, Mr Baba N Kalyani Chairman, and Managing Director, Bharat Forge Ltd stated, “KRAS is proud to accelerate the delivery of the 100th MRSAM Missile Kit for the Indian Armed Forces. This delivery is not only a shining example of synergy between India and Israel and the private and public sector but also reinforces our commitment to AatmaNirbhar Bharat as envisioned by our Prime Minister Narendra Modi”.

During his address Major General Retd Yoav Har-Even President and CEO Rafael lauded the joint efforts of all stakeholders in this programme. He stated, “We have been a reliable partner to the Indian Armed Forces for almost three decades and these missile kits are a testimony of our commitment to AatmaNirbhar Bharat”. He also stated that KRAS being a joint venture is a testament to the enhance cooperation between Israel and India in the strategic defence sector, as it leverages the technology of Rafael with the engineering strength of the Kalyani Group.

Mr. Rajinder Singh Bhatia, President & CEO, BFL Defence, Air Cmde Abhijeet Nene, Mr. U Raja Babu, Dir. RCI, Maj Gen Yoav Har- Even (Retd) President & CEO, Rafale, Dr BHVS Naryana Murthy, DS& DG MSS/DRDO, Mr. Baba N Kalyani, Chairman & MD Bharat Forge Ltd, Gp Capt. Deswal and Brig Gen. Pinni Youngman (Retd), Executive VP & GM AMDS Division.

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HAL's LCH Prachand inducted

In a big boost to Aatmanirbharatha in Defence, Raksha Mantri Rajnath Singh on 3 October 2022 presided over the formal induction of Light Combat Helicopter (LCH), designed and developed by Hindustan Aeronautics Limited (HAL), into the Indian Air Force (IAF) in Jodhpur. Naming LCH as "Prachand", Raksha Mantri said that its induction comes during the Amrit kal when the Nation is celebrating Azadi ka Amrit Mahostav and a pointer to the future when IAF will be the top most force in the world, as also making the country fully AtmaNirbhar in defence production requirements. Raksha Mantri also took a sortie onboard the LCH shortly after its induction into IAF.

Chief of Defence Staff (CDS) General Anil Chauhan, Chief of Air Staff Air Chief Marshal V.R. Chaudhary, Air Marshal Vikram Singh Air Officer Commanding-in-Chief, South Western Air Command, Chairman and Managing Director of HAL C.B. Ananthakrishnan, senior officials of Ministry of Defence, IAF and local dignitaries were present on the occasion.

Air Chief Marshal V.R. Chaudhary, Chief of Air Staff said on the occasion that induction of LCH adds unique capability to the IAF's combat potential. Versatility and offensive potential of the LCH is at par or better than most attack helicopters operating globally. Selection of the personnel in the No. 143 Helicopter Unit which will man the LCH have been made based on professional competence so as to ensure operationalisation of the unit at the earliest, he added.

The LCH is the first indigenous multi-role combat helicopter designed and manufactured by HAL. It has potent ground attack and aerial combat capability. Inducted in IAF's newly raised No.143 Helicopter Unit, it is a testimony to India's growing prowess in indigenous design, development and manufacturing and a significant milestone in the path towards 'Atmanirbharta' in Defence. The helicopter possesses modern stealth characteristics, robust armour protection and formidable night attack capability. Onboard advanced navigation system, guns tailored for close combat and potent air to air missiles make the LCH especially suited for the modern battlefield. Capable of operating from high altitude terrain and carrying out precision strike at high altitude targets, the helicopter is a formidable addition to IAF's arsenal.

All photos courtesy Vijay Seth who was at Jodhpur covering the event.

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HAL's ALH / LUH & more news

HAL Hands Over 16th ALH Mk III

HAL handed over the last of the 16 ALHs (Mk-III, Maritime role) contracted with the Indian Coast Guard at a programme on 15 November 2022 to DG Coast Guard V S Pathania in the presence of senior officials from CG, Defence and HAL. "We are proud to be associated with HAL and happy to issue a Letter of Intent (LoI) for nine more helicopters. Despite COVID-19, HAL delivered all the helicopters at the shortest time with seamless production activities and this allows us to strengthen India's Maritime security", he stated. The CG had signed a contract with HAL for supply of 16 ALH Mk III in March 2017.

Mr. C B Ananthakrishnan, CMD, HAL said a unique feature of the contract has been the Performance Based Logistics (PBL) – the one stop solution for maintenance of these helicopters by HAL. "This will serve as a benchmark for all our future contracts and boost our resolve to work with private partners to speed up the work in the interest of all our customers and strengthen Make-in-India activities in the Defence eco-system", he added.

Mr. S Anbuvelan, CEO (Helicopter Complex), HAL in his address pointed out the major challenges in execution of the contract that included integration of new systems sourced from foreign OEMs, conducting flight trials for certifications and overcoming disruptions in the supply chain due to lock-downs.

ALH Mk III is indigenously designed, developed and produced by HAL. The company has so far produced more than 330 ALHs, a versatile helicopter which has logged more than 3.74 lakh flying hours.

ICG DG sortie in LUH

Director General V S Pathania, Director General Indian Coast Guard lead a delegation of ICG officials to Helicopter Division, HAL Bangalore on 14 November 2022 and visited the design and development facilities of indigenously built state-of-art helicopters. The visit was aimed at strengthening the procurement of aviation assets developed, designed and manufactured by Hindustan Aeronautics Limited (HAL) in India, in tune with Aatmanirbhar Bharat initiatives.

HAL and LMW in MoU

HAL's LCA Tejas Division signed an MoU with Lakshmi Machine Works Limited (LMW) to manufacture 40 sets of Air Intake Assembly for LCA Tejas MK1A. The MoU was signed by Mr K Ravi, General Manager, LCA Tejas Division and Mr Chanabasappa S S, Head of Business Development, LMW.

HAL and IAI in MoU

HAL signed an MoU with Israel Aerospace Industries (IAI) Limited for leasing, operation and maintenance of fixed wing UAVs to the Indian Defence Forces. Through this MoU, HAL and IAI will collaborate on a prospective programme of Leasing of UAV systems to Indian Defence Forces. The MoU was signed by Mr Deepak Singhal, GM, AMD Nashik and Mr Moshe Levy, Executive VP, MAG Malat, IAI.

HAL and L&T in MoU

HAL's LCA Tejas Division signed an MoU with Larsen & Toubro Ltd for manufacturing 22 sets of Wing Assembly for LCA Tejas MK1A. The MoU was signed by Mr K Ravi, General Manager, LCA Tejas Division and Mr Laxmesh BH, VP & Head-Missiles & Aerospace Business of L&T.

HAL to support MRO of RD33 Mk Engine of MiG-29K/KUB

Hindustan Aeronautics Limited (HAL) signed an MoU with the Indian Navy for positioning of HAL team at Naval Aircraft Yard, Goa for supporting maintenance and repair of RD 33 Mk Engine of MiG 29K/KUB aircraft and imparting specialised training at Naval Institute of Aeronautical Technology (NIAT) Kochi. The MoU was signed by Mr D Maiti, Chief Executive Officer, MiG Complex and Rear Admiral Deepak Bansal, Assistant Chief of Naval Staff (Air Material) in the presence of Mr C B Ananthakrishnan, CMD, HAL, Vice Admiral Sanjay Mahindru, Deputy Chief of Naval Staff, AVSM, NM, Indian Navy and other HAL senior officers.

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Brahmos-ER ALCM tested

Indian Air Force on 29 December 2022 successfully fired the Extended Range version of Brahmos Air Launched missile against a ship target from a Su-30MKI aircraft. The missile achieved the desired mission objectives in the Bay of Bengal region. With this, IAF has achieved a significant capability boost to carry out precision strikes from Su-30MKI's against land/sea targets over very long ranges. The extended range capability of the missile coupled with the high performance of the Su-30MKI will give the IAF "a strategic reach and allow it to dominate the future battle fields".

NAMMO in big ammo order

Norway, a NATO member that shares a border with Russia, said it would place an order for shells worth 2.6 billion crowns ($263 million) to boost its stockpiles of ammunition. The Ministry of Defence has signed an agreement with the national ammunition manufacturer Nammo which, thanks to this "biggest contract ever", will increase its production capacity.

"There is a new geopolitical situation, there is a war in Europe and the level of preparation has been raised," the defence minister stated. "This creates a need for more military equipment, including ammunition because Norway and other countries need to build up their own stocks and because Ukraine is in dire need of military equipment". The Scandinavian country, which shares a 98-kilometre (61-mile) border with Russia in the Far North, has supplied various military equipment to Ukraine including artillery and ammunition.

Norwegian Defence Minister Bjørn Arild Gram (second from right) announced a huge order for ammunition and weapons systems from state-owned firm Nammo. From left: Nammo leader Morten Brandtzæg, Finance Minister Trygve Slagsvold Vedum, Gram and Rigmor Aasrud, leader of the Labour Party's delegation in Parliament, where the arms investment has broad support. (Photo: Forsvarsdepartementet)

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Safran expands presence and industrial footprint in India

On 7 and 8 July 2022, Safran inaugurated three new production sites in India and announced construction of a major new facility in 2025, bolstering its strategic partnership with the country. Safran has operated in India for 65 years and now counts 10 facilities and 750 employees in the country. These announcements, which represent more than $200 million of investment between 2018 and 2025, clearly reflect the Group's commitment to long-term development in the country.

"With these new sites, we're opening a new chapter in Safran's long history with the Indian aerospace and defence industries, and we are reaffirming our commitment to the government's 'Make in India' policy and sovereignty strategy," stated Olivier Andriès, Chief Executive Officer of Safran. "To support the country's dynamic aviation market, with passenger traffic set to more than double in the next twenty years, we are accelerating our investments and industrial development in India. Through the creation of our largest maintenance and repair centre for commercial engines we are also paving the way to expand our MRO activities in India to military engines. With our three new production facilities and our major in-house IT centre we will triple the number of employees in India over the next four years, building on the excellent local talent base."

Two new neighboring plants were inaugurated on 7 July in Hyderabad, for Safran Aircraft Engines and Safran Electrical & Power. The Safran Aircraft Engines plant, spanning 15,000 square meters (162,000 sq ft), will make rotating parts for the LEAP engine from CFM International. It will provide the additional capacity needed to meet the requirements of a production ramp-up for the commercial airplane engine of its generation. Eventually employing 275 people, this plant applies Safran's highest standards in terms of industrial processes, machinery and equipment and sustainability, with one-third of electrical power to be provided by solar panels.

During the inauguration, Jean-Paul Alary, Chief Executive Officer of Safran Aircraft Engines, announced the creation of a new maintenance, repair and overhaul (MRO) facility for CFM LEAP engines, to be built near

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this plant. The largest MRO centre in the network, it will start operations in 2025 and will eventually offer annual capacity of 250 to 300 engine shop visits. The LEAP and its predecessor, the CFM56, now power over 330 Airbus A320/A320neo and Boeing 737/737 MAX airplanes deployed by airlines in the Indian sub-continent. More than 1,500 LEAP engines are currently on order in the region.

Safran Electrical & Power's plant, located in the same airport zone as the Safran Aircraft Engines plant and sharing all support functions, makes wiring for LEAP engines and the Rafale fighter. Opened in November 2018, the plant has 150 employees today, growing to 200 when it reaches full capacity.

The third plant inaugurated on 8 July 2022 in Bangalore, for Safran HAL Aircraft Engines, a 50/50 joint venture between Safran Aircraft Engines and Hindustan Aeronautics Limited. This new site replaces the initial plant that dates from 2005, more than doubling the surface area and featuring state-of-the-art installations. It's located

in a Special Economic Zone near the Bangalore airport. Spanning 11,000 square meters (118,800 sq ft), the plant makes complex piping, mostly for the LEAP engine, and has about 150 employees.

VAYU Interview with Mr. Guru Biswal, CEO, Aerospace business division, Bharat Forge Ltd.

VAYU : What is Kalyani Group's vision for the aerospace business?

The Group's vision in Aerospace is to be the preferred partner for manufacturing critical parts, sub-systems, and products for OEMs and end users. We wish to add value to the entire chain of activities starting from aero grade raw material to the MRO. Our goal is to add value to the customer in the life cycle management of their assets.

VAYU : What are the latest updates on the operations of the aerospace vertical of the Kalyani Group?

We have a state-of-art manufacturing facility for critical engine and structural parts along with the assembly and testing facility of Jet Engines. The operational team is supported by a strong team of designers, both in process engineering and CAD/CAE, for the design of turbomachinery products, including micro turbines, along with product testing. This combination of component manufacturing, product design, and validation augmented with core design expertise has made us a very strong team to cater to the market requirements. The entire chain of activities is in a single Digital Thread, thereby giving a strong focus on "Product Integrity", "Traceability" and "Zero Defect" as required in the business.

VAYU : What are the opportunities arising in the sector and how is the group planning to tap the same?

The opportunities arising from the sector are both global and local. We have been seen as a reliant partner by global OEMs for taking up products as alternate sources considering faster new product developments by us. This is not only in parts or products but also in the development of aerospace-grade raw materials for the global supply chain. We have been already approved by a few OEMs and we are in the process with a few others.

The domestic market is largely for product spares and technical support to meet the fleet running needs and also for indigenisation and localisation efforts as part of the Make-in-India.

The Group is well prepared and acquiring capabilities to meet this demand scenario. We have seen a very positive response to our offers from both global and local customers.

VAYU : Has Kalyani Group received any proposal to manufacture items for the IAF?

Yes, we have been actively pursuing several proposals on parts, systems and sub-systems from the IAF, both for manufacturing and MRO.

