



2021

AERO INDIA

05 February 2021

SHOW DAILY

WAYU Day 3

“Projecting power and influence across the Indian Ocean Region”



In his inaugural speech at Aero India 2021, Defence Minister Rajnath Singh referred to the formal order for 83 LCA Mk.1As which he described as the ‘biggest’ Make in India defence contract yet and also mentioned overseas interest in the Indian fighter, specifically mentioning the Maldives, Malaysia and Sri Lanka. “India is steadily marching from *Make in India* towards *Make for the World*”.

The Minister conveyed that India was gearing itself to project power and influence across the Indian Ocean Region

(IOR). “India has a vast coastline, but our interests also lie beyond our shores. It includes our people who reside and work across continents, especially in the IOC, ...it is our bounden duty to remain capable and willing to assist them in times of natural calamities and security challenges”.

(Mention of the Maldives is curious as this tiny archipelago in the Southern Arabian Sea has a very tiny air wing with two HAL Dhruv ALHs for SAR and utility tasks (*in photo above*).

RFP issued for HTT-40

Long awaited even as HAL has assiduously worked to design, develop, test fly and clear for service the Hindustan Turbo Trainer 40 (HTT-40), the Ministry of Defence officially issued the Request for Proposal (RFP) to HAL on second day of Aero India of 2021. The RFP is for 70 aircraft with a clause for an additional 38 aircraft which will be delivered to the IAF for meeting the Stage I flying training syllabus. These will supplement the present PC-7 Mk.IIs being operated at the Air Force Academy, Dundigal. The HTT-40s will be built at two sites, HAL’s Bangalore Complex and at Nasik.



Airbus MoU with GMR Group



At Aero India 2021, Airbus signed a MoU with the GMR Group, "to explore collaboration opportunities across aviation services, technologies and innovation". Airbus and GMR Group will team up to explore potential synergies in several strategic areas of aviation services, including maintenance, components, training, digital and airport services.

"Airbus and the GMR Group are committed to high standards of operational efficiency, innovation and sustainability. Through this partnership we will align in our mission to provide world class aviation services in the region," said Rémi Maillard, President and Managing Director, Airbus India & South Asia. "We will work together towards developing solutions that will shape the future of aviation services and boost the development of aviation infrastructure in the region."

Airbus partners Flytech



At Aero India 2021, Airbus signed a MoU with Flytech Aviation Academy, a leading Indian aviation training academy, "to explore collaboration opportunities in Remotely Piloted Aircraft System (RPAS) training". The Indian government estimates that there are 40,000 drones in the country and expects the number to reach one million in five years, which will require some 500,000 drone pilots.

The drone and remotely piloted aircraft industry is evolving rapidly. This increases the demand for drone pilots equipped with the necessary skills and knowledge of safety and flying regulations along with technical proficiency," said Remi Maillard, President and Managing Director Airbus India & South Asia.

AXISCADES and VRM partner on simulators

AXISCADES and VRM have signed an Industrial Cooperation Agreement for design, build and supply of jet trainer aircraft simulators for the training of Indian Air Force pilots. Virtual Reality Media, a.s. (VRM) Slovakia are engaged in design, development and production of state-of-the-art simulators and training systems while AXISCADES, is a pioneer in the design and supply of Avionics and Ground systems for Defence Forces in India and globally. VRM and AXISCADES have been working on the Dornier 228 Level-D Full Flight & Mission Simulator (FFMS) for HAL.

CNS visits MBDA pavilion



Chief of the Naval Staff Admiral Karambir Singh visited the MBDA pavilion during Aero India 2021. As per the Company, the Indian Navy has "excellence at its side with high-performing missile systems from MBDA such as Exocet on board its new Kalvari-class submarines".

MBDA has built over 50,000 missiles in India during this time, and is working through its Indian joint venture – L&T MBDA Missile Systems Ltd – to deliver new *Make in India* programmes and provide new enhancements for the Indian Navy's fighting potency.

L&T MBDA Missile Systems Ltd has already submitted its first bid to the Indian Armed Forces for the Sea Ceptor, the next generation of naval air defence systems.



