2023
AERO INDIA
SHOW DAILY
15 February 2023
VAYU
Day 3

New day brings new surprises

Aircraft bonanza for aviation enthusiasts

The second day of the show (14th Feb) brought two great surprises: the unexpected arrival of the B-1B Lancer/Bone and Embraer's KC-390 Millennium, which thrilled the attendees. The former made a surprise flypast taking everybody off-guard. As it is, the F-35, Tejas and Su-30MKI have been vowing spectators over the past few days, and these two new arrivals just added to the thrill.

Besides aircraft and helicopter static and flying displays, there was much more going on at Yelahanka. Numerous product launches, partnerships and MoUs were signed by DPSUs and private sector companies- among themselves as well as with international defence companies.

This has been a joyride and a fruitful airshow for all!

LCA Tejas

B-1B Lancer

F-35

KC-390 Millennium

AERO INDIA 2023
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HAL's big range of displays including the HLFT-42 and IMRH

As part of Aero India 2023, HAL displayed a unique 'Aatmanirbhar Formation' flight of 15 helicopters consisting of all variants of Advanced Light Helicopter (ALH), 'Prachand' Light Combat Helicopter and Light Utility Helicopter (LUH). The fixed wing front witnessed LCA twin seater variant, Hawk-i, Intermediate Jet Trainer (IJT) and Hindustan Turbo Trainer (HTT)-40 aircraft.

HAL is showcasing its full spectrum training capabilities and display for the first time, the scale model of Hindustan Lead in Fighter Trainer (HLFT)-42. HLFT-42 is the 'Next Gen Supersonic Trainer' that will play a critical role in modern combat aircraft training with state-of-the-art avionics like Active Electronically Scanned Array (AESA), Electronic Warfare (EW) Suite, Infrared Search and Track (IRST) with Fly by Wire control (FBW) system. HAL's major attraction at its indoor pavilion (HALL-E) is the scale model of Indian Multi Role Helicopter (IMRH), Next generation HLFT-42 and models of LCA Mk 2, Hindustan Turbo-shaft Engine-1200, RUAV, LCA Trainer, Hindustan-228 etc.

Lockheed Martin hosted the Vice Chief of the Army Staff, Lt. General B. S. Raju, PVSM, UYSM, AVSM, YSM, at its Aero India 2023. He was walked through the company's prime offerings for the Indian Armed Forces.

Chief of the Air Staff, Air Chief Marshal VR Chaudhari, welcomed at Thales' stand by Pascale Sourisse, CEO of Thales International and team at Aero India 2023

UNITED AIRCRAFT CORPORATION

Yak-130

Yak-130 combat trainer aircraft is intended for military aviation colleges that train flight personnel, combat training centers and combat units for training, retraining, and maintaining piloting skills.

THE TECHNOLOGY OF FLIGHT

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SPYDER All-in-one

The 'Kalyani Rafael Advanced Systems is offering India SPYDER All-in-one air defence solution which the representative narrates as a 'trend setter'. It is claimed to be the only such system to carry C2, radar and missiles together on a single platform. He explains that generally similar platforms carry different components on seperate mobile chassis; thus if even one of the transporters is compromised over all performance is depleted. But the new offer negates such. This air defence system carries two different interceptors- Derby Mk3 with a solid-state active radar seeker and Python 5 with an electro-optical (EO) & imaging infrared (IIR) homing seeker. The system has integrated EO system to identify target and assess battle damage. While the features might excite the readers, one should not forget that it is just an offer at this moment.

(Reporting by Sankalan Chattopadhyay)

Alfa-S is more than just for swarm

The 'Air Launched Flexible Asset Swarm' or better known as ALFA-S is a long range loitering munition developed by 'NewSpace Research & Technologies' as a part of HAL Combat Air Teaming System (CATS). The main objective behind the development is not just to enhance India's swarm striking capability but to defeat robust air defence or counter drone system of the enemy as well. All these small drones are actually carried by CATS ALFA which reaching upto a desired range releases the swarm. But the capability of such drones can be increased to the next level by sending each individual Alfa-S for individual target! Thus an enhanced means to defeat enemy counter drone can be found by the indigenous product.

(Reporting by Sankalan Chattopadhyay)

Lightning at Yelahanka

The F-35A took Yelahanka by storm as the Lightning II flew at 'Aero India 2023' like a blue steak. This also marked the first flight of any fifth generation fighter jet in the Indian sky. Lockheed Martin has reportedly brought two F-35 this Aero India; one for static display and another for flying. The aerospace and defence company has already pitched F-21 for MRFA requirement for the IAF and leaving no stone unturned to win the contact. The astonishing flying display of F-35 raises the question if it will now be pitched. However, without any official statement one can just wonder.

(Reporting by Sankalan Chattopadhyay)

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HAL hands over ALH to Mauritius

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

Elated to welcome Chief of the Air Staff, Air Chief Marshal VR Chaudhari to the MBDA exhibit at AeroIndia 2023

CDSpace: First in its class Medium Altitude Medium Endurance VTOL UAV

Within the BEML booth at Aero India 2023, CDSpace, a Mumbai-based Company specialising in drone development, is showcasing its Spot V3 UAV. The VTOL drone has been researched and developed in-house by CDSpace but the turboprop engine has been supplied by Desert Aircraft (DA), and it is claimed to be first in the VTOL class of UAVs with medium endurance capability, which is around 6 hours. The drone has already completed its medium-altitude trials and will soon undergo high-altitude flight tests as well. It is flexible with the payload options, depending on the customer's choice of make and model. As a distribution partner in the program, BEML will be assisting in the marketing domain for the system. The primary purpose of the UAV will be surveillance and there are no plans as of now for its conversion into an armed drone or loitering munition. **(Reporting by Rishav)**

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ALH Dhruv - Indian Air Force


LCH


ALH Dhruv - Indian Navy


ALH Dhruv - Indian Coast Guard


ALH Dhruv - Civil


LUH - Indian Army

Photos by Abhishek Singh Chauhan

HAL's current and future projects


Dornier Do-228


HLFT - 42


LCA Tejas


AMCA

Hawk i

LCA Mk2

Photos by Abhishek Singh Chauhan

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Prime Minister Modi dedicates to the nation HAL's Helicopter Factory at Tumakuru

In yet another step towards 'Aatmanirbharta' in defence, Prime Minister Narendra Modi dedicated to the nation a Helicopter Factory of Hindustan Aeronautics Limited (HAL) in Tumakuru, Karnataka on 6 February 2023. Raksha Mantri Mr. Rajnath Singh and senior officials of Ministry of Defence were present on the occasion.

The Greenfield Helicopter Factory, spread across 615 acres of land, is planned with a vision to become a one-stop solution for all helicopter requirements of the country. It is India's largest helicopter manufacturing facility and will initially produce Light Utility Helicopters (LUHs).

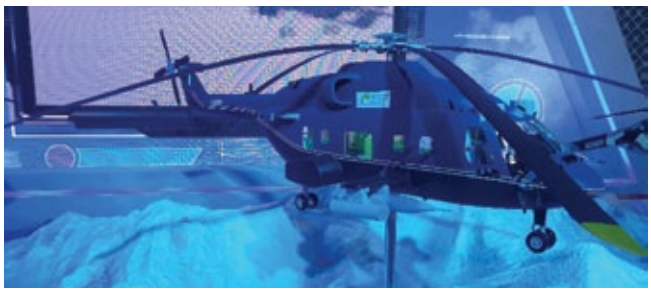
The LUH is an indigenously designed and developed 3-ton class, single engine multipurpose utility helicopter with unique features of high maneuverability. Initially, this factory will produce around 30 helicopters per year and can be enhanced to 60 and then 90 per year in a phased manner. The first LUH has been flight tested and is ready for unveiling.