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Azadi Ka Amrit Mahotsav

Saab's Gripen E: Perfect protector of Indian skies

The Gripen E is the ideal solution for the challenges and the threats faced by the Indian defence forces today and in the future. As a highly advanced, multi-role fighter, packed with new technology that delivers combat advantage, Gripen E is designed to provide operational dominance and flexibility with superior survivability and lethality. It delivers unique combat capabilities that set it aside from the competition, and from all known threats, and would provide the Indian Air Force (IAF) with a formidable force.

Here are just a few of the reasons why Gripen E is the perfect fighter for India:

Fast adaptation

The key to modern warfare is rapid adaptability – maintaining a technological advantage over capable adversaries – in effect, a fighter of tomorrow must adapt, must stay operationally relevant, every single day of the fight, so it can defeat any known or even unknown adversary. Gripen E is the only fighter in the world today that has the capability to do this. It is equipped with a smart avionics architecture where tactical functions are separated from the flight critical. Software algorithms can be upgraded without a need of new airworthiness verification testing, ensuring high availability. The architecture is also the basis for making rapid hardware and weaponry updates, with a high degree of alteration for each customer nation. The Gripen philosophy is to Fight, Learn and Adapt every day. This set Gripen apart from other fighter platforms of today.

Human Machine Collaboration

With the new avionics system, a highly advanced cockpit setup, complemented with cutting edge software, Gripen has evolved its Human Machine Interface (HMI). Today, Gripen uses a revolutionary new concept, labelled Human Machine Collaboration (HMC). This is a giant leap forward from the traditional HMI concept. The Gripen pilot and the aircraft system operate seamlessly together, but they also now collaborate, working together and supporting one another with rapid decision making, to achieve mission success. The next steps in this journey will be towards even deeper embedded operational Artificial Intelligence (AI) capabilities.

Decisive Information Advantage

A fighter mission can be compared to a large scale game of chess. It is crucial that every action is backed by the right evaluation and decision support. During a live mission, this can only be possible if correct information is shared within the tactical fighter formation. Gripen offers proven Network Centric Warfare capabilities including advanced data communications, dual tactical data links, satellite communications and video links, ensuring optimal situational awareness for the pilot in every moment. The net-centric capabilities include data linking within the tactical air unit, between Gripen AEW&C and C2 centers on ground or at sea, and with the Forward Air Controller. The suite of sensors delivers cross-domain data gathering and unprecedented level of networked sensor fusion. Information is quickly analysed and shared real-time, enabling critical decisions to be rapidly implemented, thus ensuring tactical superiority.

Lethality

Gripen E can be integrated with weapons for all types of missions; from guided glide bombs for precision engagement with low collateral damage, to long-range and agile air-to-air missiles and heavy anti-ship armaments. Fitted with 10 hard-points, an example of Air Supremacy is demonstrated by the carriage of up to seven long-range Meteor BVR missiles, 2 highly agile WVR IRIS-T missiles and a shoulder-mounted Recce or Designator pod.

But missiles and lethality are nothing unless a modern fighter can't dominate the electronic battlefield. Gripen E is equipped with a 360 degree spherical coverage AESA technology, Electronic Warfare (EW) and Electronic Attack (EA) capability. It means that Gripen E can enter a highly contested, hostile environment and deliver Air Supremacy, performing simultaneously offensive and defensive missions, whilst also surviving the fight. This makes Gripen E a game changer in the modern battlespace.

By Kent-Åke Molin, Head of Gripen for India Programme

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In combat, the ability to strike first is vital. A pilot engaging an enemy needs a missile that is able to react more rapidly than ever before, with the speed and agility to maximise the probability of a kill regardless of the target aircraft's evasive manœuvres or the deployment of countermeasures.
ASRAAM provides these capabilities. Used by the Indian Air Force, and with agreements in place for assembly in India, ASRAAM reaffirms the real partnership between MBDA and India.

VAYU Interview with Mr Bhanu Prakash Srivastava, CMD, BEL

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

CMD: 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.

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

CMD: 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.

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

CMD: BEL achieved 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 Stabilisation 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.

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***VAYU** : Tell us about your initiatives to diversify into the civilian business.*

CMD: 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.

***VAYU** : 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?*

CMD: 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.

Collins Aerospace opens new centres in India

As part of a significant investment to expand its engineering, digital technology, and manufacturing operations in India, Collins Aerospace, a unit of Raytheon Technologies Corp, has officially inaugurated its new Global Engineering and Technology Centre (GETC) and Collins India Operations Centre in Bengaluru. The new sites are part of a long-term growth strategy for Raytheon Technologies in India and globally to maximise collaboration and innovation providing cutting edge solutions for customers and provide additional STEM-based opportunities in the country.

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Boeing services solutions enabling higher mission readiness for India's defence forces

The Indian economy has witnessed remarkable growth over the last three decades. Accounting for 90% of South Asia's total economic output, it had been among the world-leading growth economies in the years before the pandemic. Over the past year, even while recovering from the impact of COVID-19, India's GDP grew by almost 7% to become the fifth largest economy in the world. India's economy is projected to grow at a 5.6% compound annual growth rate through 2041, a growth rate that continues to pace the world. As one of the fastest growing economies in the world, India offers tremendous growth and productivity opportunities for the aerospace and defence industry.

Boeing has been a trusted partner of India for more than 80 years and 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 (737 airframe) and two Head of State aircraft (777 airframe), all Boeing platforms. Ensuring mission-readiness for our customers and providing them seamless services and support on our platforms is an imperative for Boeing. Hence, we had setup Boeing Defence India (BDI) with an aim to provide holistic lifecycle solutions for defence customers in India.

BDI is leading investments in services infrastructure, building of local capabilities, workforce training and partnerships right here in India that are aimed at ensuring that 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.

Boeing services solutions for higher mission readiness

We are working with the Indian Air Force (IAF) and the Indian Navy (IN) to provide operational capability and readiness for the P-8Is, the C-17s, the Head of State aircraft and the Chinooks and Apaches. Boeing's integrated logistics support is already enabling the highest levels of fleet-readiness. We support the IAF's C-17 fleet under the Globemaster Integrated Support Programme (GISP), that maintains high mission capability rates, by providing them access to an extensive support network for parts availability and economies of scale.

Boeing provides comprehensive C-17 Globemaster III training solutions for aircrews and loadmasters with advanced simulation, courseware and computer-based training. C-17 operators can practice the complete range of tasks required for tactical military airlift operations and

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humanitarian missions, along with mission rehearsal of all scenarios including emergency procedures. Boeing's in-country C-17 training centre has completed thousands of training hours for aircrews and loadmasters.

Boeing offers long-term Performance Based Logistics (PBL) solutions for the platforms, namely, P-8I, Apache and Chinook, with a promise to provide the same level of availability we are currently providing for the C-17 fleet through our GISP programme. Boeing also offers training on platform simulators, just as we do today for the C-17 platform.

PBL strategies have a proven track record of transforming the legacy transactional support between Boeing and its customers, to solutions that increase aircraft availability, resolve Aircraft On-Ground (AOG) situations, and reduce the life-cycle cost of operating defence aircraft.

A PBL contract guarantees engineering, technical and material support for our customers at any hour and any operating location. Essentially, it ensures that the relevant parts are available at the required location and at the right time. PBLs translate to higher aircraft availability through better utilisation of inventory and the requirement for fewer spare parts.

Specifically for India, a PBL strategy will help resolve operational issues and enable further growth of the Aatmanirbhar Bharat vision by strengthening India's national defence industry. Boeing has globally executed over 12 Apache, and over 6 Chinook PBLs, bringing over 30 years of experience to enable long-term success of vertical lift readiness in India.

Notably, our offerings of the PBL solutions (also referred as: Aircraft Support Agreements) include our digital offering, that goes by the name of Mission Accelerator (MA). MA helps enhance availability of platforms significantly by providing predictability into maintenance. It also helps in operations and training of aircrew.

Boeing India Repair Development and Sustainment (BIRDS)

With more than 300 suppliers in India, we continue to explore areas for supporting the vision of Aatmanirbhar Bharat and adding more value to India's aerospace and defence ecosystem. In 2021, we launched BIRDS hub which is an in-country network and alliance of suppliers led by Boeing in India that envisions a competitive maintenance, repair and overhaul (MRO) ecosystem for engineering, maintenance, skilling, repair and sustainment services of defence and commercial aircraft. This network aims to drive high industry benchmarks in India for maintenance and repair, platform availability, customer satisfaction, quicker turnaround time. The initiative is designed to grow capabilities in India in the areas of heavy maintenance, component repairs, training and skilling. An important aspect of the hub is training programmes to increase skilled manpower by developing sub-tier suppliers and medium, small and micro enterprises (MSMEs) to build high quality MRO capabilities in India.

Boeing India's strategic collaboration with Air Works was an important first step under the BIRDS hub that envisions a collaboration with key local companies and businesses to develop India into an aviation and defence repair and sustainment hub. They have successfully concluded Phase 32 maintenance checks on six P-8I long-range maritime patrol and anti-submarine warfare aircraft operated by the IN so far. Three of them were in heavy maintenance checks concurrently, demonstrating a maturity and scale at par with developed global MRO hubs.

AI Engineering Services Limited (AIESL) entered into a strategic agreement with Boeing for the MRO of Boeing 777 IHoS aircraft operated by the IAF and is also exploring collaboration in repair and overhaul of landing gear and other commercial common 737NG equipment fitted on the IN's P-8I fleet. Horizon Aerospace won a Boeing contract for the MRO of key Boeing defence platforms in India, the P-8I operated by the IN and the VIP 737 transport fleet operated by the IAF.

We are committed to supporting the modernisation and mission-readiness of India's defence forces; that is why we are investing in partnerships across the ecosystem in skilling, research and development, and manufacturing. Our commitment to India is for the long term, and our vision is to bring the best of Boeing to India and export the best of India to the world!

Article by Surendra Ahuja, Managing Director, Boeing Defence India

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Tata Boeing Aerospace 1st fuselage for Indian Army AH-64 Apache

On 19 January 2023, Tata Boeing Aerospace Limited (TBAL) delivered the first fuselage for six AH-64 Apache attack helicopters ordered by the Indian Army from its state-of-the-art facility in Hyderabad.

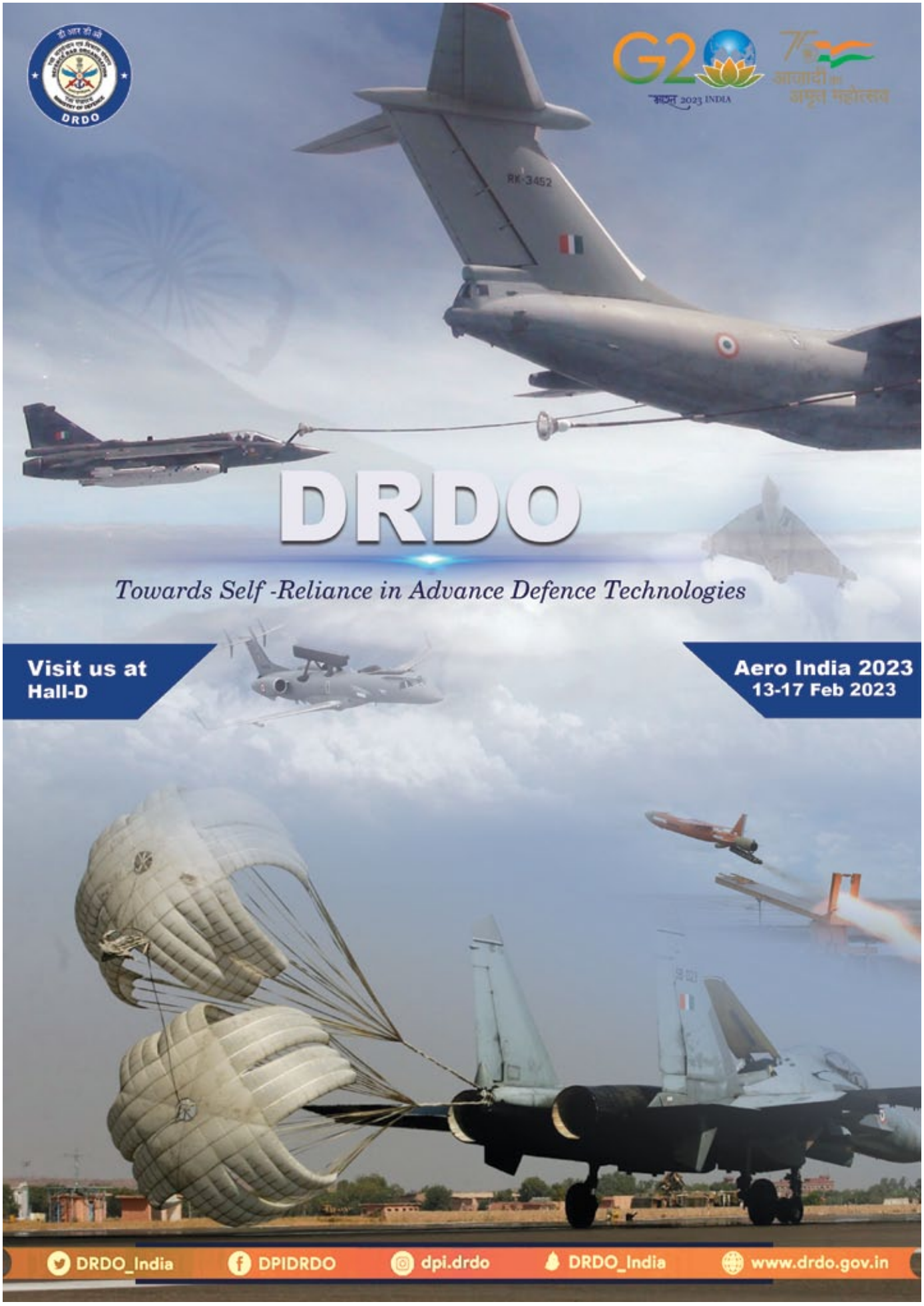
"This is a proud milestone and a testimony of our commitment towards Aatmanirbhar Bharat and the world-class manufacturing capabilities at our joint venture Tata Boeing Aerospace Limited at Hyderabad. The Apache will provide the Indian Army with a significant boost in capability just as the AH-64 has for the Indian Air Force," stated Salil Gupte, President, Boeing India. Boeing had completed the deliveries of all 22 AH-64E Apache helicopters to the Indian Air Force in 2020.