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HCL in Digital Workplace Services agreement with Airbus

HCL Technologies (HCL) has signed a five-year Digital Workplace Services Agreement with Airbus. HCL, to “establish a modernised digital workplace to enhance the user experience and service quality for the majority of Airbus employees globally”. HCL’s Fluid Workplace Model will enable Airbus to deploy the latest digital technologies and will rapidly simplify Airbus’ existing

IT processes and optimization of delivery costs, using unique end-to-end management services to cover the information and operational technology landscape.

“We’re delighted to be working with Airbus as a key strategic partner in its digital workplace transformation journey. The combination of HCL’s scale transformational expertise and management capabilities of IT and OT landscape will enable Airbus to remain at the forefront of innovation and deliver leading-edge user experiences,” said Sandeep Saxena, Executive Vice President (UK&I, France & Benelux), HCL Technologies.

RAC MiG Strategic Partnership with AEPL

Aviatech Enterprises Pvt. Ltd. (AEPL), a Crown Group Company specialising in Defence Aerospace MRO and Aviation Engineering services including engineering design, manufacture, product development and production for indigenisation and NABL-accredited calibration facility, have entered into a ‘Framework Agreement’ with Joint Stock Company RAC MiG.

AEPL will be the in-country authorised partner for RAC MiG for providing post-warranty product support for MiG-29K/KUB aircraft, associated systems, ground support equipment (GSE) and special to type test equipment (STTE) in inventory of the Indian Navy.

Rear Admiral Srinivas Kanugo (Retd), Head of Aerospace Engineering and CEO Aviatech Enterprises Pvt. Ltd. (AEPL), commented, the ‘Framework



Agreement’ is an enabling agreement which paves the way for enhanced in-country product support at doorstep of Indian Navy establishments operating or maintaining the MiG-29K/ KUB fleet of aircraft.

Strategic Partnership between SASMOS HET Technologies and Matra Électronique

SASMOS, the specialist manufacturer of electrical wiring interconnection system, electromechanical assemblies & electronics sub-systems from India and Matra Électronique, a leading electronic equipment manufacturer from France for the Aerospace, Defence, Marine and Space market have signed a Strategic Cooperation Agreement. This partnership “will ensure emergence of Aerospace and Defence Electronic Systems equipped with the most advanced and efficient technologies”.



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But it isn't enough to be state-of-the-art, even when the last aircraft on order rolls in. You have to stay awesome through the lifespan of these incredible aircraft as the world moves at hyperspeed to new frontiers of technology.

Gripen E is the fighter which rapidly adapts to unfolding developments and stays relevant over time.

Equipped with smart avionics architecture, algorithms can rapidly be replaced by new ones without reducing the high availability of the aircraft. The architecture is also the basis for making rapid hardware and weaponry updates, with a high degree of alteration for each customer nation.

With this, Gripen E is not only the smart fighter of today, but it is designed to be the smartest fighter for generations to come. It will allow the Indian Air Force to keep pace with evolution, while India leads it.

Gripen E. Born to stay awesome.

Rafael and BDL MoU on Anti-Torpedo Defence System for Indian Navy

On 4 February 2021, Rafael Advanced Defense Systems and Bharat Dynamics Limited (BDL) signed a MoU for joint induction of an Anti-Torpedo Defence System (SHADE) for the Indian Navy. The MoU was signed by Mr Eli Hefets, Rafael's Corporate Regional Director for India, Rafael and Mr NP Diwakar, Director (Technical), BDL, in the presence of Defence Minister Rajnath Singh.

SHADE will be the first system in the world to employ a combination of soft kill and hard kill decoys, thereby providing a robust and effective defence against modern torpedoes.