The factory will be augmented to produce other helicopters such as Light Combat Helicopters (LCHs) and Indian Multirole Helicopters (IMRHs). It will also be used for Maintenance, Repair and Overhaul of LCH, LUH, Civil Advanced Light Helicopter (ALH) and IMRH in the future. Potential exports of civil LUH will also be catered to from this factory.

HAL plans to produce more than 1,000 helicopters in the range of 3-15 tonnes, with a total business of over Rs four lakh crores over a period of 20 years. Besides generating direct and indirect employment, the Tumakuru facility will boost the development of surrounding areas through its CSR activities with large-scale community centric programmes on which the company will spend substantial amounts. All this will result in improvement in the people's lives in the region.

The proximity of the factory, with the existing HAL facilities in Bengaluru, will boost the aerospace manufacturing ecosystem in the region and support skill and infrastructure development such as schools, colleges and residential areas. Medical and health care would also reach the community residing in the various nearby Panchayats.

With the establishment of facilities like Heli-Runway, Flight Hangar, Final Assembly Hangar, Structure Assembly Hangar, Air Traffic Control and various supporting service facilities, the factory is fully operational. This factory is being equipped with state-of-the-art Industry 4.0 standard tools and techniques for its operations.



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BEL showcases its capabilities at Yelahanka (Part 2)

Mr Bhanu Prakash Srivastava, CMD, BEL

BEL's 'Airborne Products & Systems' on display includes Ultra Violet Missile Approach Warning System, Self-Protection Suite for Helicopters, Hand Held Field Signal Generator, HD Airborne Spread Spectrum Modem, HD Ground Spread Spectrum Modem, Directed Infrared Counter Measure System, Tarang II Radar Warning Receiver and Display Unit Indigenous.

Other 'Futuristic Technologies' on display include Automatic Dependent Surveillance-Broadcast System, Position Indicator – G3I, Hand-Held Indian Regional Navigation Satellite System, Extended C-Band Block Up-Converter, Monolithic Microwave Integrated Circuit, C Band Phase Locked Oscillator, Router with Call Manager, Voice Gateway Unit, MIL-GRADE TAB, Signal Processing Unit for Flight Level Radar, UHF RFID Reader, 3 ATI Display, Torpbuster CPU Board and Smart Energy Meter.

The 'Homeland Security and Cyber Security' cluster includes display of Smart City solutions, Homeland Security solutions, Comprehensive Integrated Border Management System, Naval Airfield Integrated Security System, and Integrated Perimeter Surveillance System, while the 'Missile Systems' display includes Air Defence Weapon System.

'EO & Laser-based Products' includes Panoramic Night Vision Goggle, Twin Tube Goggle, Laser Dazzler, Corner Shot Weapon System, Multipurpose Reflex Weapon Sight, Mini Eye-safe LRF Module, FO Gyro-based Sensor Packaged Unit, Laser Fence System, Electronic Artillery Fuzes and Aerial Fuze.

The highlight of BEL's outdoor display is the GIMBAL for Tethered UAV, Tethered UAV, Shallow Water ROV, Hexacopter and Ultra-Light Weight Enclosure with platform.

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Mission Mode (MM) projects of DRDO

The Government has worked out the Mission Mode (MM) projects of the Defence Research and Development Organisation (DRDO). As on date, DRDO is working on 55 MM Projects for a total sanctioned cost of Rs 73,942.82 crore. These are in the area of Decoys, Nuclear Defence Technologies, Air Independent Propulsion (AIP), Combat Suite, Propulsion System, Air Droppable Container, Torpedo, Fighter Aircraft, Cruise Missile, Unmanned Aerial Vehicle, AEW&C Aircraft System, Gas Turbine Engine, Assault Rifle, Warhead, Light Machine Gun, Rocket, Advanced Towed Artillery Gun System (ATAGS), Infantry Combat Vehicle Command, Ordnance Disposal System, Tactical Radios, EW Systems, Radars, Life Support System, Geographical Information System, Surface to Air Missile, Anti-ship Missile, anti-Airfield Weapon, Glide Bomb, Simulator etc.

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Azadi Ka Amrit Mahotsav

Tata Group to set up FAL for C295 at Vadodara, Gujarat

On 30 October 2022, the Prime Minister of India, Mr. Narendra Modi, laid the foundation stone of the Final Assembly Line (FAL) for Tata Group's India C295 Programme at Vadodara, Gujarat. The unit will undertake aircraft manufacturing and assembly and will deliver a mission-ready aircraft in transport configuration, equipped with an indigenous Electronic Warfare Suite to the Indian Air Force (IAF). Raksha Mantri Mr. Rajnath Singh, Gujarat Governor, Acharya Devvrat, Chief Minister of Gujarat, Bhupendra Patel, Minister for Civil Aviation Jyotiraditya M Scindia, Defence Secretary, Dr. Ajay Kumar, Secretary, Ministry of Civil Aviation, Rajiv Bansal and Chairman, Tata Sons, N. Chandrasekaran were among the dignitaries who were present on the occasion.

In September 2021, India formalised the acquisition of 56 Airbus C295 aircraft to replace the Indian Air Force legacy Avro fleet. It is the first 'Make in India' aerospace programme in the private sector, involving the development of a complete industrial ecosystem: from manufacture to assembly, test and qualification, to delivery and maintenance of the complete lifecycle of the aircraft.

This will be the first time in the Indian private sector that an aircraft will be manufactured in-country, from parts to final assembly. The programme will lead to the development of a strong private industrial aerospace ecosystem in India and will create more than 15,000 skilled direct and indirect jobs across the aerospace eco-system, with more than 125 suppliers qualified on global quality standards across India.

Sixteen aircraft will be delivered in flyaway condition. They are

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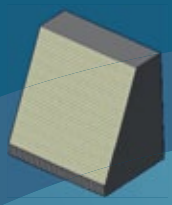

Space Debris Radar

Drone Detection Radar System (DDR)

Coastal Surveillance Radar (CSR)

Bird Detection Radar

Air Traffic Management Radar Systems

Radiation Mode Test & Evaluation Facility for Radar EW Systems

Pulsed Phased Array Tracking Radar

S-Band AAAU for Naval Application

AAAU for UTTAM RADAR

AMP-MFRS-101

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scheduled to be received between September 2023 and August 2025. Remaining forty will be manufactured at the Vadodara manufacturing facility. The first Made in India aircraft is expected from September 2026.

The C-295 is a transport aircraft of 5-10 tonne capacity with contemporary technology that will replace the ageing Avro aircraft of IAF. Robust and reliable, it is a versatile and efficient tactical transport aircraft which can perform a number of different missions. The aircraft, with a flight endurance of up to 11 hours, can carry out multi-role operations under all weather conditions. It can routinely operate day as well as night combat missions from desert to maritime environments. It has a rear ramp door for quick reaction and para dropping of troops and cargo. Short take-off/land from semi-prepared surfaces is another of its features.

The IAF became the 35th C295 operator worldwide. Up to date the programme counts 285 orders, with more than 200 aircraft delivered, 38 operators from 34 countries as well as 17 repeated orders. In 2021 the C295 achieved more than half a million flight-hours.

With a proven capability of operating from short or unprepared airstrips, the C295 is used for tactical transport of up to 71 troops or 50 paratroopers, and for logistic operations to locations that are not accessible to current heavier aircraft. It can airdrop paratroops and loads and can also be used for casualty or medical evacuation. The aircraft can perform special missions as well as disaster response and maritime patrol duties.