TBAL's 14,000 sqm facility in addition to being a global sole source supplier for Apache fuselages, produces complex aero-structures for Boeing 737 and 777 models. The joint venture between Boeing and Tata Advanced systems Limited (TASL) employs over 900 engineers and technicians and utilises cutting-edge robotics, automation and advanced aerospace concepts in its manufacturing processes.

"Successful delivery of the first fuselage for Boeing AH-64 Apache combat helicopters for Indian Army is the result of the hard work and seamless collaboration of the teams at TBAL, India. This delivery also positions TBAL and India as an important manufacturing base in overall Boeing operations. We stay committed towards progression of indigenous defence manufacturing with strong focus on the quality and timely delivery," stated, Sukaran Singh, Managing Director and CEO, Tata Advanced Systems Limited (TASL).

(Images from Twitter)

TBAL has produced and supplied Boeing's Apache final assembly plant in Mesa, Arizona with over 190 fuselages. More than 90 percent of the parts used in these aerostructures assemblies are manufactured within India through over 100 Micro, Small and Medium Enterprises (MSME) suppliers in support of the government's vision for Make in India. Tata Group recently won the "Supplier of the year" award 2022 from Boeing, from among more than 11,000 suppliers worldwide.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Rafael Advanced Defense Systems and India


Representational images of SPYDER Air Defence System

Rafael is deeply committed to its work and relationships in India, some of which go back more than two decades. Over that time, we've successfully delivered a variety of advanced systems and have established numerous collaborative projects and ventures such as the Kalyani-Rafael (KRAS) and Astra-Rafael (ARC) joint ventures.

Rafael was a pioneer in establishing a 49% FDI JV in India. By creating an ecosystem of over 100 local manufacturers, most of them MSMEs, we have successfully transferred production capabilities and know-how to our partners.

Spice bomb and Litening pod from Rafael. Photo: WikiCommons

More recently, Rafael has opened manufacturing plants in India; we continue to expand our operations throughout the country. These collaborations and partnerships remain central to Rafael's strategic approach to investment in and support of local manufacturing in India.

Rafael will be supported by its partnered Indian based companies Kalyani-Rafael (KRAS) and Astra-Rafael (ARC) with whom Rafael has joint ventures.

Rafael's operational legacy in India is evidenced by the array of systems and solutions that have been delivered over the last two decades and are still in active operational use. India based subsidiaries KRAS and ARC will be showcasing that legacy in India through various vectors which demonstrate comprehensive and advanced defensive capabilities.

Rafael's LITENING, the world's most widely used targeting and navigation pod, is a single pod incorporating a wide array of sensors enabling target detection, recognition, identification, and electro-optical tracking of multiple stationary targets. Known for its ability to shorten the sensor-to-shooter cycle, LITENING also provides auto-detection of multiple dynamic and aerial targets. LITENING is in operational use with over two dozen global air forces and is carried by over twenty-five platforms including the F-16, F-15, AV8B, F-18, F-4, F-5, A-10, B-52, Jaguar, LCA Tejas, AMX, Mirage 2000, Tornado, Typhoon, MiG-21, MiG-27, M346, KC390, Gripen, Sukhoi 27 and Sukhoi Su-30MKI.

Rafael's focus on the local industry within India is also well supported by the local manufacturing of the LITENING 4i.

The latest version of the Litening combat-proven targeting and navigation pod includes sensors enabling Standoff targeting; new Color/MWIR/SWIR sensors operational 24/7 in any weather conditions. It is an upgrade to the operational system used by the IAF, providing an enhancement to day and night attack operational needs; much longer standoff Ranges, much better image Resolutions and automated data analysis tools, Air to Air IRST capabilities. Operational on multiple platforms in the IAF and 22 other countries it is easily integrated into the operational and maintenance structure of older Litening version operators.

In use with the Indian Armed Forces, 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 individualised, operational needs.

Courtesy: Rafael Advanced Defense Systems

Safran in India

Safran has been present in India for more than 65 years and today has 750 employees in eight companies and a training centre, all working in production, design or services in the aeronautics and defence industries.

Aerospace: Safran-HAL, a joint venture between Safran and Hindustan Aeronautics Limited (HAL) in Bengaluru is producing the unit manufacturing components for CM56 and LEAP engines for CFM International (a 50/50 joint venture between Safran Aircraft Engines and GE). The Group is also one of the leading suppliers of wheels and carbon brakes for the commercial Airbus A320 and Boeing 787 Dreamliner aircraft used in India. Inaugurated in October 2016 in Goa, Helicopter Engines MRO Pvt. Limited (HE-MRO) is a joint-venture between Safran and HAL aiming to support local and international operators, including India armed forces.

Defence: Safran is one of the main contributors to the 36 Rafales acquired by India in 2016. The first fighter aircraft was delivered in October 2019. Group companies produce a large proportion of the systems and equipment, for instance the aircraft's M88 engine, the power transmission system, the landing gear, the wheels and carbon brakes, the ring laser gyro inertial navigation system, the gyroscopes for the fly-by-wire system, the auxiliary power unit (APU) and all the wiring systems. Safran is in addition managing the project for the Hammer modular air-to-ground weapon (AASM). It is also the primary supplier of inertial navigation systems for Indian combat aircraft. Sigma 95N navigation systems are used in the Sukhoi Su-30MKI, LCA Tejas, MiG-29, Jaguar and Hawk fighter planes. Over 500 fighter aircraft used by the Indian Air Force and Navy are equipped with inertial navigation systems produced by Safran.

Helicopter engines: The Group is the leading supplier of turbine engines for the helicopters used by the Indian Armed Forces, with more than 1,500 helicopter engines in service. The Shakti/Ardiden 1H1 engine, certified in 2009, is one of the key components in the partnership between the two countries. Co-developed by Safran and HAL, the engine is currently under construction in Bengaluru, badged as Shakti, using components manufactured mainly in India. It was initially selected for the Dhruv helicopter produced by HAL, which is now in service. It is also being used in the Light Combat Helicopter (LCH). To date, over 350+ Shaktis have been produced. More recently, the Ardiden 1U engine, derived from the Ardiden 1H1, designed specifically for single-turbine helicopters, was selected for the Light Utility Helicopter (LUH), a new and innovative single-turbine multi-function helicopter weighing three tonnes. The first technical flight of the Ardiden 1U in the LUH took place in September 2016 in Bengaluru, and met all its performance objectives. It was certified by Indian Directorate General of Civil Aviation (DGCA) in 2021.

Supporting research: To promote the development of increasingly innovative technologies and solutions, Safran has established a number of partnerships with leading Indian scientific and educational institutions. The collaboration with the Indian Institute of Science (IISc) in Bengaluru and the Indian Institute of Technology (IIT) in Delhi focuses in particular on subjects such as the Internet of Things and processors and parallel processing: topics that relate to current and future challenges.

Lockheed Martin recognises HELLFIRE II's sole international supplier

At Lockheed Martin's annual Suppliers Conference held in Bengaluru, SASMOS HET Technologies Ltd. was awarded as an Outstanding Supplier by Lockheed Martin RMS and Missiles and Fire Control Global Supply Chain Organisations and the programme teams. SASMOS is a critical player in the HELLFIRE II's supply chain as the producer of its mission-critical cables.

This recognition was for their dedication to the success of the Aegis Low Noise Amplifier (LNA) and HELLFIRE programmes. Lockheed Martin representatives praised SASMOS for their dedicated support and partnership as the sole international supplier for the HELLFIRE II AGM-114R missile for the past two years. Despite the challenges of the pandemic, SASMOS successfully delivered over 18,000 assemblies, showcasing a strong customer-focused approach and meeting or exceeding expectations.

The precision-strike AGM-114R multi-purpose HELLFIRE II consolidates the capabilities of all previous HELLFIRE II variants equipped with semi-active laser seekers into a single missile that defeats a broad range of targets. It can be launched from multiple air, sea and ground platforms, autonomously or with remote designation.

India's Defence Budget announced on 1 February 2023 (for 2023-24)

- **Rs. 5.93 lakh crore (12.95% increase over previous year's Rs 5.25 lakh crore)**
- **Capital outlay up Rs 12,000 crores to Rs. 1.62 lakh crores (Rs. 1.50 lakh crores in 2022)**
- **Indian Army: 37.24 thousand crores**
- **Indian Navy: 52.80 thousand crores**
- **Indian Air Force: 57.13 thousand crores**

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News from Russia's UAC

MC-21 to prepare for joint pilot operation

The experimental MC-21 aircraft of Irkut Corporation (part of PJSC UAC of Rostec State Corporation), painted in the livery of Rossiya Airlines (Aeroflot Group), arrived early December 2022 at Flight Test and Development Complex of Yakovlev Design Bureau, where it will be prepared for joint pilot operation. As part of the MC-21 joint pilot operation programme, Irkut Corporation and Rossiya Airlines plan to train command and instructor personnel and instructor pilots, gain experience in air transportation on standard airliner routes, and also work out operating procedures.

(Photo: Aleksey Simanovich/ planespotters.net)

In total, three experimental MC-21 aircraft will take part in the programme, which will be based at the Ramenskoye airfield, where Flight Test and Development Complex of Yakovlev Design Bureau is located. The pilot operation programme is currently being coordinated with the relevant federal agencies. At the first stage, piloting will be carried out by test pilots of the Yakovlev Design Bureau. MC-21 is a new generation medium-haul passenger aircraft with a capacity of 163 to 211 passengers.

2nd MC-21 prototype flies with Russian PD-14 engines

The second MC-21 aircraft has completed its first flight with domestic PD-14 engines, Russia's state-owned Rostec has announced. The aircraft took off from the airfield of the Irkutsk Aviation Plant, a branch of UAC's subsidiary Irkut Corporation. In addition to installing the PD-14 on the aircraft, the systems were finalised based on the results of past flight tests. Also, in order to integrate the domestic power plant, a number of imported aircraft equipment components were replaced with Russian counterparts.

After completing the flights, the MC-21 prototype will fly to Zhukovsky to continue certification work on the basis of the Flight Test and Development Complex of the Design Bureau named after AS Yakovlev. Initially, the MC-21 project was developed with two types of powerplants, but the aircraft will go into serial production with the Russian PD-14 engine. Possessing a high bypass ratio, the PD-14 is characterised by low fuel consumption and reduced noise levels.

(Photo: Denis Fedorko/ russianplanes.net)

UAC exhibits a wide range of aircraft

United Aircraft Corporation (PJSC UAC, part of Rostec State Corporation) participated at the international exhibition Indo Defence Expo & Forum 2022, in Jakarta, Indonesia with a wide range of products. The multimedia exposition included a wide range of civil and military aircraft such as MC-21 medium-haul airliner, SSJ-100 regional jet, Su-30SME multifunctional fighter, as well as Yak-130 combat trainer.

One of the key models at the UAC exposition was the MC-21, a new generation medium haul passenger aircraft. This model offers passengers comfort comparable to the cabins of mainline airliners, significant economic advantages to carriers, convenience for the crew and maximum level of environmental safety. Serial production of SSJ-100 is currently carried out by the production centre of Irkut Corporation in Komsomolsk-on-Amur. Prototypes of import-substituted versions of the aircraft (SSJ-NEW) are also being assembled there as a preparation for the serial production of the airliner.

In addition to civil aircraft, the supermaneuverable multifunctional two-seat Su-30SME fighter was presented as part of the UAC exposition. The aircraft is designed for attacking aerial targets in free airspace and against the background of the earth, as well as ground and surface targets day-and-night in favorable and adverse weather conditions.

Another aircraft demonstrated was the combat trainer Yak-130. This model is characterised by high maneuverability and modern avionics complex, typical for advanced combat aircraft. Yak-130 has a subsonic aerodynamic configuration and flight performance characteristics. It can be successfully employed to train pilots in conditions close to a combat situation with the use of air-to-air/air-to-ground weapons.


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Good going for Dassault Aviation in 2022

"The Rafale chosen by the United Arab Emirates to equip their air forces in December, Dassault CEO, Éric Trappier, signed a contract in Dubai for the supply of 80 Rafale aircraft to the UAE Air Force. The signing took place in presence of the President of the Republic, Emmanuel Macron, and Sheikh Mohamed bin Zayed Al Nahyan, then Crown Prince of Abu Dhabi and Deputy Supreme Commander of the UAE armed forces. It is the largest contract in Dassault Aviation's history. Its effective date was announced on 19 April 2022. It is the result of more than 45 years of trust between the UAE and our company through The Mirage family, and in particular The Mirage 2009".

"It is yet another demonstration of the excellence of the Rafale and the French aviation industry. The Rafale demonstrates its versatility, efficiency and reliability daily in many theatres of operation. It continuously integrates feedback from the armed forces and the latest innovations to stay at the cutting edge of technology".

"The French Ministry of the Armed Forces, Directorate of Aeronautical Maintenance, has awarded the Dassault Aviation a new generation contract, Balzac, to support the French Air and Space Forces' Mirage fleet. This follows from the Ravel contract which guarantees excellent Rafale availability for the armed forces. Covering a period of 14 years, this verticalised contract includes all through life maintenance activities for the French Mirage 2000, excluding the engine and the ejection seat".