COAS visits BrahMos pavilion

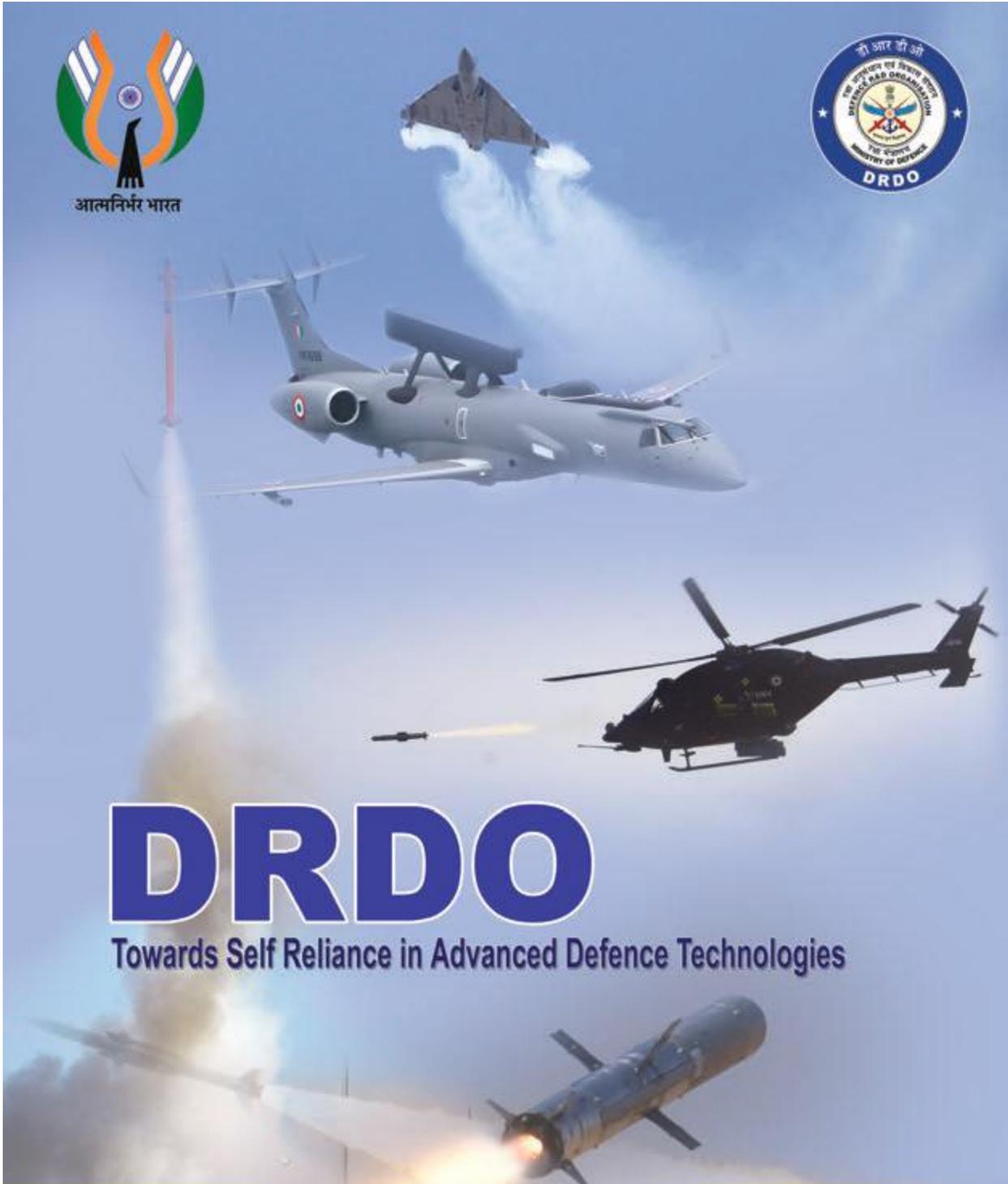


Chief of the Army Staff, Gen MM Naravane, visited the BrahMos Aerospace pavilion on inaugural day of Aero India 2021. He was briefed by Dr Sudhir K Mishra, CEO & MD of BrahMos, about the BrahMos Weapon System and the major milestones the India-Russia defence JV has achieved over the years. The Indian Army has operationalised the mobile land attack BRAHMOS cruise missile variants since 2007.