HAL pushes ahead

The first flight of Advanced Light Helicopter (Wheeled Version) with segmented MRBs (Main Rotor Blades) and MRH (Main Rotor Head) in pre-cone configuration was carried out in Bengaluru on 30 June 2022. The flight was carried out by Wg. Cdr. Unni Pillai, ED (CTP-RW).

"The 2-Segment Main Rotor Blades (MRBs) and Pre-Cone Configuration of Main Rotor Head (MRH) have been developed to address the stringent stowage dimension requirement specified by Indian Navy and to improve the Time Between Overhauls (TBO) life of the Main Gear Box", stated CMD, HAL.

"On completion of mandated ground testing of various factors, the prototype helicopter was built with 'Segmented Pre-Cone MRBs' and 'Pre-Cone MRH'. The RTB runs, Ground Resonance test and Clamped Power Ground Run were carried out to be found satisfactory", the CMD further stated.

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Kalyani M4 vehicles for UN Peacekeeping Missions

Bharat Forge Limited has dispatched 16 Made-In-India Kalyani M4 vehicles to the Indian Army for United Nations Peacekeeping deployment. The Kalyani M4 is a state-of-the-art Armoured Personnel Carrier that provides 'unprecedented levels of protection' to the occupants against high Kinetic Energy threats including severe mine blasts and grenades. The Kalyani M4 is a Quick Reaction Fighting Vehicle (Heavy) indigenously manufactured by Bharat Forge Ltd and is capable of carrying an infantry platoon in full combat gear. The Kalyani M4 successfully completed a series of extreme vehicle trials in some of the toughest environments in India. The trial were conducted in the freezing terrains of Leh and Ladakh, and the unforgiving deserts of Rann of Kutch.

Speaking on the occasion, Mr. Baba N. Kalyani, Chairman, and Managing Director, Bharat Forge Ltd stated, "We are proud to be delivering the Made in India Kalyani M4 for UN Peacekeeping missions. This encourages us to work for the benefit of our armed forces and it reinforces our commitment to harness our Prime Minister's vision for Atmanirbharat and self-reliance in the defence sector."

Mr. Amit Kalyani, Deputy Managing Director, Bharat Forge Ltd added, "Keeping crew safety and vehicle performance as paramount factors, Kalyani M4 has been ergonomically and aesthetically designed to allow the crew to perform their duties in an optimum manner."

The Kalyani M4 can enhance the required combat power in minimum time in all types of terrain with the help of a combat radius of approximately 800 kms. It is equipped with modern military-grade power terrain will all-time situational awareness. "The Kalyani M4 today is the best mobility platform available in the world and variants such as the ambulance and command post vehicles have been delivered to the Indian Army in the past" stated company officals. Recently, Army's northern command inducted the Kalyani M4 to its fleet of armoured vehicles under an emergency procurement amid the China-India border standoff. The vehicle can withstand three 10 kg TNT charges under the wheels and one 50 kg IED blast at one side.

Safran's HAMMER for Precision Strike

The Indian Air Force (IAF) evaluated and opted for a significant number of Safran Electronics & Defense designed, developed and produced 3.1-m long Armement Air-Sol Modulaire (AASM) Precision Guided Munition (PGM) for its Rafale fleet that also forms the standard PGM of French Armée de l'Air (Adl'A) and IAF Rafale platforms. In a typical surface attack mission the Rafale carries up to six 500 lb AASM/SBU-38/SBU-54/SBU-64 Highly Agile Modular Munition Extended Range Hammer (all can be ripple fired in one pass to strike six different desired mean points of impact points with clinical precision for simultaneous attacks on multiple targets), plus four MICA Beyond Visual Range Air-to-Air Missiles (BVRAAM) and three 2000 litre drop tanks.

A conversion kit for 500 lb class bombs, the guidance section at the front combines data from a Global Positioning System (GPS) receiver and an Inertial Navigation System (INS) unit through Kalman filtering enabling 10 metre accuracy even in adverse weather and decimation of multiple targets simultaneously. The bomb body (general purpose or penetration) is in the centre and a rocket motor aft. For long distance engagements, the AASM is equipped with a bolt-on tail unit/range extension kit which comprises a solid rocket motor and flip-out wings. Folded wings enable a glide range of 15 km when dropped from low altitude or 50 km when dropped from medium to high altitudes with the guidance processor enabling the pilot or Weapon Systems Officer (WSO) to select the angle at which the bomb impacts the target, thus allowing it to manoeuvre aggressively to engage distant, off-boresight targets.

There is a provision for IIR seeker (SBU-54) for contingency-type operations reported to be capable of being programmed before launch with a template of the target derived from reconnaissance imagery, "acquiring immunity" to GPS jamming and giving it "meter-class" accuracy against precision targets. AASM has been extensively battle proven

over Libya with outstanding performance and reliability. The Semi-Active Laser Homing (SALH) version (SBU-64) gives high accuracy against mobile targets.

Meanwhile, first separation tests of 1000 kg version of AASM Hammer air-to-ground modular weapon, has successfully completed its first two inert separation tests from a Rafale. The separation dynamics observed during the two firings were in line with simulations. These industrial validation tests were designed to check the correct sequencing of all components of the wing hard points and the weapon, as well as the wing deployment mechanism on the range extension kit.

Following these successful separation tests, the first live firing tests will be conducted in 2021 as part of the final development and qualification of the 1000 kg AASM. The 1000 kg AASM features a guidance kit derived from the 250-kg version and a specific range extension kit, and has the same modular characteristics with the BLU109 penetrating bomb body and MK84 conventional body, as well as its close functional integration with the Rafale, especially for fire control system and configuration options. This new weapon will give the Rafale an enhanced strike capability, with payload configurations of up to three 1000 kg AASMs per aircraft. As noted earlier, its standoff range is also extended, thanks to the integrated propulsion system.

Sayan Majumdar

(All photos: Vayu)

TASL delivers 200th CH-47 Chinook Crown and Tail cone to Boeing

Tata Advanced Systems Limited (TASL) has successfully delivered the 200th Crown and Tail-cone for Boeing's CH-47 helicopter. Manufactured by TASL in Hyderabad, the parts of the CH-47 helicopters will be integrated at Boeing's facility in Philadelphia. TASL has delivered the Crown and Tail-cone for CH-47 Chinook helicopters for the US Army and other international customers. The CH-47 Chinook is an advanced multi-mission helicopter operated by the US Army and 18 other defence forces around the world. In June 2017, TASL had also delivered the first crown and tail cone parts for one of the 15 CH-47 Chinook helicopters for delivery to the Indian Air Force.

Boeing India and MIDHANI explore collaboration

Boeing India announced it will assess and collaborate with Mishra Dhatu Nigam Limited (MIDHANI) to develop raw materials for standards aerospace parts and components in India. Indigenous availability of special aerospace materials and alloys has been identified as crucial for creating a self-reliant aerospace and defence industry in India. The availability of essential aerospace materials is the first step in securing the supply chain, and aligns with the Government's vision of Aatmanirbhar Bharat.

Dynamatic Technologies completes first F-15 former assembly

"This is the first aero-structure, for the latest and most advanced F-15 manufactured in India, a significant milestone for the Indian aerospace and defence industry. This is enabled by innovation and forward-thinking processes, the newest version of the legendary F-15 fighter incorporates the most advanced systems available globally, including next-generation design and technology built on a digital thread", said officials.

F-15EX model on display at Defexpo 2022

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Updates from Saab

Order for Gripen C/D upgrade

Saab has received an order from the Swedish Defence Materiel Administration (FMV) to ensure the continued operation of JAS 39 Gripen C/D and to provide capability enhancements to preserve the operational relevance of the fighter aircraft. The order value is SEK 500 million.