"On 19 January, six Rafales flown by the Greek Air Force's crews, took off from an east side to the Tanagra Air Base. Our CEO was a guest at the ceremony, presided over by the Greek Prime Minister. The entry into operational service for these first six Rafales in the Hellenic Air Force 332 Squadron clearly demonstrate the strong partnership between France and Greece, just one year after the signature of the contract for 18 aircraft".

Rafale

Éric Trappier, Chairman and Chief Executive Officer of Dassault Aviation presented the "2022 first half-year results" during a press conference

"On 24 March, the CEO and the Greek Defence minister signed a new contract for six additional Rafales in Athens in the presence of the French Minister of the Armed Forces. This will bring the number of Rafales operated by the Hellenic Air Force to 24. This year, two Greek Rafales also took part in the traditional 14th of July parade".

"In late January, Dassault Aviation attended the second edition of La Fabrique Défense trade show in Paris alongside GIFAS and the French aerospace industry. For three days, defence and industry professionals gave a large number of young people the chance to discover the challenges of

Falcon 6X

defence and to find vocations, training opportunities, and professions for their future".

"On 10 February, Éric Trappier and Air Vice Marshal Yusuf Jauhari, Head of Defence Facilities Agency for the Indonesian Defence Ministry, signed a contract in Jakarta for the purchase of 42 latest generation Rafale aircraft in the presence of French Defence Minister, Florence Parly. Once the contract comes into effect, Indonesia will become the eighth country to purchase a Rafale and the seventh international customer and the first country having never had a Dassault aircraft to acquire new Rafales".

"Now we're going to continue the development of work in France on our F4 standard, which is the armed forces standard for the UAE and for France, the launch of the productivity works to allow Batch 5 contracts for 2023; around 42 aircraft".

As for military support, we are delivering the retrofits of Mirage 2000D. The Mirage 2000D will keep flying together with the Rafale aircraft air/air and air/ground improvements. Ravel for Rafale, or ATL 2 for Ocean, and Balzac contract for the Mirage 2000D but also for the other Mirage 2000 that will still be flying in the coming years".

"Future Combat Air System launched in February 2020. Phase 1 work was completed at the beginning of the year. We are waiting for the contractualisation of the Phase 1B after Phase 1A. This contract should have been signed at the end of last year or before the end of 2021, and we encountered a few interpretation difficulties of what 'prime contractor' means between Dassault and Airbus, and we are still at that point right now".

"For the export support for our fleets and all the service platforms that we're setting up to improve the support and be as close as possible to our clients for all the Rafales that were delivered to four countries - Egypt, Qatar, India and Greece. Our training centre in Mérignac is still running, especially now, to train pilots and Greek mechanics who have bought the Rafale".

"Falcon 10X, we are still developing it. So, this is an ultra-long range aircraft. We are developing a new cockpit. We have a technology and innovations centre. All this was presented. The cabin; we are really insisting on that in terms of comfort because these are long flights, because it's an ultra-long range aircraft, and the design has already received a certain number of awards thanks to the mock-ups of size one that we have manufactured and that we're taking around the world so that our future clients might realise how pleasant it is and how efficient this cabin is once this aircraft will be flying. The state of the programme - we finished the wind tunnel test. We have produced the first parts of the Falcon 10X. The development of the Pearl10X engine is taking place well with 1,000 test hours. So therefore we are quite satisfied with this development. But of course, it's a very ambitious plan and the COVID issues have stopped us from working as we usually do, with an integrated platform in Saint Cloud before each one goes back to his company to carry out the ad hoc developments."

(All photos: Dassault Aviation)


A fully loaded Rafale off on a mission

Some achievements of DRDO in 2022

New Generation Akash Missile (Akash-NG): The successful flight trial of New Generation Surface to Air Akash-NG Missile was conducted from a land-based platform with all weapon system elements such as Multifunction Radar, Command, Control & Communication System and launcher participating in deployment configuration.

Akash Prime Missile: A new version of the Akash Missile 'Akash Prime' was successfully flight tested from ITR, Chandipur. It is equipped with an indigenous active Radio Frequency seeker for improved accuracy.

Short Span Bridging System-10 m: The SSBS-10 m was inducted into Indian Army. It plays a crucial role of bridging the gaps as a single span providing a wide, fully decked roadway, ensuring faster movement of the troops. The system will help in quick movement of troops and enhance the mobilisation of resources.

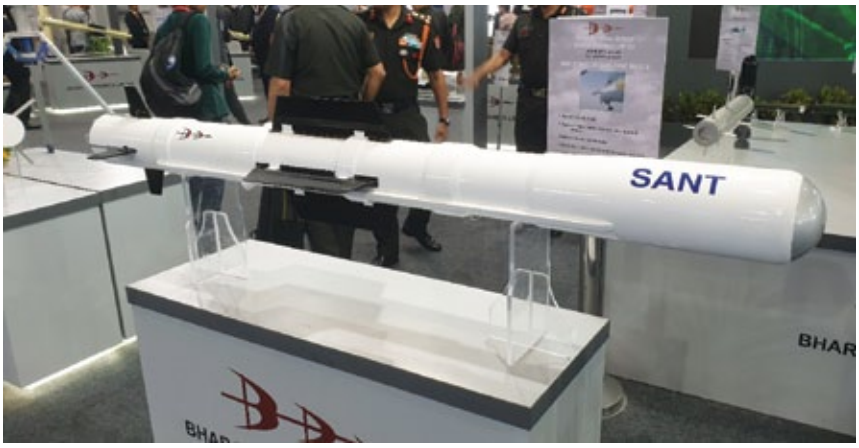
Advanced Chaff Technology: The technology was developed by DRDO to safeguard the fighter aircraft of Indian Air Force against hostile radar threats and enemy missile attack. Chaff is a passive expendable electronic countermeasure technology used worldwide to protect naval ship from enemy's radar and radio frequency missile seekers.

Long-Range Bomb: DRDO and IAF successfully flight-tested indigenously developed Long-Range Bomb from an aerial platform. The Bomb, after release from the IAF fighter aircraft, guided to a land-based target at a long range with accuracy within specified limits.

Abhyas: The High-speed Expendable Aerial Target was successfully flight-tested from ITR, Chandipur. Abhyas can be used as an aerial target for evaluation of various missile systems. This indigenous target aircraft, once developed, will meet the requirements of High-speed Expendable Aerial Targets.

Smart Anti-Airfield Weapon: Two successful flight tests of indigenously-developed Smart Anti-Airfield Weapon (SAAW) was carried out jointly by DRDO and IAF at Chandan ranges at Jaisalmer, Rajasthan. DRDO has indigenously designed and developed SAAW capable of engaging ground enemy airfield assets such as radars, bunkers, taxi tracks, and runways etc. The high precision guided bomb is light weight as compared to weapon system of the same class.

Pralay: The maiden flight test of indigenously developed surface-to-surface missile 'Pralay' was successfully conducted by DRDO from Dr APJ Abdul Kalam Island. The missile can be launched from a mobile launcher. This was a new generation missile equipped with modern technologies and induction of this weapon system will give necessary impetus to the Armed Forces.



Supersonic Missile assisted Torpedo System: DRDO developed supersonic missile assisted torpedo (SMART) system was successfully launched from Wheeler Island in Odisha. The system is a next generation missile-based standoff torpedo delivery system. It has been designed to enhance anti-submarine warfare capability far beyond the conventional range of the torpedo. The system will further enhance the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strength of our Navy and promote self-reliance in defence, harnessing of expertise and capabilities.

Stand-Off Anti-Tank Missile: DRDO and IAF flight-tested the indigenously designed and developed Helicopter launched Stand-off Anti-tank (SANT) Missile from Pokhran ranges. The missile is equipped with a state-of-the-art MMW seeker which provides high precision strike capability from a safe distance.

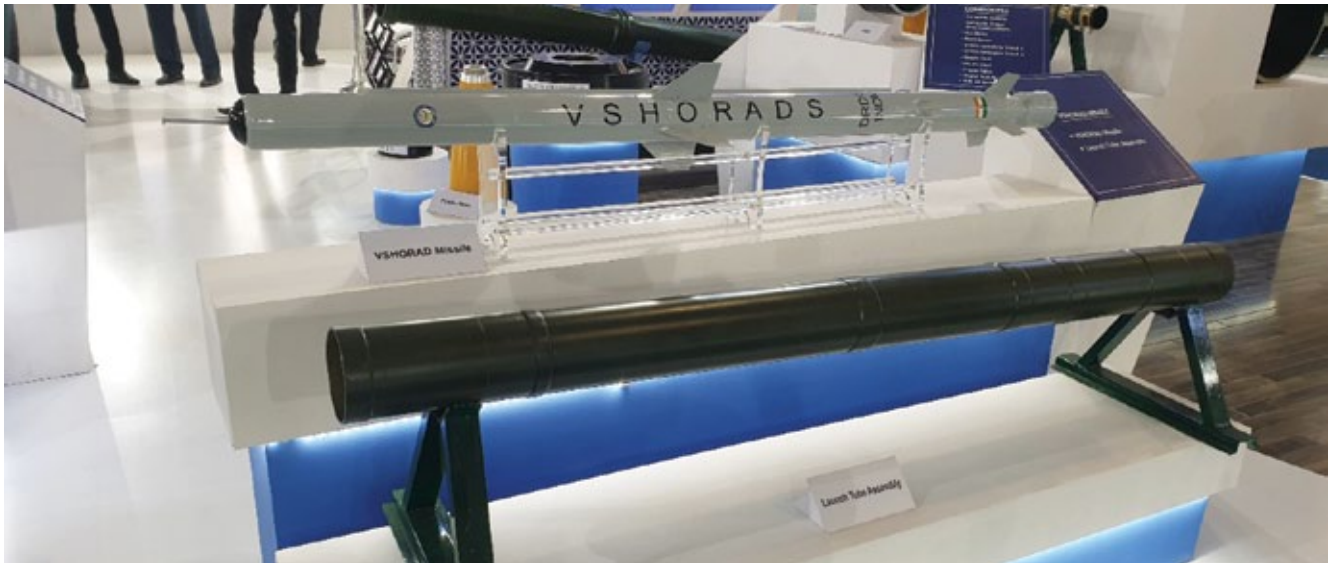
Pinaka: Pinaka Mk-I (Enhanced) Rocket System (EPRS) and Pinaka Area Denial Munition (ADM) rocket systems were successfully flight-tested by DRDO and Indian Army at Pokhran Firing Ranges. The EPRS is the upgraded version of Pinaka variant which has been in service with the Indian Army for the last decade. The system has been upgraded with advanced technologies enhancing the range to meet the emerging requirements.

Solid Fuel Ducted Ramjet Technology: DRDO successfully flight tested Solid Fuel Ducted Ramjet booster, which demonstrated the reliable functioning of all critical components involved in the complex missile system. The SFDR-based propulsion enables the missile to intercept aerial threats at very long range at supersonic speeds. With the successful trial of SFDR, the range of air-to-air missiles can be enhanced.

Very Short Range Air Defence System: DRDO conducted two successful test flight of Very Short Range Air Defence System from a ground based portable launcher at ITR, Chandipur. It is a Man Portable Air Defence System designed and developed indigenously by DRDO in collaboration with Industry Partners.

BrahMos contract with Philippines: BrahMos Aerospace Private Limited (BAPL) signed a contract with the Department of National Defence of Philippines for supply of Shore Based Anti-Ship Missile System. The BAPL is a joint venture company of DRDO. The contract is an important step forward for Government of India's policy of promoting responsible defence exports.

Flight Control System Integration complex: The state-of-the-art seven story Flight Control System Integration facility at Aeronautical Development Establishment, Bengaluru was constructed in record 45 days, with in-house hybrid technology consisting of conventional, pre-engineered and precast methodology. The technology has been developed by DRDO with the help of Larsen & Toubro. This facility will support R&D activities for developing Avionics for Fighter Aircraft and FCS for Advanced Medium Combat Aircraft being undertaken by ADE, Bengaluru. The complex will also provide simulator training to the pilots of combat aircraft.



IAI announces a new subsidiary located in India

Israel Aerospace Industries (IAI) has opened a new subsidiary located in New Delhi, Aerospace Services India (ASI). IAI's investment in Aerospace Services India is a strong demonstration of IAI's support for the Indian government's 'Atmanirbhar Bharat'- Make in India vision. This also shows the commitment to the strong partnership between IAI and DRDO in developing and supporting advanced systems for the Indian armed forces. Boaz Levy, IAI's President and CEO stated, "Aerospace Services India is leveraging top technology, innovation, and talent to deliver customer satisfaction so that they can focus on their mission. IAI has a well-established operation in India, working with various partners and customers in the Indian market. Through the years, IAI has pursued a flexible and adaptive business policy to comply and respond to PM Modi's 'Self-Reliance' vision."

Boaz Levy, IAI's President and CEO

IAF CAS Air Chief Marshal Vivek Ram Chaudhari visited IAI India Group booth at Defexpo and was introduced to IAI and HAL "Make in India" Flight Refueller Aircraft (FRA) converted from Boeing B767.

IAI highlights commitment to India's defence ecosystem

IAI India Pvt Ltd, a subsidiary of Israel Aerospace Industries Ltd., showcased its advanced technologies, air-defence systems and ground-combat solutions at Defexpo 2022. Boaz Levy, IAI President and CEO stated, "IAI is proud and excited to be exhibiting at this year's Defexpo, emphasising our commitment to the local Indian defence ecosystem. We have been innovating and delivering state-of-the-art technologies that have expanded our partnerships and collaboration with India's industry-leading companies in both the public and private sectors. For the last three decades, we have been jointly developing tailor-made, cutting-edge solutions to meet India's unique challenges. As a trusted partner in India, IAI's elite technological solutions are deployed throughout the Indian defence forces. As we celebrate thirty years of friendship with India, we are re-pledging our commitment to India's self-reliance campaign and seek opportunities to further advance the 'Make in India' vision. We look forward to meeting our friends and partners while exhibiting our cutting-edge technologies to the Indian, Asian, and global markets during this prestigious defence exhibition."