HAL, GE Aviation in contract for forgings



On 4 February 2021, HAL signed a contract with GE Aviation for development and supply of ring forgings for GE Aviation military and commercial engine programmes. The five-year contract, involves supplying both steel and nickel alloy forgings for shrouds, cases, rings and seals. In the photo are seen Mr Chandrashekhar Yavarna, Senior Director, Global Sourcing Strategy, GE Aviation handing over the contract document to Mr M S Venkatesh, Executive Director, Foundry Forge Division in the presence of Mr M S Velpari, Director (Ops), HAL and other officials



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Bharat Forge at Aero India 2021



As Babasaheb Kalyani, Chairman of Bharat Forge Ltd tweeted, 'we are proud to be showcasing a wide range of our indigenously developed defence systems... looking forward to engage with various industry leaders, policy makers and defence & aerospace experts on the journey towards Atmanirbhar Bharat.'

Over the years, Bharat Forge has invested in state-of-the-art facilities for production of world-class products including airframes, structural and engine parts. The Company manufactures high end shafts, LPC Discs and HP Discs aero engine components, blisk blades, OGV blades and fan blades in keeping with the latest technology and design trends while maintaining high quality standards.



Mr. Rajinder Bhatia, President and CEO, Bharat Forge Defence and Aerospace

Book on 'The Tejas Saga' released

The DRDO monograph, *Radiance in Indian Skies The Tejas Saga* was released by Defence Minister Rajnath Singh in the early afternoon of 3 February 2021 during Aero India 2021. The book is co-

authored by Air Marshal Philip Rajkumar (Retd) and Mr BR Srikanth and is about "the inspiring journey of the Tejas from concept to entry in to squadron service".



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Gripen E

“keeping the Air Force ahead of the curve”

It's hard to imagine that the smartphone in your pocket has anything in common with Gripen, one of the most modern fighters in aviation history. But they have more similarities between them than meets the eye.

Both rely on technology that can be upgraded and updated without the need for costly replacement, to ensure continual performance at optimal levels. And both have been developed with built-in flexibility, allowing the original product to evolve and to be customised to meet the changing needs of the user.

The same way that you download apps for your smartphone that fit your individual preferences, with Gripen, software adaptations can be made to address new and evolving types of threats.

The ability to customise functionality of the fighter to address future needs is thanks to adaptability of the advanced Avionics Platform Software (APS) architecture that is embedded in Gripen software.

“We try to keep the software for Gripen as generic as possible. By having generic software and generic computers that aren't dependent on each other, it's much easier to upgrade software,” says Daniela Ivanic, Project Manager, Avionics Platform Software.

Avionics platform software architecture

Thousands of hours have been spent developing the many thousands of lines of code that together make the avionics software for the latest generation of Gripen, the Gripen E. But this is not a static process. As the technology becomes increasingly advanced, Gripen is evolving with it.

“India is one of the few countries in the world that is already having to cope with asymmetric warfare.

It is, therefore, absolutely essential for the Indian Air Force to have aircraft that are able to harness the increasing power of processing speeds, storage, artificial intelligence and machine learning to deal with the challenges of this era. Gripen E is uniquely equipped to enhance its overall performance, situational awareness, electronic warfare capability and pilot's ability to process huge volumes of data in a future driven by escalating and asymmetric threats,” says Gripen India Campaign Head, Mats Palmberg.

By designing the avionics architecture for the Gripen to separate flight critical functions; the functions that ensure the safety and security of pilots, from mission critical functions; which include intelligence, surveillance, and reconnaissance, as well as communication, radio and navigation systems for combat and peacekeeping operations, mission functions can be upgraded without having to retest safety critical functions.

“We try to keep the software for Gripen as generic as possible. By having generic software and generic computers that are not dependent on each other, it is much easier to upgrade software. For instance, when integrating new functionality or a new weapons system, the protocols are standardised. That way we don't need to upgrade the computers as well,” says Ivanic.

The avionics architecture also enables the integration of tailor-made customer applications, and it reduces the risk of the system becoming obsolete. Almost any weapon can be integrated thanks to the flexible avionic architecture, giving the fighter very high weapon flexibility. One of the great benefits of the avionics architecture design is the customisation level of the software.