Gripen C/D is the system that will be used for many years to come in Sweden and in other countries that have purchased Gripen. The development is also done to further ensure a cost-effective solution regarding construction, design and procurement. “Gripen C/D is the backbone of the Swedish Armed Forces today and will continue to be for many years to come, so this is an important order where we will ensure the continued operation and operational relevance of Gripen C/D,” stated Jonas Hjelm, Head of Saab’s Aeronautics business area.

Contract for new Gripen launch system

Saab has received an order from the Swedish Defence Materiel Administration (FMV) for the development and integration of a new launch system for Gripen C/D and Gripen E. The order includes the development and integration of a new launch system for air-to-air missiles and countermeasure pods on Gripen C/D and Gripen E. The

contract also includes options for subsequent series orders of launcher systems. The launchers can be integrated with existing variants of weapon pylons and can carry all Gripen air-to-air missiles.

Denmark is 15th Carl-Gustaf M4 customer

Saab has received an order from the Danish Ministry of Defence Acquisition and Logistics Organisation (DALO) for the multi-role, man-portable Carl-Gustaf M4 weapon, making Denmark the 15th customer for the M4 version. Deliveries will take place in 2022. The recoilless Carl-Gustaf M4 weapon increases tactical flexibility. Built to satisfy future requirements, it is compatible with advanced fire control devices and prepared for specialised ammunition, putting advanced technology at forces’ fingertips. The Danish Armed Forces has been using Carl-Gustaf, which is designated Dysekanon in the country, since the 1970s.

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Programmable Carl-Gustaf munition

Saab's programmable Carl-Gustaf munition, designated HE 448, was fired for the first time in front of an audience at a live fire event in Karlskoga, Sweden. The firings took place 3-4 May 2022 in front of an audience with representatives from 30 different nations and included shoulder-fired engagements demonstrating the capabilities of the new programmable High Explosive (HE) round. A new Fire Control Device (FCD), designated FCD 558, was also demonstarted at the event. The new HE 448 programmable round has the ability to communicate with the new Fire Control Device 558 via a new protocol known as Firebolt. The HE 448 round provides the FCD 558 with the exact information on round type and propellant temperature and combines this with target distance entered by the operator to determine the best trajectory. This means that Carl-Gustaf operators will be able to quickly configure a chambered round and so increase their operational effectiveness.

In December 2021, Saab was contracted to deliver the new HE 448 munition and Fire Control Device 558 to the Swedish Armed Forces.

Sirius Compact for EW users

Saab has unveiled Sirius Compact - a lightweight electronic warfare passive sensor to meet surveillance challenges across all levels of tactical operations by locating threats while remaining undetected. Sirius Compact brings new capabilities thanks to its low size, weight and power, particularly in comparison to equivalent larger static solutions. Because it can easily be integrated to drones, vehicles, vessels, masts or man-portable applications, users can rapidly deploy the system and its coverage as the situation demands.

Sirius Compact is modular, scalable and can be used stand-alone, in a network of sensors or as a complement to existing sensors. By enhancing situational awareness through silent detection, classification and prioritisation of radar and datalink emissions, it is also a force-multiplier enabling users to locate threats whilst remaining undetected. Autonomous operation enables assimilation and compilation of situational awareness information without the need to store sensitive data in the sensor.

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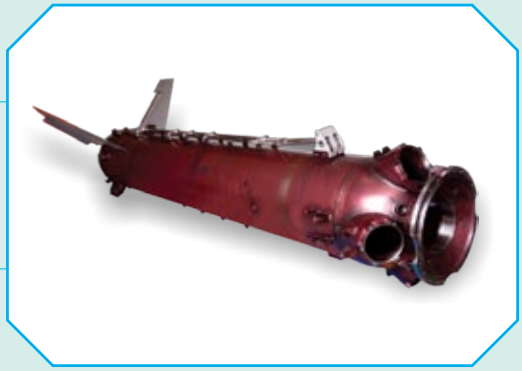

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Updates from Lockheed Martin

Aerojet Rocketdyne selected by LM

Aerojet Rocketdyne has been selected by Lockheed Martin Missiles and Fire Control to build an advanced solid rocket motor booster for the second stage of a US Defense Advanced Research Projects Agency (DARPA) hypersonic weapon system, known as Operational Fires, or OpFires. OpFires aims to develop and demonstrate a ground-launched missile system, enabling hypersonic boost glide weapons to penetrate modern enemy air defences and rapidly and precisely engage critical time-sensitive targets from a highly mobile launch platform.

LM's 1st TPY-4 radar completes production

Lockheed Martin's first AN/TPY-4 radar, recently selected by the US Air Force for the Three Dimensional Expeditionary Long Range Radar (3DELRR) Rapid Prototyping programme, has completed production marking availability to the world.

LM delivers precision strike missile system on JLTVs

Lockheed Martin successfully delivered the Spike Non-Line-of-Sight (NLOS) missile system on the Oshkosh's Joint Light Tactical Vehicle (JLTV) to US Special Operations Command (USSOCOM). This integration demonstrates the versatility of the Spike NLOS weapon system. Spike NLOS is a multi-purpose, electro-optical/infrared missile system. Its rocket motor provides capability to reach ranges up to 32 kilometers.

Contracts for Javelin anti-tank weapon systems

The US Army recently awarded the Javelin Joint Venture two production contracts for Javelin missiles and associated equipment and services with total value of $309 million. These contracts include more than 1300 Javelin missiles funded from the recent Ukraine Supplemental Appropriations Act and orders for several international customers including Norway, Albania, Latvia and Thailand. Javelin is developed and produced by the Javelin Joint Venture, a partnership of Raytheon Missiles & Defense and Lockheed Martin.

Updates from Safran

Lower fuel consumption with Safran's SFCO2

Newly launched French airline Flying Green has signed a Memorandum of Understanding (MoU) with Safran Aircraft Engines for the use of its SFCO2 fuel optimisation service. As part of the agreement, the two companies will conduct collaborative research into the use of SFCO2 for the Orly-based airline's new fleet of Airbus A320 neo and A321neo aircraft, aimed at assessing savings in CO2 emissions and operating costs. The MoU also covers the rollout of SFCO2 at Flying Green's new academy for training its pilots in fuel saving techniques. In addition, Flying Green and Safran Aircraft Engines have signed a framework agreement to equip the airline's eight aircraft—due for entry into service between 2023 and 2027—with new-generation CFM International LEAP-1A engines.

Makila 2 engines powered by SAF

An Airbus H225 has performed the first ever helicopter flight with 100% sustainable aviation fuel (SAF) powering both Safran's Makila 2 engines. This flight, which follows the flight of an H225 with one SAF-powered Makila 2 engine in November 2021, is part of the flight campaign aimed at understanding the impact of SAF use on the helicopter's systems. Tests are expected to continue on other types of helicopters with different fuel and engine architectures with a view to certify the use of 100% SAF by 2030.

The use of SAF is one of Airbus Helicopters' levers to achieve its ambition of reducing CO2 emissions from its helicopters by 50% by 2030. One of the main benefits of using this new fuel is that it allows the aircraft to minimise its carbon footprint while maintaining the same flight performance. In June 2021, Airbus Helicopters launched the SAF User Group with the intention of bringing all stakeholders together to work on ways to accelerate the use of blended SAF kerosene and to pave the way toward 100% SAF flights for future fleets.