IAI India Pvt Ltd showcased a wide array of aerial systems, including its Medium Altitude Long Endurance (MALE) strategic Unmanned Aerial Systems (UAS) Heron TP, and its most advanced UAS to date, the Heron MK II. In addition, IAI exhibited its unique Vertical Take-Off and Landing capabilities with the WanderB VTOL, developed by IAI's BlueBird Aero Systems subsidiary, alongside IAI's advanced tactical loitering-munition designed for both ground and naval units, the Mini Harpy.

Rosoboronexport: Indo-Russian JV starts manufacturing Kalashnikov AK-203's

Indo-Russian Rifles Private Limited, a joint venture between Russia and India, registered and located in India, whose founders on the Russian side are Rosoboronexport and Kalashnikov Concern (both are subsidiaries of the Rostec State Corporation), has started producing Kalashnikov assault rifles according to a press statement on 17 January 2023.

"Russia and India are linked by strong partnership relations. Military-technical cooperation between the two countries has resulted in the construction of the joint venture Indo-Russian Rifles Private Limited. With the launch of series production of Kalashnikov AK-203 assault rifles, high-quality, convenient and modern small arms will begin to enter service with India's defence and law enforcement agencies. The model combines excellent ergonomics, adaptability to different shooters and high performance characteristics, it is one of the best assault rifles in the world," stated Sergey Chemezov, General Director of Rostec.

The joint venture plans to ensure 100% localisation of the production of AK-203 rifles in India. In future, the company may also increase output and upgrade its production facilities to manufacture advanced rifles based on the Kalashnikov assault rifle platform.

"Korwa Ordnance Factory in Amethi, Uttar Pradesh, has produced the first batch of 7.62 mm Kalashnikov AK-203 assault rifles. The beginning of deliveries to the Indian Army is expected soon. At the same time, the factory's capacity makes it possible to fully equip the personnel of other law enforcement agencies in India with AK-203 assault rifles, which, due to their high adaptability, are suitable for various operators. In addition, the joint venture will be able to export its products to third countries," stated Alexander Mikheev, Director General of Rosoboronexport.

"Indo-Russian Rifles Private Limited fully complies with the Government of India's Made in India initiative and DAP 2020. Today, India is the first country to start producing the AK-200-series assault rifles of the world-famous brand", he further stated.

The AK-200-series assault rifles have retained all the advantages of the traditional AK scheme: reliability, durability and ease of maintenance. At the same time, they fully meet the latest requirements for firearms in the world in terms of ergonomics and the ability to mount high-tech additional equipment.

Russia and India continue to implement military-technical cooperation projects. Their current and future programmes are maximally focused on technological cooperation, including on the basis of joint ventures, in the format of licensed production and joint R&D projects. Rosoboronexport aims to cooperate on terms of transfer of technology put forward by the Indian side and in accordance with the Make in India initiative.

MBDA showcases the IAF's latest missiles during Aero India 2023

Photos: Tejaswi Singh

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.

At the centrepiece of the company's presence this year in Bangalore, are the weapon systems that arm the IAF's latest Dassault Rafale combat aircraft. These highly potent set of weapons from MBDA give the IAF an air combat capability that is unrivalled by any of India's neighbours. The most famous of these weapons is 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 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 exhibiting also at Aero India 2023 where it 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 make it a long-term true partnership, and one that should only continue to get stronger.

By Ludovic Dumont, Country Head MBDA & MBDA India General Delegate

GE Aerospace driving innovation in India through successful industry-academia collaborations

As one of the fastest-growing economies in the world, it is critical for India to focus on aviation technology innovation as a key priority. The Government as well as industry have several initiatives driving experimentation in materials and manufacturing processes to power the Indian aviation growth story.

As a world-leading provider of engines, integrated systems for commercial, military, business and general aviation aircraft, innovation has been the key driver for GE Aerospace over 100 years.

Engineers and researchers at our India Technology Centre in Bengaluru have been working on advancements in aviation technology since 2000. In the past decade, they have generated over 500 patents. These group of engineers have reached out to and collaborated with industry and academia over the years. These efforts have led to new inventions and opportunities for the Indian industry.

In 2022 we announced a product developed by IIT Madras and GE Aerospace under a joint innovation programme started in 2016 has now entered the testing phase. The locally designed and developed aviation high-speed Micro Turbomachine is being tested at National Aerospace Laboratories (NAL), an important step towards technology maturation.

The development of Micro Turbomachine is a shining example of academia-industry collaboration to drive innovation in India. It was designed and developed as part of Ucchatar Avaishkar Yojana (UAY) launched by the Government of India to promote industrial innovation of a higher order that addresses the needs of local industry.

During the development of the product, engineers and researchers from GE and IIT-M collaborated to establish a local aviation supplier ecosystem for the production of high-precision, high-speed turbomachinery that met global aviation industry standards. The prototype was manufactured and assembled with the participation of two local aviation industry companies, Pragati Transmission Pvt. Ltd. and Turbocam India Pvt. Ltd.

Another 30+ year partnership is with Hindustan Aeronautics (HAL). GE Aerospace and HAL worked together to make GE engines and turbines work for India's Tejas Light Combat Aircraft and frigates and aircraft carriers including the indigenous Aircraft Carrier Vikrant.

GE Aerospace has partnered with Tamil Nadu Industrial Development Corporation Ltd. (TIDCO) to set up a Centre of Excellence (CoE) in Advanced Manufacturing technologies. Governed by TIDCO's special purpose entity (SPV), the CoE aims to create an ecosystem of advanced research and development using additive technologies. Both GE Aerospace and TIDCO signed an MoU in 2021. An investment of about Rs.141.26 crores over five years to be funded by TIDCO and GE in two phases was proposed. The CoE will work towards technology development for additive manufacturing besides taking up projects in development of predictive analytical solutions for additive manufacturing (AM) for Industry 4.0. The CoE will aim to develop Indian intellectual property for the AM technologies including materials, machines, design software to provide specific technology solutions.

These key partnerships show our commitment to growing the Indian aviation industry backed by research, development and local manufacturing skill development.

Article by Sanjeev Jha – Section Leader, Advance Technology, GE Aerospace

NAMMO updates

Nammo to develop 120mm ammunition for K2 MBT

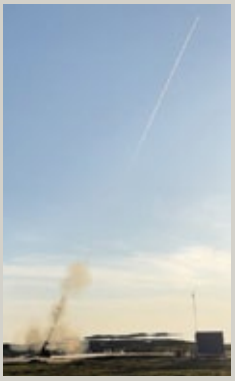
Nammo has secured an agreement to develop new and modern 120mm ammunition for Hyundai Rotem Companies' K2 main battle tank. The first test shots have already been fired. "This is a major milestone for Nammo. The agreement with Hyundai Rotem Company (HRC) enables us to integrate and further develop our modern ammunition portfolio for the K2 main battle tank (MBT). This means more powerful ammunition for NATO countries using the K2, including Norway", stated Audun Dotseth, Vice President Large Caliber Systems at Nammo.

The agreement between the two companies has an initial value of $5 million for the R&D part, and likely more than $100 million if Nammo ends up producing and delivering 120mm ammunition to K2 users. Poland recently signed a contract to procure close to two hundred K2 tanks, in a deal where HRC will deliver a total of 1000 K2 MBTs with successive contracts. Norway is currently in the final stage of choosing a new MBT for its Army – the K2 is one of two candidates.

Initially, Nammo will start the work on integrating its current 120mm ammunition to ensure a high safety standard as well as perfect compatibility with the K2 MBT. In the mid- to long term, Nammo together with HRC also expects to finalise the development of a programmable fuze. This will enable the K2 MBT to use rounds with different scenario dependent modes, with airburst as one such option.

The first successful test shots with the new airburst ammunition were fired at Rena firing range during winter test and trials in Norway. To facilitate further development and testing procedures, an identical gun with the one used by the K2 MBT, delivered by Hyundai Wia, will be permanently set up by HRC at Nammo's Raufoss test centre.

Boeing, Nammo complete long-range ramjet artillery test



Boeing and Nammo have successfully test-fired a ramjet-powered artillery projectile, further demonstrating the viability of one of the US Army's modernisation priorities – long-range precision fires. During the test at the Andøya Test Center in Norway, a Boeing Ramjet 155 projectile was fired out of a cannon and its ramjet engine ignited successfully. It

demonstrated flight stability with a well-controlled engine combustion process.

The long-range test at Andøya follows years of research, development and testing by Boeing and Nammo of ramjet technology, including more than 450 static or short-range tests. Boeing Phantom Works and Nammo have been working together under a strategic partnership to jointly develop and produce the next generation of boosted artillery projectiles. In July 2019, the Boeing-Nammo team was awarded a contract under the US Army's XM1155 programme to develop and mature the Ramjet 155 projectile. In May 2021, the team was awarded a Phase II technology development contract.

Ramjet 155 uses an engine in which the air drawn in for combustion is compressed solely by the forward motion of the projectile at supersonic speeds. Considered a hybrid between guided artillery and missiles, the programme has an objective of a common round design that can be used in L39 and L58 cannons.

Indian Forces, armed with supersonic BRAHMOS, is a military force to be reckoned with

India, being one of the emerging economic powerhouses in Asia, is vitally positioned in the southern sub region of the Asian continent. The country dominates the Indian Ocean and commands an important strategic position in the neighbourhood. India, armed with an strong and effective Armed Forces, has been defending its territorial integrity and sovereignty, while ensuring peace and stability in the region. The country, facing military challenges across several fronts, have systematically modernised its defence manufacturing and military firepower over the years.

Firepower is the military capability to direct force at the adversary. It involves the employment of whole range of potential weapons wherein the enemy forces are destroyed and their will to fight is degraded. Missiles have added a new dimension in the realm of application of firepower. BRAHMOS missile, an exemplary product of Indian-Russian Joint Venture has been a front runner in this class of weapon system. The BRAHMOS weapon system has fulfilled the Indian Armed Forces' operational lead for accurate engagement of high value targets deep inside enemy territory.

The missile deployed in the Indian Army, the Indian Navy and the Indian Air Force has established itself as a major force multiplier in modern-day complex battlefields with its impeccable land attack, anti-ship capabilities and multi-role plus multi-platform abilities.

BRAHMOS weapon system has become the mainstay of the Indian Army's artillery firepower with several regiments raised. Similarly, for many of the Navy's frontline surface ships, BRAHMOS has been deployed as a prime strike weapon in both land-attack and anti-ship configurations. The missile has also proved its 'salvo' launch capability to knock down single or different targets located in different directions. BRAHMOS missile is capable of being launched from submarine from a depth of 40-50 metres. In 2020, a squadron of fourth-generation fighter jets Sukhoi Su-30MKI ('Tigersharks' 222 squadron) equipped with the BRAHMOS supersonic cruise missile was inducted in the Southern India, adding teeth to India's air and maritime dominance in the Indian Ocean Region (IOR). The successful induction of BRAHMOS in all the three services has made India the first and only country in the world to complete the "supersonic cruise missile triad".

BRAHMOS has recently conducted numerous successful launches which boost India's defence indigenisation efforts by significantly highlighting the vital contributions of BRAHMOS missile to the Govt. of India's ambitious "Make in India" initiative. BRAHMOS has also achieved historic milestones in the flagship "Aatmanirbhar Bharat" programme by successfully indigenising major sub-systems of the missile. All launcher systems for the weapon are manufactured domestically. 100% of ground support equipment for the weapon complex are also being made in India.

Both Defence Research & Development Organisation (DRDO) of India and JSC MIC NPO Mashinostroyeniya (NPOM) of Russia have made impressive strides in joint design, development and production of the high-technology BRAHMOS. BrahMos Aerospace also prides itself in possessing a full-fledged design centre, an Industrial Consortium for producing different sub-systems, a world-class integration, and check-out facilities with stringent quality control. BrahMos Missile Industrial Complex comprises of more than 200 Indian industries and multiple Russian industries, R&D labs and academic institutions of both the countries.

BRAHMOS has also emerged as a potential weapon of choice with several countries across continents evincing strong desire in possessing the versatile weapon. Philippines in January 2022 signed a mega defence contract with BrahMos Aerospace for the supply of shore-based anti-ship variant of the BRAHMOS supersonic cruise missile to the Armed Forces of Philippines.

Versatile weapons like BRAHMOS Supersonic Cruise Missile will play a significant role in modern battlefields as it supersedes the most popular cruise missiles in the world by three times in terms of velocity, flight range and nine times the kill energy range. It is going to remain a world-class system in the coming years.

Saab to set up manufacturing facility in India for Carl-Gustaf

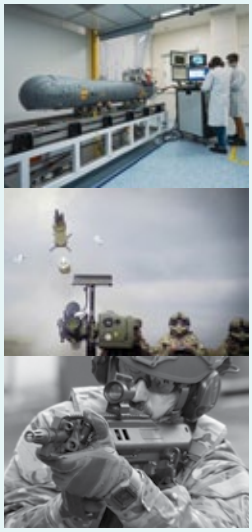
Saab will set up a manufacturing facility for the shoulder launched weapon system Carl-Gustaf in India, further strengthening production in the country. Production in the new facility is planned to start in 2024.The facility will support the production of the Carl-Gustaf M4 for the Indian Armed Forces as well as components for users of the system around the world.