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“We can either add new functionality by developing new software applications to run on current hardware; the existing avionics computers. Or slightly adapt the current platform software to upgrade the hardware for performance. We don’t necessarily have to change both. The fighter won’t be spending a lot of time on the ground for time consuming requalification of the entire aircraft, so it’s available for the next mission quickly.”

The separated avionics architecture in Gripen E is certified to the highest software technicality levels. In software terms, this means that the Gripen E is the most secure fighter system on the market. Like the smartphone, the software is the most important feature of the future proof fighter. Daniela Ivanic explains how Gripen is adapted to new technology and new threats without investments in new hardware.

Continual testing of the software follows strict processes, using manual as well as automated tests. “Testing is an important part of what we do. Being able to see the simulation of a real flight, with the system

up and running in the simulators and seeing exactly what the pilot would see, is invaluable to the process,” Daniela Ivanic says.

All testing is performed with the help of flight simulators and the certification standards for software used in airborne systems and equipment certification. “In many ways, testing is also software development. Ten years ago, you sat with applications and followed multiple steps in system testing. Today you are developing software tests to do the same thing. Now as we develop Gripen, we are also becoming a software company because we are continuously developing new software to meet and fit our current, as well as future needs.”

Since first flight of the Gripen E in June 2017, the software platform has been updated. In addition to tweaking the hardware and the hardware performance, all Gripen E computers have also been updated. “The basics of the platform that were in the first flight edition are still there, but we’ve added so many new functions that we have basically updated the total system,” explains Ivanic.

“We now have the complete context of Gripen E, and we can show how fast we can update something. It’s so important to be able to describe the total offer; not just the first addition,” she adds.

As further artificial intelligence enhancements and adaptive machine learning capabilities are considered, the tactical agility and ability to adapt future technologies will be built in from the start, and new functionality areas for Gripen will be possible to incorporate with ease.

Courtesy: Saab

IMRH programme progresses

According to official HAL sources, the company has embarked on the concept and configuration studies of the Indian Multi-Role Helicopter (IMRH) of the 13-ton medium lift class. The IMRH is being designed and developed to progressively replace the Mi-17 variants being used by the Indian Air Force and Army. In finalising configuration of the IMRH, a 1:10 scale wind tunnel model will be tested to ascertain the basic aerodynamic characteristics of the helicopter.



HAL delivers 175th F/A-18 Gun Bay Door

HAL’s Aircraft Division has recently delivered the 175th F/A-18 Gun Bay Door to Boeing. Since January 2018, HAL has been maintaining ‘Gold’ rating for 100% quality and on-time delivery. Earlier, HAL shipped new configuration FAI Door four months ahead of schedule. Owing to high performance, Boeing awarded HAL purchase contract for additional 74 such doors in May 2020 for a business volume of Rs. 21.5 crore.



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MBDA and the IAF

Seen here are MICA AAMs on a French Air Force Rafale which are also in service with the IAF Mirage 2000s and Rafales

With Rafale now in the IAF's inventory, the IAF can field a new and potent suite of weapons from MBDA. Unquestionably the most important is the Meteor, the ramjet-powered and network-enabled beyond visual range air-to-air missile that is widely recognised as a game changer in air combat. Meteor's throttleable ramjet engine provides sustained high-supersonic power, making it the only missile able to chase down manoeuvring targets at even the longest of ranges.

No less game-changing for the IAF is the SCALP stealthy air-launched cruise missile which also forms part of the Rafale weapons package. This potent weapon will give the IAF an unrivalled and flexible tool to conduct deep strike missions at long ranges against even the most protected hostile targets.

Another MBDA weapon, the MICA provides both the Rafale and the newly upgraded IAF Mirage 2000s with a uniquely flexible approach to air combat. MICA is the only missile in the world featuring two interoperable seekers (active radar and imaging infrared) which makes MICA highly countermeasure resistant and therefore highly effective.