Contract for French FURIOUS programme

The French defence procurement agency DGA (Direction Générale de l'Armement) has announced a new optional tranche contract awarded to Safran Electronics & Defense for FURIOUS (FUturs systèmes Robotiques Innovants en tant qu'OUtilS), a science and technology programme that aims to develop innovative robotic systems for mounted and dismounted warfighters. The DGA's announcement follows successful field trials of the FURIOUS robotic system, carried out by Safran in late 2021 at the French army's urban combat training center (Sissone military base) – a key advance culminating the firm contract phase.

During this phase participants focused on the modular architecture concept (hardware and software), designed to ensure the autonomous operation of any terrestrial platform, whether crewed or not. Safran Electronics & Defense was able to deploy this architecture on three very different types of platforms included in the FURIOUS system. The optional tranche announced today aims to optimize this architecture and make the autonomous functions developed more robust (tracking passage points, replaying trajectories, monitoring the leader, autonomous target homing, etc.) within more complex and even unstable environments.

SkyNaute to equip H160M Guepard's

Airbus Helicopters has selected Safran Electronics & Defense to supply SkyNaute navigation systems to equip future H160M helicopters, developed as part of the HIL joint light helicopter programme. This contract follows the order from the French Ministry of the Armed Forces for 169 "Guépard" helicopters in December 2021. SkyNaute is an ultra-compact hybrid inertial navigation system based on a disruptive Safran-patented technology: the HRG Crystal. This hemispherical resonator gyroscope offers a virtually unlimited service life, robust design for the most severe environments and ultra-high reliability.

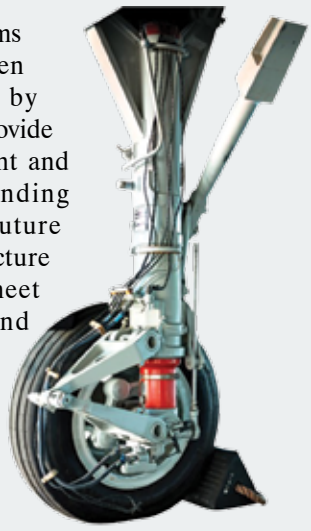
Safran and ATR develop Smart Lander

Safran Landing Systems, the world leader in aircraft landing and braking systems, and ATR, world's leading regional aircraft manufacturer have developed Smart Lander, an innovative landing gear diagnostics service that uses state-of-the-art knowledge in data analysis to optimise the manufacturer's response times in the event of hard landings, and enable aircraft to be quickly returned to service.

This extremely innovative service, the first of its kind in the aviation industry, is based on machine learning technology. Based on hundreds of thousands of hard landing simulations, Smart Lander issues recommendations to operators on the maintenance actions to be taken according to the hardness of the landing and to the load level sustained by the landing gear. Aircraft can subsequently be permitted to continue their commercial operations or alternatively, be sent to a maintenance base. This process takes less than an hour, compared to over a week previously.

New landing gear for next gen military aircraft

Safran Landing Systems Canada Inc. has been awarded a contract by Lockheed Martin to provide the design, development and qualification of a landing gear structure for a future aircraft. This new structure will include a clean sheet design of the nose and main landing gear.



VAYU Interview with Surendra Ahuja, Managing Director, Boeing Defence India

VAYU: How can the services business be a significant driver of defence growth in India?

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. If we start with a quick look at the last five years, Boeing has accelerated growth in India with a razor-sharp focus on the key areas of:

- Customer engagement: meeting the Indian Navy (IN) and Indian Air Force's (IAF) modernisation and mission-readiness needs
- Services growth: localisation of our services, and the value Boeing Defence India, our local establishment in India, is able to provide through the lifecycle of platforms offered
- Supplier expansion: building an indigenous and robust supplier-partner network with a focus on Aatmanirbhar Bharat

Hence, we had setup Boeing Defence India (BDI) with an aim to provide holistic lifecycle solutions for defence customers in India. Cost-effective solutions, timely support, and flawless execution are critical elements of BDI's commitment to the market and our customers. Boeing's integrated logistics support is already enabling the highest levels of fleet-readiness. We are seeing growth in our services business and, with it, growth in the value Boeing creates through product lifecycle support and training. From performance-based logistics contracting and integrated fleet support to maintenance, modifications and repairs, Boeing provides a broad spectrum of innovative products and services across platforms which directly support and enhance capabilities while reducing total cost of ownership for our customers globally. Boeing's investments in services infrastructure, building local capabilities, workforce training and partnerships in India are aimed at ensuring the Indian armed forces successfully complete their missions, operate their assets at peak condition and do so affordably.

In 2021, we launched the Boeing India Repair Development and Sustainment (BIRDS) Hub. BIRDS is an initiative to bring together ecosystem partners to shape India as a strategic destination for aerospace engineering, maintenance, repair and sustainment services. This is a one-of-its-kind initiative that seeks to provide customers with best-in-class solutions, efficient turnaround times, and optimal economical value, all available in-country. Under this programme, we have by now signed strategic partnerships with leading indigenous players like Horizon Aerospace, Air Works, and AI Engineering Services Limited (AIESL). 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. Our programmes have skilled close to 4,000 frontline aerospace manufacturing workers and aircraft maintenance engineers.

VAYU: What are the services support packages being offered to the Indian Air Force and the Indian Navy to support the mission readiness of the C-17, P-8I, Apache and Chinook fleet?

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. We support the Indian Air Force 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 humanitarian missions, along with mission rehearsal of all scenarios including emergency procedures. Boeing's in-country C-17 training center 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 armed forces the same level of availability we are currently provide on the C-17 fleet through our GISP programme. Boeing also offers training as a service on simulators on these platforms, 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, resolves Aircraft On-Ground (AOG) situations, and reduces 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 the relevant parts, 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 Aatmanirbhar Bharat in 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.

VAYU: And how are your MRO partners supporting you in the upkeep of the fleet?

Boeing has also partnered with customers and local industry to set up MRO facilities in the region to support India's aspiration to become an MRO hub for the region, and we also provide engineering and parts services to directly support regional commercial airline customers. Boeing India's strategic collaboration with Air Works was an important first step under the Boeing India Repair Development and Sustainment (BIRDS) hub that envisions a collaboration with key local companies and businesses to develop India into an aviation and defence repair and sustainment hub. Air Works successfully concluded Phase 32 maintenance checks on six P-8I long-range maritime patrol and anti-submarine warfare aircraft operated by the Indian Navy (IN) so far. Three of them were in heavy maintenance checks concurrently, demonstrating a maturity and scale at par with developed global MRO hubs.

VAYU: Can you share an overview of Boeing's fleet at service in India and the future opportunities being pursued?

Boeing has the largest fleet in defence among any foreign OEM in the country with the 11 C-17s, 22 AH-64 Apaches (with six more on order), 15 CH-47 Chinooks, 12 P-8Is, 3 VVIP aircraft and two Head of State aircraft and is a growing player in the civil market. We're regularly engaging with our defence customers in India on their current and future requirements for national security, and the value our portfolio can deliver to develop capabilities they require for the execution of their missions. In the near-term, those capabilities include the additional P-8Is, Apaches and Chinooks, F/A-18 Super Hornet Block III and additional training, sustainment, and performance-based logistics solutions. Just with the F/A-18 Super Hornet Block III, should it be down selected, Boeing projects an economic impact of $3.6 billion over 10 years to the Indian economy. This economic impact would be over and above Boeing's current offset obligations and plans.

VAYU: Can share an update on the training center for the P-8I?