The new company Saab FFV India, currently under registration, will make the latest generation of the state-of-the-art weapon in India. Saab will also be partnering with Indian sub-suppliers and the systems manufactured in the facility will fully meet the requirements of "Make in India". Saab FFV India will deploy complex technologies including the latest sighting technology and apply advanced manufacturing techniques like carbon fibrewinding for the Carl-Gustaf system including the latest M4 weapon.

Over the years Saab have partnered with Indian companies to make parts orcomponents for Saab's products on the global market. This project is a continuation of Saab's commitment to "Make in India". Saab will continue its partnership with Munitions India Limited (MIL) and Advanced Weapons andEquipment India Limited (AWEIL) to manufacture the Carl-Gustaf weapon and its ammunition.

The Carl-Gustaf system has been in service with the Indian Army since the first cooperation agreement for production in India was signed 1976. Through its wide variety of ammunition, Carl-Gustaf has established itself as the main shoulder launched weapon in the Indian Armed Forces.

Thales: Proud of 70 year-long journey in India



The Indian Defence and Aerospace sector is undergoing a significant wave of indigenisation, boosted by the 'Aatmanirbhar Bharat' vision of the Government of India. The Government policies and industrial collaborations are enabling the country to move towards self-reliance in defence technology.

Thales, celebrating its 70 year long and proud journey in India this year, is a strong supporter of the government's ambitions. It has been a trusted partner to India's growth story by sharing its innovative technologies and expertise across defence, aerospace, transportation, and digital identity and security markets.

Building on its global prowess in technology, the organisation has been proudly supporting the modernisation efforts of the Indian armed forces, enabling them to maintain tactical superiority over any form of risk, with the purpose of building a future that all can trust.

Capabilities to add strength to the Indian Armed Forces

Globally, Thales provides a wide range of products and services to aid the armed forces in achieving and sustaining operational superiority. To serve India's ambitions in defence and aerospace, Thales has created an industrial ecosystem consisting of over 75 supply chain partners. This also includes partnerships with public and private sector enterprises such as joint ventures with Bharat Electronics Ltd and Reliance Aerostructures Ltd, partnership with Bharat Dynamics Limited for STARStreak/laser beam riding MANPAD system (LBRMS), long-term association with Hindustan Aeronautics Limited for avionics, among others. Through this ecosystem, Thales has developed substantial and diverse skill sets in India to cater to programmes in India and rest of the world. Thales and its joint ventures employ more than 1,800 people in India. The organisation is growing its presence in the country by continuing to hire and develop more talent in high-tech roles.

In addition, Thales has been fortifying the local engineering R&D capabilities through our competence centres in Noida and Bangalore. Thales's engineering centre in Bangalore specialises in defence and aerospace, and is working on high-value software areas like air traffic management, complicated avionics systems, cockpit, flight management, connectivity and video systems, and radar softwares. And, the engineeering centre in Noida focuses on digital activities such as data protection and encryption, cybersecurity, biometrics, among others.

Adding teeth to the Indian defence and aerospace sector

A member of the Rafale team led by Dassault Aviation, Thales provides several state-of-the-art equipments and systems aboard the Rafale such as the AESA RBE2 radar, the SPECTRA electronic warfare suite for 360° detection and action modes, advanced man-machine interface with displays in the cockpit, missile electronics, the front-sector optronic with infrared search and track systems FSO-IRST, the CNI suite (communication, navigation, and identification), as well as power generation systems and a logistics support component.

We have several such successful references with the Indian Air Force, Indian Navy, and Indian Army, and others, built over the last 70 years in India. We are committed to take this proud legacy forward and be part of the new India growth story.

Thales has also been actively contributing to India's aviation sector with its services and solutions including the retrofit of avionics to Air India, critical avionics to IndiGo, and navigational aids to Airport Authority of India, among others. It is bringing its technology prowess in UAVs and Counter-UAV measures to support the burgeoning drone focus in the country.

'Make in India' spotlight at Aero India 2023

At Aero India this year, we will bring a spotlight on a range of our cutting-edge technologies across the sectors of land, air, naval defence, as well as space and our 'Make in India for India and for the world' strategy. Some of these include our air defence systems like LBRMS, Lightweight Multi-role Missiles, and Free Fall Lightweight Multi-role Missile, a high-performing, lightweight, precision strike missile designed to be fired from tactical platforms like fixed or rotary winged UAVs and surface platforms, amongst other demos across Connectivity, Optronics, Armaments and Ammunition, and Intelligence, Surveillance and Reconnaissance. Thales is committed to contribute to the "Aatmanirbhar Bharat" vision of the government by bolstering its local teams, collaborations, and innovation in the future as well.

By Mr. Ashish Saraf, VP and Country Director, India, Thales

VAYU Interview with

Air Chief Marshal Vivek Ram Chaudhari, Chief of the Air Staff, Indian Air Force

VAYU : There is a lot of confusion on whether the IAF will go in for the LCA Mk.2 or MRFA. Are they separate programmes or will the IAF go in for both types?

CAS: LCA Mk 2 and MRFA are separate programmes and IAF plans to induct both these fighter aircraft in a phased manner. The differences in the two plans are as explained below: -

(a) **LCA Mk 2:** LCA Mk 2 is a more capable and potent variant of the indigenous Tejas fighter aircraft (LCA). The IAF's Qualitative Requirements have been handed over to ADA for the LCA Mk 2, the induction of which is likely to commence from 2030 onwards. On 31 August 2022, CCS has approved the D&D of the LCA Mk 2 programme. Initially, the IAF plans to place an order for six Sqns of the LCA Mk 2.

(b) **MRFA:** IAF plans to induct six squadrons of MRFA in a phased manner. It is studying the responses to the RFI issued in April 2018. The Air Staff Qualitative Requirements for the current proposal are being finalised prior to seeking Govt approval. The programme would be progressed under the 'Make in India' initiative of DAP-2020, with a focus on a substantial transfer of key technologies to an Indian Production Partner.

VAYU : Can you update us on the current UAV status: are the current ones operated by the IAF being upgraded and what are the acquisition programmes across UAV platforms, ie, small, large, MALE/HALE, loitering munitions etc?

CAS: The IAF has prepared a roadmap for induction of RPAs to meet both the short term and long term operational requirements by addressing the limitations of the existing RPAs. The plan includes various types of RPA systems ranging from Small Drones and Counter Drone systems to the MALE and HALE class of RPAs, including those having an offensive capability.

Upgrade of a select fleet of UAVs to possess a weapon capability is being progressed, the case for which is at an advanced stage.

Efforts are being made to indigenously design and develop RPAs to meet the stated requirement. Work is also on for the development of armed Drone technology by DRDO. As far as Loitering Munitions are concerned, we are working with many companies in the private sector and have seen good progress.

VAYU: Can you tell us about the IAF involvement with the AMCA?

CAS: IAF has had and continues to have extensive collaboration with the DRDO. The operational experience of the IAF has contributed immensely to the successful development of indigenous platforms. The service has also supported DRDO in the resolution of issues arising in development, flight testing of aircraft, etc.

MiG-29s and MiG-21s

LCA Tejas

SKAT Team with Hawk Mk.132s

Sarang Team with Dhruv ALHs

Rafale and Su-30MKI

The draft Preliminary Services Qualitative Requirements (PSQR) have been forwarded and DRDO has undertaken comprehensive design studies on the project. The detailed design has also been reviewed by the IAF. The IAF will also be fully involved in design iteration, flight testing and programme management. Induction of AMCA is likely to commence from 2035 onwards.

VAYU: On the helicopter front, can you update us on potential Chinook/Apache further orders as well as the status of the LCH and IMRH programmes?

CAS: Presently, the IAF does not plan to induct more Apache and Chinook helicopters and is focussing on inducting indigenously developed helicopters.

A contract for 10 x LCH Limited Series Production (LSP) was signed with HAL on 30 March 2022. Training for aircrew and ground crew has been completed and the helicopter was formally inducted in to the IAF on 3

Su-30MKIs and C-130J Hercules


Su-30MKI


Mi-35 and AH-64E Apache


IAF ALH


Rafale

October 2022. The IAF plans to procure 55 LCH SP (Series Production) in future.

Considering the requirement of the Indian Armed Forces, HAL has carried out Preliminary Design Studies of the IMRH in the 10-15 tonne class and has arrived at a configuration for the basic platform. Currently, IMRH is planned to be developed under the SPV route. As per HAL, the D & D is likely to take six to eight years and would cater for future MLH requirements of the IAF and a deck based version (DBMRH) for the IN. Induction of IMRH/ DBMRH is likely to commence wef 2031 if there is no delay in the D&D.

VAYU: As for upgrades, what is the status of the Sukhoi Su-30 MKI's plan for the so called "Super Sukhoi"?

CAS: There is no project called 'Super Sukhoi'. However, the IAF is processing an upgrade programme for the Su-30 in collaboration with DPSUs, DRDO labs and Indian private industries.

All photos of air assets: Sujan Singh Chopra at Sukhna Lake, Chandigarh on 6 October 2022 during IAF rehearsals.

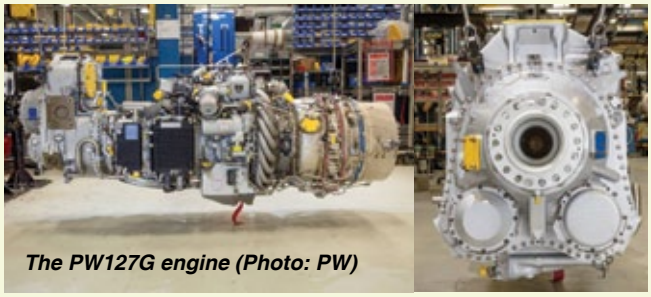
All photos of CAS courtesy IAF


MiG-29s, Su-30MKIs and Netra


CH-47F Chinook

Pratt & Whitney: Powering future strategic airlift capabilities with the C-295

Representational image of the C295 (Photo: Airbus)



The PW127G engine (Photo: PW)

Pratt & Whitney is delighted with the Indian Air Force choosing the Airbus Defence and Security C-295 aircraft and that 40 of these aircraft will be made in India in partnership with the Tatas. A next-generation light and medium tactical airlifter, the C-295 is capable of conducting operations across a wide range of mission profiles. Fully certified for all-time, all-weather operations, the aircraft is ideally suited to meet the needs of the Indian Air Force's ever evolving operational requirements across diverse environments. When in service with the Indian Air Force, the 56 C295 will conduct critical missions in support of the country's 1.3 billion residents, just as it does in many other jurisdictions across the world.

With the C-295, we are looking forward to building our already strong partnership with the Indian armed forces. Pratt & Whitney's F117 engines currently power the Indian Air Force's 11 C-17 Globemaster III aircraft that have been enhancing the country's armed forces' strategic airlift capabilities. Our iconic PT6A engines power the Indian Air Force's fleet of 75 PC-7 trainers. Furthermore, our Auxiliary Power Unit powers India's Netra Airborne Early Warning and Control System (AEW&CS) that has been indigenously modified from the Embraer E145J.

PW127G for the C-295

We are pleased that our PW127G engines power the C295, which is widely acknowledged as the next generation of Fixed-Wing Search and Rescue (FWSAR) and light and medium transport aircraft. The C295's twin PW127G engines provide remarkable range and endurance for time-critical missions due to its low-fuel consumption during cruising.

Since the maiden flight of the C295 in 1998, we have been supplying these engines to Airbus Defence and Space (ADS) and have shipped over 400 PW127G engines to ADS since then. The PW127G is a member of the PW100/PW150 engine family and the PW127 alone powers not just the C-295, but also the ATR 42-500/600, ATR 72- 210/500/600, Fokker 50 High Performance and the Fokker 60 Utility.

It is noted for its capacity to excel at a range of missions such as regional commercial airline service, firefighting, aerial surveillance, cargo transport, humanitarian services, and civil defence. The PW100/PW150 engine family, originally designed for regional aviation, now powers 90% of regional turboprop aircraft in the 30-90 passenger format flying today. We have refined our engines' dispatch reliability to industry-leading levels over the years. Given the stakes involved in any nation's FWSAR and associated missions, the ability to fly on command can sometimes mean the difference between life and death.

PW100/150 Series: Proven, future ready excellence

PW100 powered aircraft utilise 25 to 40% less fuel and emit up to 50% less CO2 than comparable-sized jets, resulting in lower greenhouse gas emissions. 38 PW100 models have been produced, ranging in shaft horsepower power from 1,800 shp to 5,000 shp.

No other engine family delivers higher propulsion at takeoff and climb when it comes to powering aircraft of this weight class. We have built our reputation on the reliability of our engines. The PW150A engine, for example, has a dispatch availability of more than 99.96%. Our PW100/PW150 engines have four times more flying hours than our nearest competitor.

We are developing next-generation engine technology to address the different business needs of our many customers. We intend to provide more power, improved fuel efficiency, improved noise and emissions performance, and increased maintainability while maintaining the durability and dependability that our customers have come to expect.

By Ashmita Sethi, President and Country Head, Pratt & Whitney

Rolls-Royce and GRSE in MoU for production of marine engines

In a major step aimed towards bolstering the 'Make in India' initiative, Garden Reach Shipbuilders and Engineers (GRSE) Ltd signed a Memorandum of Understanding (MoU) with Rolls Royce Solutions of Germany for manufacture of high quality marine diesel engines. Under the agreement, GRSE and Rolls Royce Solutions will co-operate in the licence production and localisation of the technologically advanced MTU S4000 governmental marine engines. These engines, with a power output of 746-4300 KW, are compact, reliable and easy to maintain. They are used for fast patrol vessels, interceptor boats and fast attack craft built by GRSE and other shipyards around the country.