Boeing has built a 60,000 sq. ft. Training Support & Data Handling (TSDH) Centre at INS Rajali, Arakkonam in Tamil Nadu as part of a training and support package contract signed in 2019. The facility was handed over to the Indian Navy, and the trainings commenced in April, 2022. The secondary centre at the Naval Institute of Aeronautical Technology, Kochi was also handed over to the Indian Navy last year. The indigenous, ground-based training will allow the Indian Navy crew to increase mission proficiency in a shorter time, while reducing the on-aircraft training time resulting in increased aircraft availability for mission tasking. We also continue to support the Indian Navy's P-8I fleet through Boeing's services business - providing spares, ground support equipment, and by positioning field service representatives at INS Rajali & INS Hansa so they are available to the Navy on 24x7x365 basis.

MBDA updates

MBDA response to the industrial agreement for the FACS

MBDA welcomes the industrial agreement recently finalised to prepare the Future Air Combat System. Following the first phases of FACS/SCAF work, the signing of this agreement is a change in scale for this programme and lays the foundations for a large-scale European industrial partnership.

Phase 1B is primarily a phase of technological maturation. In co-operation with its partners, Airbus Defense and Space GmbH and the Spanish consortium SATNUS, MBDA will design 'Remote Carrier' demonstrators and conduct experiments in connected collaborative combat, both simulated and in-flight. In particular, MBDA will be responsible for the demonstrator of Remote Carriers that can be fired from combat aircraft.

As the leader in effects management, MBDA will principally develop new effectors, the Remote Carriers. They are multipliers of the tactical options available to our armed forces. Remote Carriers will force adversaries to reveal themselves, will disrupt them, confuse them and/or saturate them to finally neutralise the threats they pose, which continue to become ever more effective. Capable of operating in packs or individually, the Remote Carriers will cover all areas of combat, from air combat, to maritime operations, and ground strikes.

Exocet continues to break records

One of MBDA's longest standing international partners, the Peruvian Navy, set two new range records with two firings of Exocet missiles, carried out during a major joint naval exercise.

Of all the actions organised during this large-scale exercise, the most emblematic and complex was to conduct the Missile Launch Exercise (Missilex), carried out at sea, 90 nautical miles from the coast. However, this was an opportunity to put MBDA's Exocet AM-39 and MM-40 Block 3 (B3) to the test. The first, the AM-39 from a Sea King SH-3D helicopter to a surface target, and the second, the MM-40 B3 from a Lupo-class frigate to the same target.

The two firings broke two range records. With a target hit at a range of 19 nautical miles, the Exocet AM-39 set a new national range record, breaking the previous record of 17 nautical miles set by the Navy in August 2021. The Exocet MM-40 B3 then made headlines again, hitting the target at 92 nautical miles, 11 more than a firing of MBDA's Otomat by Peruvian armed forces in 2008.

Gripen E: Dominating the Electronic Fight

In battle, your enemy is constantly trying to find new ways to challenge your capabilities and find any weak points. This is particularly true when considering Electronic Warfare (EW) systems – an area where Gripen E truly excels.

The Gripen EW system, combined with the highly integrated situational awareness provided by fusing intelligence from all sensors in the tactical unit and co-operating units, allows Gripen to enter what is known as contested battle-space, win the fight and exit safely.

Today all aircraft have some form of EW, but none has the power or the ability to be enhanced constantly, like the Gripen EW system. This is a result of several new technological breakthroughs, and it ensures that Gripen can deliver both defensive electronic measures and offensive electronic disruption. This fundamentally eliminates enemy sensors operating on various bandwidths; sensors that in today's environment can locate platforms, even those with stealth features, if they do not have an EW system as capable as the one equipping the Gripen.

So let's put this into perspective. During peacetime, the enemy hides their most potent capabilities, refraining to use them to full operational effect. This can include various key systems such as Electronic Warfare and radar capabilities. In reality, this means that during peacetime advanced systems, including operational transmissions, emitter modes, frequencies and jamming techniques are kept secret and held in reserve for the war. Once the necessity arises and tensions rise, new hostile system capabilities are engaged. In times of an escalating conflict, day-by-day new threat emissions are introduced into the battlespace in order to confuse and threaten your defences.

For this reason, it has never been more important than now to have the ability to rapidly change, instantly adapt and quickly implement features that counter the enemy, to Develop Operationally.

It is not possible to change the platform design – but the sensor must be capable of being tweaked and improved to adapt to the threat and defeat it. With Gripen E all this comes as a "built-in feature," thanks to its one-of-a-kind avionics system, that continuously enables upgrades with even more advanced AI software and increased computational power. Adaptability therefore, of key sensors like the EW, ensures Gripen can provide lethality, while also excelling in survivability. In the scenario presented, Gripen fights, learns and adapts, so that its multitude of sensors, such as the EW are better than the adversary is the next day. It's survival of the fittest.

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

VAYU Interview with Ravi Hazarika, Chief Commercial Officer, PBS India

PBS India is offering together with partners at Deep Engineering Industries replacements of old APUs used in Mi-17 helicopters for technologically superior PBS APUs and providing MRO for Mi-17V5 of IAF.

VAYU: How long is the history of the PBS brand in India?

The PBS Brand has a quite long history in India, it was registered in 1955. But it is only in recent years that business activity has really picked up thanks to the Indian company PBS India Private Limited and important successes have been achieved. PBS India is a part of PBS Group, a Czech engineering manufacturer that operates globally in aerospace, precision casting, cryogenics and energy. It has more than 200 years of history behind it with the ability to design, construct, manufacture and test the entire aerospace products. This is a significant competitive advantage, as is the ability to adapt products to specific customer requirements. PBS has been developing and supplying small turbine drive units for the aerospace industry for half a century. And we want to do a long-term business here in India to reach mutual satisfaction.

VAYU: What new products are you presenting at Aero India?

We bring some of the most successful turbine engines from the PBS jet engine portfolio, but we also want to introduce our APU development programme to build on our current success in delivering these units for IAF medium helicopters. Last year the company celebrated 20 years since the start of development of its highly successful SAFIR APUs intended especially for medium helicopters and training airplanes. During these years PBS has developed a number of very successful auxiliary power units and gained the certification by European Union Aviation Safety Agency for design, production and maintenance of auxiliary power units. Our SAFIR auxiliary power units can be primarily seen in several developed versions and modifications. The achieved parameters of these units enabling simultaneous supply of compressed air and electricity, an operating altitude up to 6,000 m, continuous operation for up to 6 hours, a service life of 4,500 hours, simple maintenance and reliable operation extreme weather conditions ranks PBS APUs in the category up to 100 kW among the world's best. To this day, PBS has installed over 6,500 PBS auxiliary power units (APU).

The new PBS APU SAFIR 5K/G MI40

VAYU: What can you offer Indian Air Force development programmes in this area?

Petr Motýl, PBS India Director and Ravi Hazarika, PBS India Sales Director

In short, I would say that we are able to contribute our share to the successful development of the IMRH programme. We would like to showcase our ability to offer our partners a mutually interoperable modern APU and Environmental Control Systems (ECS) units. PBS has 50 years of experience with development, manufacture and testing of ECS for airplanes and helicopters, including more than 7,000 implemented aircraft installations. Main advantages of ECS made by PBS include the possibility of cooling, heating and ventilation in one system, minimal power consumption, ecological operation without the need for a coolant and a compact design.

Our advantage is that we can rely on the development base of our parent company PBS, which has been a leading manufacturer of products and equipment for the international aerospace industry for almost 50 years. The ability to carry out in-house development, manufacture and testing of aircraft products in accordance with global aerospace standards is well known. And we are ready and willing to support the Indian aerospace industry.

VAYU: What do you see for the future of PBS India?

PBS India definitely intends to strengthen its presence and plans to expand the business in the country. Our intention is to create more jobs and increase our sourcing demands for locally produced materials, services and work force as more production, service, and after-sales support capacities will be allocated in India. We are interested in working with young talents from India and to be a reliable partner for Indian defence industry.

PBS INDIA

News from Boeing

Boeing, US Navy demo manned-unmanned teaming

Boeing and the US Navy have completed a series of manned-unmanned teaming (MUM-T) flight tests

in which a Block III F/A-18 Super Hornet successfully demonstrated command and control of three unmanned aerial vehicles (UAVs). Boeing system engineers connected Block III's adjunct processor, known as the Distributed Targeting Processor – Networked (DTP-N), with a third-party tablet to team with the UAVs. Boeing developed new software loads for the DTP-N specific to running the third-party tablet and transmitting commands. The software development, tablet connection to the fighter and all flight tests were completed in less than six months.

Boeing partnered with the F/A-18 and EA-18G Programme Office (PMA-265), Air Test and Evaluation Squadrons (VX) 23 and 31, Naval Air Warfare Center-Weapons Division at China Lake, Calif., and a third-party vendor on the demonstration. During the test flights, F/A-18 pilots entered commands into the tablet, which were processed and transmitted through Block III's hardware. The UAVs executed all commands given by F/A-18 pilots during tests over a two-week period.

50 years of F-15 innovation

On 27 July 1972, the Boeing F-15 flew for the first time with Chief Test Pilot Irv Burrows at the controls. Fifty years later, the undefeated F-15 continues to evolve and add advanced capability to the US Air Force fighter fleet. Boeing's F-15 programme was initiated at the request of the US Air Force, which needed a fighter jet designed to maintain the country's air superiority. Through its variants, the F-15 has also served that mission internationally with numerous global customers including Japan, Israel, Saudi Arabia, Singapore, South Korea and Qatar.

The newest F-15, the F-15EX Eagle II, delivers a state-of-the-art electronic warfare system, along with contemporary sensors and avionics. The airframe, known for its unrivaled payload capacity, is capable of carrying next-generation hypersonic weapons. More than 1,500 F-15s are in service worldwide. The US Air Force took delivery of its first F-15EX in March 2021.

Boeing delivers 150th P-8

The newest Boeing P-8 maritime patrol, reconnaissance aircraft took to the skies over Puget Sound early July 2022 bringing the total number of P-8s delivered to 150. The 150th multi-mission P-8 will be operated by Air Test and Evaluation Squadron (VX) One based at Naval Air Station Patuxent River, Maryland. Amassing more than 450,000 mishap-free flight hours, the global P-8 fleet includes 112 aircraft delivered to the US Navy, 12 to Australia, 12 to India, nine to the United Kingdom and five to Norway. The aircraft are designed for anti-submarine warfare; anti-surface warfare; intelligence, surveillance and reconnaissance and search and rescue.

(Photos: US Navy)

Delivery of MH-60R's to the Indian Navy

A Letter of Offer and Acceptance (LoA) for procurement of 24 MH-60R multi-role helicopters was concluded with the US Government in February 2020 at a cost of more than Rupees Fourteen Thousand Crores. The first three MH-60Rs delivered in US in 2021 are being utilised for training to IN crew. The next three MH 60R helicopters were delivered at Kochi, two helicopters of which were received by the Indian Navy at Cochin International Airport on 28 July 2022 and the third helicopter was delivered in August 2022. The delivery of all 24 MH-60R helicopters will be completed by 2025.

Nammo Updates

Nammo extends artillery range with smarter 155mm rounds

It was interesting to see the range of 155mm artillery systems on display by Nammo during Eurosatory 2022. While the US Army is working on the Extended Range Cannon Artillery (ERCA) programme to provide it with a longer 58cal gun capable of firing over longer distances, Terry Russell, VP of business development for Nammo Defense Systems, noted the pressing need to modernise tactical fires too. He stated, "Most NATO artillery systems are still confined to a short range of about 20 miles, which leaves them vulnerable to counter-battery fire. With this in mind, Nammo at Eurosatory 2022 is showcasing its portfolio of smarter artillery ammunition. Examples include the 155mm IM HE-ER (base-bleed), the 155mm HE-LR (rocket-assist) and the 155mm HE-ExR (ramjet) munitions. These are designed to meet various international programmes, especially the Long-Range Precision Fires programme for the US Army".

Boeing, Nammo conduct ramjet 155mm artillery tests

A team from Boeing and the Norwegian company Nammo has conducted successful ground-fire tests of its Ramjet 155 Extended Range Artillery Projectile – a technology to enable long-range precision fires, one of the US Army's key modernisation priorities. The tests, led by Nammo and conducted during the months of January and March in Norway, validated gun-launched survivability and performance predictions, and expanded Ramjet 155's employment envelope.

Since 2019, 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 to meet the Army's long-range, precision-fire priorities. 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. The team continues to develop and mature the technology, with further testing and demonstrations planned in the coming months.

Chief of the Air Staff flies 3 indigenous platforms

Air Chief Marshal VR Chaudhari, Chief of the Air Staff (CAS) was on a two day visit to Bangalore on 5 and 6 August 2022 where he flew three indigenous platforms, Light Combat Aircraft (LCA) Tejas, Light Combat Helicopter (LCH) and Hindustan Turbo Trainer-40 (HTT-40), which are being inducted into IAF as part of its drive towards Atmanirbharta. CAS was demonstrated the capabilities of the LCH and HTT-40 as well as updates on the Tejas. He also interacted with the designers and test crew to understand the current status and future plans.

On 6 August 2022, CAS delivered the Air Chief Marshal LM Katre Memorial Lecture which was attended by serving and retired officers of IAF, HAL and other stakeholders from the aerospace industry. The CAS spoke on 'Capability and Force Development Plans of IAF' towards making it a future ready combat force.

SMARTSHOOTER unveils SMASH X4

SMARTSHOOTER, a designer, developer, and manufacturer of innovative fire control systems that significantly increase the accuracy and lethality of small arms, presented the SMASH X4, a Fire Control System with a x4 magnifying optic scope, at the Eurosatory exhibition in Paris.

SMASH X4 combines a x4 magnifying optic scope with SMARTSHOOTER's SMASH unique fire control capabilities, thus providing extended detection, recognition and identification ranges for the shooter as well as extended lethality ranges. The SMASH X4 also includes an etched reticle to allow shooting without battery power. An optional integrated laser range finder (LRF) enables range measurement both as a user-initiated capability as well as a system input for improved precision. Night-capability is also available by using the X4 with thermal night vision devices as a clip-on.

SMARTSHOOTER has recently completed the delivery of thousands of additional SMASH systems for the IDF and other customers. Deployed and combat-proven, the SMASH family of fire control systems lock on target and ensure precise target elimination of ground, aerial, static or moving targets during day and night operations. Equipped with an onboard computer to perform complex targeting solutions, SMASH enables superior situational awareness and can be operated as a stand-alone solution as well as combined with other systems to provide an effective multi-layer defense solution.

Roboteam and SMARTSHOOTER unveil TIGR UGV

Roboteam, a leading global provider of tactical ground robotic systems, and SMARTSHOOTER unveiled an integrated solution: a tactical ground robot utilising the SMASH technology that ensures precise hit capabilities as well as air defence against drones (C-sUAS). A highly mobile, all-weather system capable of operating in any terrain, Roboteam's Transportable Interoperable Ground Robot (TIGR) is a medium-sized, two-man carried UGV. Incorporating SMARTSHOOTER's SMASH Hopper, a Light Remotely Controlled Weapon Station (LRCWS) with pin-point accurate lethal capability, the integrated solution enhances tactical forces' lethality and survivability by providing them the ability to hit ground, aerial, moving or stationary targets from a safe stand-off distance. Lightweight, with high maneuverability and stair-climbing ability, this solution is ideal for urban scenarios, border control, subterranean and other tactical, operational missions.