MTU is a solution brand of Power Systems, a fully-owned subsidiary of Rolls Royce plc. The manufacture of these engines in India would also provide a great opportunity to local industry, particularly MSMEs involved in the manufacture of components and spares. The MoU deals with Transfer of Technology related to engine assembly, painting, parts sourcing and after sales service for these engines that are to be assembled at GRSE's Diesel Engine Plant in Ranchi.

MoD contract with BDL for Astra Mk-I BVRAAM

In a major boost to Prime Minister Narendra Modi's vision of 'Aatmanirbhar Bharat', Ministry of Defence, on 31 May 2022, signed a contract with Bharat Dynamics Limited (BDL) for supply of Astra MK-I Beyond Visual Range (BVR) Air to Air Missile (AAM) and associated equipment for the Indian Air Force and Indian Navy at a cost of Rs 2,971 crore under Buy (Indian-IDDM) category.

Till now, the technology to manufacture missile of this class indigenously was not available. Astra MK-I BVRAAM has been indigenously designed and developed by Defence Research and Development Organisation (DRDO) based on the Staff Requirements issued by the Indian Air Force (IAF) catering for beyond visual range as well as close combat engagement reducing the dependency on foreign sources. air to air missile with BVR capability provides large stand-off ranges to fighter aircraft which can neutralise the adversary aircraft without exposing itself to adversary air defence measures, thereby gaining and sustaining superiority of airspace. This missile is technologically and economically superior to many such imported missile systems.

Astra MK-I missile and all associated systems for its launch, ground handling and testing has been developed by DRDO in coordination with the IAF. The missile, for which successful trials have already been undertaken by the IAF, is fully integrated on the Su-30MKI fighter aircraft and will be integrated with other fighter aircraft in a phased manner, including the Light Combat Aircraft (Tejas). The Indian Navy will integrate the missile on the MiG-29K fighters.

Resumption of Rafale deliveries to France

On 29 December 2022, Dassault Aviation's Mérignac plant delivered Rafale B359 (F3R standard) to the Direction Générale de l'Armement (French defence procurement agency).

This event marked resumption of Rafale deliveries to France after an interruption of four years. The Rafale B359 is for the French Air and Space Force. It is part of the "tranche 4" order for 60 aircraft awarded in 2009. In accordance with the various Military Programming Acts, deliveries to France were interrupted for budgetary reasons and the Rafale production line was then dedicated to export orders.

A further 27 Rafale are still to be delivered for tranche 4, plus 12 Rafale ordered by France in 2021 to make up for the 12 aircraft sold to Greece. Tranche 5 should be awarded in 2023.

DAC AoN for 3 three capital acquisition proposals

A meeting of Defence Acquisition Council (DAC), held on 10 January 2023 under the chairmanship of Raksha Mantri 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). The DAC also accorded AoN for procurement of VSHORAD (IR Homing) missile system under design and development by DRDO. Further, the DAC granted approval for procurement of Brahmos Launcher and Fire Control System (FCS) for the Shivalik class of ships and Next Generation Missile Vessels (NGMVs) for Indian Navy.

Lockheed Martin finalises Lot 15-17 Agreement

The F-35 Joint Programme Office and Lockheed Martin have finalised the contract for the production and delivery for up to 398 F-35s for $30 billion, including US, international partners and Foreign Military Sales (FMS) aircraft in Lots 15 and 16, with the option for Lot 17.

"The F-35 delivers unsurpassed capability to our warfighters and operational commanders", stated Air Force Lt. Gen. Mike Schmidt, programme executive officer, F-35 Joint Programme Office. "This contract strikes the right balance between what's best for the US taxpayers, military services, allies and our foreign military sales customers. The F-35 is the world's premier multi-mission, 5th-generation weapon system, and the modernised Block 4 capabilities these new aircraft will bring to bear strengthens not just capability, but interoperability with our allies and partners across land, sea, air and cyber domains."

The agreement includes 145 aircraft for Lot 15, 127 for Lot 16, and up to 126 for the Lot 17 contract option, including the first F-35 aircraft for Belgium, Finland and Poland.

Lot 15-17 aircraft will be the first to include Technical Refresh-3 (TR-3), the modernised hardware needed to power Block 4 capabilities. TR-3 includes a new integrated core processor with greater computing power, a panoramic cockpit display and an enhanced memory unit.

These aircraft will add to the growing global fleet, currently at 894 aircraft after 141 deliveries this year. The F-35 team was on track to meet the commitment of 148 aircraft as planned; however, due to a temporary pause in flight operations, which is still in effect, necessary acceptance flight tests could not be performed.

The finalised contract caps off a year of the F-35 delivering combat-proven airpower around the world and continued international growth. This year, Finland, Germany and Switzerland signed Letters of Offer and Acceptance (LOAs) as an important step in their procurement of F-35 aircraft.

F-35 programme participants currently include 17 countries. To date, more than 1,870 pilots and 13,500 maintainers have been trained, and the F-35 fleet has surpassed more than 602,000 cumulative flight hours.

Courtesy: LM

Updates from Rafael

Ice Breaker unveiled

Rafael Advanced Defense Systems has introduced the Ice Breaker: a 5th generation long-range, autonomous, precision-guided missile system, enabling significant attack performance against a variety of high-value land, and sea targets. Ice Breaker is a multi-service solution, across air, land, and sea domains. This unveiling comes one year since the introduction of the Sea Breaker, which serves as the naval and land-based version of the all-encompassing Ice Breaker.

Rafael and Philippine AF

In a ceremony, Rafael's Executive Vice President Pinhas Yungman, Head of the Air and Missile Defence Directorate. Secretary of National Defense of the Philippines Delfin Lorenzana, Commanding General of PAF Lt. Gen. Connor Anthony Canlas Sr., SIBAT Director for Asia and the Pacific Eytan Levi, and other officials took part in the official opening of the training centre. The SPADS Simulator - Training Centre is the Philippine Air Force's first missile training centre which will serve as a training ground for future air defenders to prepare them for real-time threats as well as enhancing personnel knowledge and skills. The training centre is part of the GBADS Acquisition Project of the Philippine Air Force which will further enhance the nation's defensive capabilities.

Spike Firefly evaluated by US Army

Rafael and its US subsidiary RSGS demonstrated the Spike Firefly loitering munition at the Army Expeditionary Warrior Experiment 2022 (also known as AEWE). AEWE 2022 is a collaborative venue under the Maneuver Battle Lab of the Maneuver Centre of Excellence at Fort Benning.

AEROSPIKE unveiled

As part of the 2022 Special Operations Forces Industry Conference (SOFIC), Rafael unveiled AEROSPIKE, a new advanced air-to-surface Stand-Off Precision Guided Missile (SOPGM) for fixed-wing airborne platforms. It is a state-of-the-art, next generation EO/IR SOPGM system, designed to meet the needs of complex modern warfare. It is light-weight, high precision (CEP ≤ 3 ft), and offers an significant stand-off range of 30 km, all within a contested environment, independent of GPS.

The World of Saab

Gripen E in operation with Brazilian AF

The Brazilian Air Force (FAB) held a ceremony on 19 December 2022 at the Anápolis Air Base (BAAN) marking the beginning of operational activities of the Gripen E fighters (referred to as Gripen F-39 in Brazil) by the First Air Defence Group (1st GDA). This important customer milestone follows the flight test phase in Brazil that started in September 2020 with the arrival of the test aircraft in the country, and which were conducted at the Gripen Flight Test Centre (GFTC) located at the Embraer plant in Gavião Peixoto.

In November, Saab achieved the certification necessary for the military use of Gripen E, which attests that the aircraft has met certain airworthiness and flight safety requirements which was an important step prior to operational activities with the FAB. This was granted by both the Swedish and Brazilian military authorities, represented by the Swedish Military Aviation Safety Inspectorate (FLYGI) and the Industrial Fostering and Coordination Institute (IFI) in Brazil. The joint certification reflects the synergy obtained through the technical cooperation between the two authorities in each country.

Order for upgrade of Gripen C/D

Saab and the Swedish Defence Materiel Administration (FMV) have signed a contract and Saab has received an order to ensure the continued operability of and provide capability enhancements to the fighter aircraft JAS 39 Gripen C/D. The order value is approximately SEK 3.5 billion and the contract period is 2023-2029. The contract also includes options that enable FMV to place additional orders for capability enhancements during 2023.

The enhancements will provide Sweden with a more effective and powerful fighter capability. The aircraft will be equipped with a new version of the engine, which will enhance flight performance. A more effective electronic warfare system will also be introduced and the upgrade will create conditions for increased attack capability with a new payload.

NLAW's for the UK

Saab has reached an agreement with and received an order from the United Kingdom Ministry of Defence for the Next Generation Light Anti-Tank Weapon system (NLAW). The order value is approximately SEK 2.9 billion and deliveries will take place 2023-2026. NLAW is a shoulder-launched, anti-tank guided missile system that attacks the tank from above. NLAW combines the simplicity of light anti-armour weapons with the advantages of heavy, crew-operated guided missile systems. With NLAW, a single soldier can take out a heavily-protected modern main battle tank at ranges between 20 and 800 metres.

NLAW's for Sweden

Saab has received an order for NLAW (Next Generation Light Anti-Tank Weapon) from the Swedish Defence Materiel Administration (FMV). The order value is approximately SEK 900 million with product deliveries scheduled 2024-2026. The order is placed within a framework agreement between FMV and Saab.

WB Group of Poland forms Joint Venture in India

Grupa WB have established a Joint Venture named WB Electronics India Pvt Ltd to cooperate with Indian Armed Forces in advanced military projects under common R&D programmes and to offer new solutions for Indian military and industry.

WB Group, Poland's largest manufacturer of advanced electronic, unmanned, communication and information systems for defence and public security, has established the joint venture company in India. Nearly 25 percent of WB Group's (Poland) shares is owned by the Polish government. This means the company is a proven, stable and long-term partner of the NATO countries' Armed Forces. The maritime, land and air solutions offered by the Group are being used on all continents.

WB Electronics India Pvt Ltd (WB India) will have its headquarters at New Delhi. The head of the company is the experienced soldier and administrator, Col Sandeep Malik (Retd) as the Vice President.

"WB Group/WB India is planning to start a broad cooperation with the Indian armed forces, science and industry, all while respecting the "Make in India" and the "Atmanirbhar Bharat" approach of the Prime Minister, Mr. Narendra Modi, in the self-sufficiency principle in the field of defence," stated Piotr Wojciechowski, President, WB Group. "WB Group systems are already in service with the Indian Army," he further stated.

"WB has been engaged in cooperation with various Indian defence industry players since early 2000s – both

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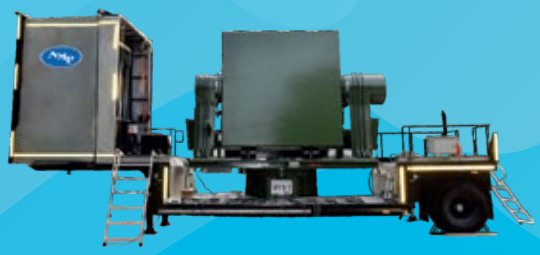

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state owned organisations like BEL, DRDO and private sector companies. Industrial cooperation as well as joint development of military technologies has been the essence of these early interactions," stated Adam Bartosiewicz, Vice-President of WB Group.

WB Group's aim is to start a large-scale participation in the Indian R&D projects and consequently join the great potential of the Indian and Polish engineers and constructors to the benefit of the Indian defence and public security.

"The newly established Joint Venture, WB Electronics India Pvt Ltd is a proof of both WB Group's commitment to the Indian Armed Forces customers as well as a result of alignment between dynamism of hi tech community both on the Polish and Indian side", added Adam Bartosiewicz.

WB Group has been delivering the advanced defence solutions to armed forces globally for 25 years. The Polish manufacturer specialises in system integration and communication and information systems. WB Group's solutions are being manufactured under license in many countries, including the US. The Group offers battlefield management systems such as TOPAZ and FONET mobile Digital Communication Platform, tactical software defined radios with embedded cryptography PERAD and COMP@N. WB Group is a leader in the field of the multi-purpose unmanned reconnaissance systems Flyeye and FT-5, as well as tactical and operational loitering munition Warmate. All these systems are battle tested in some of the most demanding situations.

WB Group is a manufacturer of modern technical solutions and employs over 1,300 people. The company operates globally in the communication, crisis management, public security, transport, electromobility and defence markets.

ECIL in MoU with Presto Infosolutions Pvt Ltd

The MoU entails creation of Data Centres, Disaster Recovery, Network, WiFi, IT and Cyber Security infrastructure, modernisation, SOC and NOC both for IT and OT, Compute, Storage, IT Consulting, System Delivery, O&M, Training, Home Land Security and other similar/relevant projects and technologies.

Additionally, the MoU calls for modernisation of IT Infrastructure in India at the State and Central level and providing integrated telecom and IT solutions based on newer technologies. In this respect a number of opportunities for consultancy and turnkey project execution are likely to arise, in which ECIL and Presto can participate either as Consortium or Teaming partners for mutual benefits. Plus the two companies will jointly participate in projects identified for joint bidding and execution related to the above-mentioned areas. The MoU is on exclusive basis and parties can identify new projects/tenders to do joint participation/execution. This includes all RFPs falling under IT projects, its operations and maintenance or AMCs or augmentation of IT and software development.

Rolls-Royce reinforces commitment to partner India for combat engine co-development at Aero India 2023


R-R Adour powered IAF Hawk

Rolls-Royce is participating at Aero India 2023 show in Bengaluru (Karnataka) from 13-17 February. The show will serve as a platform for the company to reiterate its readiness to partner India for co-development of critical combat aircraft engine technologies.

The company will also take the opportunity to familiarise defence customers with its advanced technology solutions for air defence, and its full range of naval-marine offerings, including the power-dense MT30 marine gas turbine for aircraft carriers, frigates and destroyers.

Kishore Jayaraman, President, India and South Asia, Rolls-Royce, stated, "We firmly believe in India's vision of defence indigenisation with a sharp focus on developing critical defence technologies in-country. We are ready to partner the country for its combat engine co-development programme, and are well-positioned in India with an ecosystem of partners. Such a programme will not only catapult the country's defence production and export capabilities, but also create a strong foundation for technology development in the future."

Commenting on Rolls-Royce's readiness for the partnership, Alex Zino, Executive Vice President, Business Development & Future Programmes, Rolls-Royce, stated, "We are proposing a collaborative, co-development model for the country's fighter engine programme. Our offering is not merely about the transfer of technology, but the creation of a full range of engine capability to boost India's future technology development and add thrust to its vision of being a key global defence player."

Rolls-Royce has a history of many firsts with the Indian Air Force (IAF) - from powering the first IAF aircraft to delivering the first whole engine technology transfer agreement for the licensed production of Rolls-Royce engines in India. Today, the company has successfully created a robust ecosystem of Indian partners, talent, supply chain, digital, service delivery and manufacturing capabilities. With this rich legacy of partnerships, Rolls-Royce continues to contribute to the development of the aerospace and defence ecosystem in India and is committed to supporting the self-reliance journey.

At Aero India 2023, Rolls-Royce will explore opportunities for its MT30 marine gas turbine for future platforms. The naval turbine offers a superior power-to-weight ratio, generating up to 40MW from a 30-tonne packaged unit, and offers ship designers much more options and flexibility in designing the naval vessels of tomorrow.

Courtesy: R-R

Aircraft spotting and building excitement for Aero India!

Photos by Samarth Mahajan (Instagram @indian.spotter05)


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Aeronautics unveils the Orbiter 4 with a VTOL kit

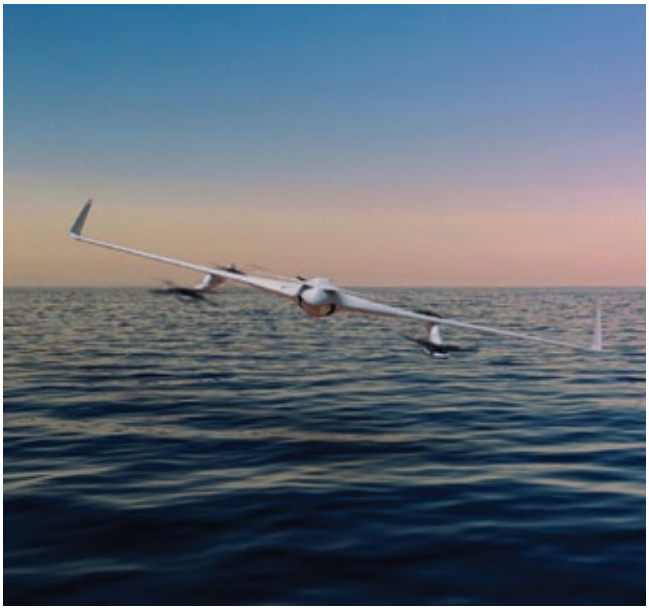
Aeronautics Group, a leading provider of integrated holistic solutions based on unmanned systems platforms, payloads and communications for defence and HLS applications, has unveiled the Orbiter 4 system with a flexible VTOL capability.

The VTOL kit provides superior mission capabilities and offers maximum flexibility for all-terrain mission success. The operational forces will, for the first time, be able to adjust the Orbiter 4 for optimal mission profiles whenever and wherever required. The operator can select whether to take-off and land the UAS using a traditional Orbiter 4 (launcher and parachute) and to benefit from outstanding endurance of 24 hours, or to attach the VTOL kit for accurate take-off and landing with reduced endurance.

"One of the most important needs in the modern battlefield is the ability to operate systems flexibly, depending on changing conditions," stated Matan Perry, Chief Marketing Officer and VP Sales at Aeronautics. In response to this need, we have developed the Orbiter 4 VTOL kit. Our goal was to keep the superior advantages of the Orbiter 4 as the most advanced UAS in its segment while adding extra flexibility and more autonomy to field personnel.

About Orbiter 4: Measure for measure, Orbiter 4 delivers higher capabilities than other tactical platforms in operation today, with greater endurance, serviceability, operational flexibility and cost-effectiveness. An advanced tactical UAS, multi-mission platform with versatile payloads, optional BLOS operation and extraordinary endurance for all weather conditions, it retains the legacy capabilities of the combat-proven Orbiter UAS family. Suitable for both land and maritime operations, the system can simultaneously carry multiple payloads, extending its ISTAR capabilities. Easy to use, with a low logistical footprint and a small crew, the runway-free Orbiter 4 STUAS aircraft suits all operational needs.

As part of Rafael Advanced Defense Systems, Aeronautics utilises the technological synergy between the two companies – Rafael's advanced air, land and naval defence capabilities and Aeronautics' proven technologies - to strengthen its own status as a leading unmanned and autonomous solutions integrator.



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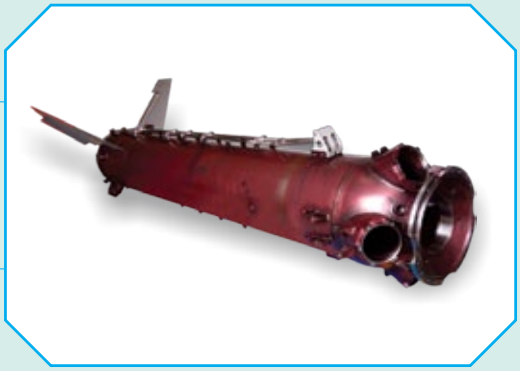

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Astra Microwave Products Ltd (AMPL) takes big strides

AMPL marching ahead proudly!

History

Astra Microwave was started by three Microwave Engineers in the year 1991. The founders had taken voluntary retirement from their illustrious careers in DRDO labs and started this organisation with an objective of making critical RF and Microwave components and sub-systems indigenously. Back then all critical components had to be imported and as these are the important building blocks of military systems, they were being imported by the country at exorbitant costs. The journey was not easy. Having started this organisation with their retirement savings, the company had to work on RF/Microwave products for use in fast growing telecom base stations in the country in order to generate cash for building the high end design, assembly, test and qualification facilities in house.

Apart from this, we had to work closely with our customers in various DRDO labs to help them develop the critical components indigenously. We participated at each step in building the specifications of the products required, designed them using our carefully chosen R&D team and then worked with system engineers at DRDO labs to help them integrate our products into their systems. In this process, we overcame several different challenges as the electronics industry was growing at a rapid pace and newer technologies were emerging continuously even as we achieved stringent specifications originally set out for us.

Perhaps the biggest challenge came when the West imposed sanctions on India for the high frequency semiconductor ICs that are again the important building blocks in sub-systems. Overnight it meant that several of the sub-systems we had designed and proven for the DRDO had to be worked on again building new indigenous components to replace the components that were under sanction. Working closely with DRDO and overcoming several such challenges, Astra Microwave today is one of the only companies in India that works in all critical domains of the defense RF and Microwave industry.

We supply critical RF and Microwave Products that are used in Military Radars – Ground, Naval and Airborne, Electronic Warfare systems for Army, Navy and Airforce, Strategic Missile programmes and for Telemetry applications. In parallel we also work with Indian Space Research Organisation for space qualified RF and Microwave sub-systems for major Communication, Geo-synchronous and remote sensing satellites.

Apart from this, we work with Defense Public Sector units for production of the sub-systems we had originally supported DRDO during design stage and we work with Indian Meteorological department for their requirements in Weather products.

In our journey from a startup to a 600 crore company we have overcome several high technology challenges and today we are amongst the very few Indian private sector companies whose core strength is technology in major areas of the defence and space market in India. This journey has seen us being rewarded by the Indian Government's Scientific department for indigenous R&D, by Electronics Industry Associations and Independent Media agencies for Business Excellence, R&D and Quality. Today we are well poised to realise any high end product in India using indigenous technology and are working our way up to the systems domain

Our journey

Our journey in defence products started in the year 1997 when we first supplied the prototypes of a critical sub-system for Surface to Air Missile programs of the DRDO. It was just the first proof of concept and gave DRDO the confidence that very high technology products can be built indigenously and meeting stringent requirements. From there we worked alongside DRDO over several steps to continuously improve the sub-system until the trials of the Akash Missiles were successfully carried out. For the last 5 years, we have been supplying 2 most important RF sub-systems on board the missile.

Over the course of 30 years, we have contributed to indigenously developing Transmit Receive Modules for Phased array radars in all major frequency bands – V/UHF, S, L, C, X and Ku bands. We have qualified our products for ground, naval and airborne requirements and have been certified by quality agencies like CEMILAC, RNQA, DGAQA etc. One of the most important strategic areas for any country is Electronic Warfare. Simply put, in todays digital era, the edge for countries is clearly using the electronic intelligence of the enemy systems that helps device our strategies to counter them effectively and to gain a significant battlefield advantage. We are *among* the only few companies in India who have worked on Ultra Wide band products for COMINT and SIGINT requirements. The challenge of working in wide band RF systems is quite high and requires a very good understanding of all the RF and Microwave challenges. We have successfully delivered several products for India's naval and airborne EW needs, the latest being the very important system that will be used in the EW POD that will go on the LCA Tejas. In parallel, we have delivered several space qualified products to ISRO for their ground and satellite needs. In fact we are proud to have been associated with every major Satellite Program of ISRO on many occassions – sometimes to screen components to space grade for Chandrayan mission to building about 80% of all electronics on board the Synthetic Aperture Radar Payload for the RISAT programme.

We are also now working to scale up vertically and have already delivered Weather Radars to IMD requirements. Looking back, I am very happy to say that we have achieved what we set out to do – develop several critical RF and Microwave products for the Indian Defence and Space domain indigenously. It is very heartening to see that today our customers call us to ask how we can innovate more and our discussions with DRDO today center around where we should leapfrog to, in terms of technology. It shows we have come a long way in trying to replace foreign components to making our own next gen products.

Our differentiators

The products developed by Astra Microwave have found application in several key military and space projects in India. Major contributions have been made to the Airborne Early Warning and Control Aircraft for all major sub-systems of the primary radar, for the Uttam AESA radar where we have built the Active Antenna Array and all its electronic backbone, major contribution to the EW PODS on the LCA, major contributions to the Naval EW programmes like Samyuktha, Himshakthi, Nayan etc. Apart from this, we have been one of the important suppliers for all ground and naval radars built by LRDE and then productionised by BEL. We have been part of major missile programs like Akash, Astra, Brahmos, AGNI, Nag etc. We have also contributed to several telemetry and weather based products for DRDO and IMD.

Taking advantage of the offset requirements of the Indian Government, we have also supplied several critical modules for export customers in Israel, France, USA etc. for important systems that ultimately come back to India like MPR, MFCR and P8I.

Coming this far has taken a lot of dedicated efforts on the part of our R&D team and also the fact that we have continuously invested in improving our skillsets, assembly and testing infrastructure. The fact that we are the only private industry in India that has the kind of infrastructure that compares to the public sector industry highlights the importance we have associated in building top class products. It is the dedicated effort of our HR and our high end facilities that have ensured we have been able to meet critical product deliveries.

The hard work and the expertise we have gained on RF and Microwave technology is not easy to replicate, and for sure it is not possible to create an equivalent in a short span of time. This we believe is the most important strength for Astra Microwave and we look forward to serving the Indian defence and space programmes in the future.

Courtesy: AMPL

BEML at Aero India 2023

Showcasing its capabilities in Defence and Aerospace Sectors

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

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

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

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

Some displays of BEML from Aero India 2021

Submarine lost and found in the desert?

In the shimmering heat of the Saudi desert, it could be dismissed as a mirage, but photographer Khaled Al Enazi has pictures to prove he really did spot a giant fish or submarine shaped rock emerging from the sands. The rock formation resembles an aquatic creature or submarine swimming through the golden sand, its dorsal fin-like structures also suggesting it could be a predator emerging from the depths to stalk its prey. (CNN)

Month of "The Last" for two 'Queen of the Skies'

December 2022 saw the end of two eras- two very different aircraft serving two very different and distinct markets. On 12 December 2022, the last Pilatus PC-6 (SN 1019) was delivered to an Indonesian customer and earlier in the same month, Boeing rolled out their final 747 from its widebody factory in Everett for delivery to Atlas Air marking close of a historic 54-year 'jumbo' production run.

Smile please!

In the current times of gloom, Airbus has a remedy: cute and beautifully painted Airbus aircraft for various customers on their way for delivery with nice happy faces. The world would be a happier place if one saw humanity roaming around with such faces—and would make the tedious wait at airports better for passengers.

Happy New Year to all!

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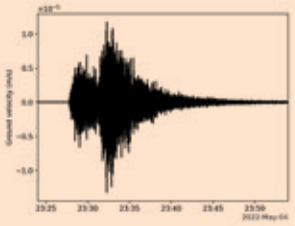
A brief timeline of human progress

Learning to fly on earth and now on Mars! Truly breathtaking.

And more fantastic stuff continues...

NASA's Ingenuity helicopter has now (end June 2022) flown an incredible 28 times across the Martian surface! (Image NASA)

Yet more Mars news: NASA detects a "marsquake"



According to NASA, after more than three years of listening to the soft rumbles of Mars, their rover and its instruments felt by far the biggest "marsquake" yet (looking like about magnitude 5). However, the graph has a similar resemblance to the Sukhoi Su-30! Perhaps...?

Candy in the skies!

The question is: White stripes painted over an originally coloured frame or coloured stripes painted over an originally white frame? Condor's recent rebrand by MAAS has grabbed the attention of the aviation industry with its bold striped liveries.

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U.S. Marine Corps photo by Sgt. Luke Kuennen

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