Rafael India showcases its systems

Rafael's local partners & subsidiaries showcase a number of advanced systems

Rafael is "proud to have local partners and subsidiaries, such as its partnered Indian based companies Kalyani-Rafael (KRAS) and Astra-Rafael (ARC) with whom Rafael has joint ventures, presenting a selection of innovative defence solutions at the Aero India."

"Through our partners, state-of-the-art systems can be produced in India independently by KRAS and ARC, allowing for the transfer of technology, know-how, and active support of the local industry, and Indian economy. After decades in India, Rafael continues its long-term effort to invest in the supply of advanced defence systems to the Indian market".

Systems showcased at conference include I-Derby Missiles, RecceLite Reconnaissance Pods, Litening Advanced Targeting Pods, the SPICE Family of Air-to-Surface Missiles, the SPIKE Missile Family, and the BNET

Tactical Communications system. Likewise, advanced versions of both Litening and RecceLite pods will be presented together with our local partners.

HAL MRO support for engines of the MQ-9B Remotely Piloted Aircraft manufactured by GA-ASI

Hindustan Aeronautics Limited (HAL) and General Atomics Aeronautical Systems Incorporated (GA-ASI) have jointly announced that turbo-propeller engines which power the state-of-art MQ-9B Guardian High Altitude Long Endurance (HALE) Remotely Piloted Aircraft System (RPAS) will be supported by the HAL Engine Division at Bengaluru for the Indian market.

"HAL has been manufacturing and providing MRO support for TPE 331-5 engines for the last 40 years. We are also establishing facilities for manufacturing TPE 331-12B engines for HTT-40 project. The engine used on the MQ-9B RPAS belongs to the same family of engines with upgraded configuration to adapt to the RPAS technology. I am glad, that HAL Engine Division, Bangalore would be providing MRO support to the engine for MQ-9B RPAS, one of the most sophisticated equipment in the world" said Mr. C.B. Ananthakrishnan, Chairman and Managing Director, HAL.

Rosoboronexport offers India new joint projects in aviation (Part-2)

Rosoboronexport is also presenting the Ka-226T light utility helicopter, the production of which is suggested to be launched under the Make in India programme on the premises of Indo-Russian Helicopters Limited, a joint venture with the participation of Russian and Indian industrial companies.

In addition, a wide range of various Russian military helicopters are being demonstrated. Among them are the upgraded versions of the Ka-52E and Mi-28NE attack helicopters and the Mi-171Sh military transport helicopters, which are in strong demand on the world market and in the Asia-Pacific region today.

Visitors to the Rosoboronexport display are invited to see Russian unmanned aerial vehicles, including the Orion-E reconnaissance/strike UAV, the Orlan-10E reconnaissance UAV and the Orlan-30, a new product launched in 2022.

In the air defence segment, Rosoboronexport is showcasing the entire range of assets that can operate both independently and as part of an echeloned air defence system. Russia's collective display is exhibiting the S-350E

Vityaz air defence missile system, the Viking, Tor-M2KM, Tor-M2E SAM systems, and the Pantsir-S1 self-propelled anti-aircraft gun/missile (SPAAGM) system. In addition, the company is offering the Igla-S and Verba man-portable air defence systems. Russian-made anti-drone systems, including Repellent, RLK-MCE, RB-504P-E and RB-504A-E, are also on display.

Elbit's 'Iron Fist' for India

Elbit is offering India its 'Iron Fist' active protection system (APS) as a robust means of enhanced protection for armoured platforms against multiple threats. It is a 'hard kill' system; that means it can defeat enemy projectiles by physical means. It has active electronically scanned array (AESA) radars to detect an imminent enemy. Once detected, the APS releases projectiles which then explode near the threat nullifying it. It also has a passive infrared detector as well. The sensors provide a robust 360° situational awareness capability and hostile fire detection. The modular design can be adapted to a range of armoured platforms. In the last DefExpo, a lighter version called 'Iron Fist Light Decoupled' also was hinted as a part of offer for Elbit FICV. However, the offer is currently on preliminary stage, so we'll have to wait longer to see how it unfolds.

(Reporting by Sankalan Chattopadhyay)

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Astra Microwave Products Ltd (AMPL) marches ahead

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 today's 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 Programme 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.

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.

Thales and BDL to join hands for 'Make in India' 70mm laser guided rocket solution

Thales and Bharat Dynamics Limited (BDL), a Government of India enterprise, will be signing a Memorandum of Understanding for setting up manufacturing facilities in India for precision-strike 70mm laser guided rockets (FZ275 LGR).

Through the agreement, BDL will become a part of the FZ275 LGR global supply chain, providing the opportunity for export of Indian manufactured components to existing and future 70mm laser guided rockets customers.

This agreement will also provide the opportunity for BDL to offer a 'Make in India' 70mm laser guided rocket solution for existing helicopter fleet of Advanced Light Helicopters (WSI) and Light Combat Helicopters of the Indian Government.

DRDO showcases over 330 technologies & systems

The DRDO Pavilion is showcasing over 330 products categorised into 12 zones namely Combat Aircraft & UAVs, Missiles & Strategic Systems, Engine & Propulsion Systems, Airborne Surveillance Systems, Sensors Electronic Warfare & Communication Systems, Parachute & Drop Systems, Artificial Intelligence Machine Learning & Cyber Systems, Materials, Land Systems & Munitions, Life Support Services, and Industry & Academia Outreach.

The flagship products in each of 12 Zones are: AMCA, LCA Tejas Mk2, TEDBF, ARCHER, TAPAS UAV, Abhyas, Autonomous Stealth Wing Flying Test Bed from the Combat Aircraft & UAVs Zone; Akash, Astra, QRSAM, Helina, Nag, Pralay from the Missiles & Strategic Systems Zone; FACECU, Gearbox module, Kaveri Dry Engine Prototype, Small Turbo Fan Engine from the Engine & Propulsion Zone; AEW&C-NETRA, AEW&C- MkII, MMMA Aircraft, IFF, AAAU Model from the Airborne Surveillance Systems Zone; TWIR, BFSR-SR, Bharani, Ashlesha, AATRU, ASPJ Pod, LEOP from the Sensors Electronic Warfare & Communications Systems Zone; Military Combat Parachute System, Brake Parachute, P-16 Heavy Drop System from the Parachute & Drop Systems Zone; Airborne Sonar with Helicopter Model, Air launched Directional Sonobuoy from the Naval Systems Zone; DDCA, INDIGIS, Air Warfare Simulation System, QRNG from Artificial Intelligence Machine Learning & Cyber Systems Zone; FSAPDS, Titanium Alloys from the Materials zone; ASREM, Surveillance ROV, SUMITRA from Land Systems & Munitions Zone; Integrated Life Support System, Helicopter Oxygen System from the Life Support Services Zone and Wankel Rotary Engine, Jet Fuel Starter, Radio Altimeter from the Industry & Academia Outreach Zone. The India Pavilion will exhibit five DRDO products. The exhibits are AEWC&C Mk-II, AMCA, LCA Tejas Mk2, TEDBF and Archer (Image intelligence with Weapon Payloads).

The DRDO's participation in the mega show is being marked by the flight displays of LCA Tejas, LCA Tejas PV6, NETRA AEW&C and TAPAS UAV. The static display also includes LCA Tejas NP1/NP5 and NETRA AEW&C. The participation is also marked by the flying debut of indigenous Medium Altitude Long Endurance class UAV TAPAS-BH (Tactical Aerial Platform for Advanced Surveillance - Beyond Horizon).

USAF/USN at AI'23

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