With their strong reputation as a reliable partner that has supported the Indian Air Force for over 50 years, European missile firm MBDA understands the importance of operational capability and sovereignty for the IAF. For these reasons, the company is very strongly committed to *Make in India* to deliver both industrial sovereignty and the best of military equipment.

Indian firms are now supplying key components for the new generation missiles which are enhancing combat power of the IAF. For example Indian industry today is manufacturing 15 major subassemblies of the MICA missile, covering various complex technologies including mechanical, electrical, electromechanical and pyrotechnic items. MBDA continues to deepen its relationship with the Indian industry, as exemplified by the recent formation of a joint venture with long-standing partner Larsen & Toubro to deliver a series of important missile programmes under the *Make in India* category.

The IAF is also getting a major boost with addition of the ASRAAM as its Next Generation Close Combat Missile. With its large rocket motor and clean aerodynamic design, ASRAAM has unrivalled speed and resultant aerodynamic manoeuvrability and range. The ASRAAM gives it high kinematic capability which delivers superior end-game performance for within visual range air combat. MBDA's ASRAAM missiles significantly enhance the battle capability of India's Jaguar strike fighters, giving them unrivalled self-protection ability and enhanced ability to penetrate hostile airspace. This highly capable missile could also boost combat capability of other IAF aircraft.

Working with HAL, integration of the Mistral ATAM system on the Dhruv advanced light helicopter (ALH) and the Light Combat Helicopter (LCH) has been successfully completed.

Courtesy: MBDA

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Empowering the Nation's Defence Forces

DRDO major achievements during 2020 (Part-II)

Multi Influence Ground Mine (MIGM)

The Multi Influence Ground Mine (MIGM) has been designed and developed by NSTL, DRDO to give the Indian Navy an edge against most modern stealth ships. The MIGM is deployable from ships, submarines, and has successfully completed Technology Demonstrations during various Technical Trials.

'Uttam' Active Electronically Scanned Array Radar



The *Uttam* Active Electronically Scanned Array Radar, being developed by DRDO, is a multimode, solid-state active phased array fire control radar with scalable architecture which can be adapted for various types of fighter class of aircraft.

"This is capable of tracking multiple targets with high accuracy suitable for firing missiles with interleaved air-to-air, air-to-ground and air-to-sea modes for all terrain operations".

Flight test of ABHYAS

Successful flight test of the ABHYAS - High-speed Expendable Aerial Target (HEAT) – was conducted on 22 September 2020 by DRDO at the Interim Test Range, Balasore in Odisha. During the trials, two demonstrator vehicles were successfully test flown, the vehicle to be used as an expendable target for evaluation of various missile systems.

AHSP transfer of Pinaka weapon system from DRDO to DGQA

On 25 September 2020, Authority Holding Sealed Particulars (AHSP) responsibility of the Pinaka weapon system were handed over by DRDO to the DGQA. This AHSP transfer marks successful establishment of production of Pinaka rockets, Launchers, Battery Command Posts, Loader Cum Replenishment and Replenishment Vehicles as well as successful establishment of Quality Assurance processes. The AHSP handing over took place at ARDE, Pune wherein the documentation required by various Production agencies, Quality Assurance agencies, Maintenance agencies and Users were formally handed over by ARDE, HEMRL and VRDE to the CQA (A).

Flight tests of BrahMos missile

The BrahMos surface-to-surface supersonic cruise missile which incorporates indigenous booster and airframe sections along with other 'Made in India' sub-systems was successfully flight tested for designated range on

30 September 2020 from the ITR, Balasore in Odisha, "a major step in enhancing its indigenous content". On 18 October 2020, another BrahMos missile was successfully test fired from Indian Navy's indigenously-built stealth destroyer INS *Chennai*, precisely hitting a target in the Arabian Sea, after performing high-level and extremely complex manoeuvres. On 1 December 2020, another BrahMos missile in anti-ship mode was successfully test fired against a decommissioned ship, "the missile performing highly complex manoeuvres and destroying the target".

Flight testing of DRDO's laser guided ATGM

The indigenously-developed Laser Guided Anti-Tank Guided Missile (ATGM) was successfully test fired on 1 October 2020 against a target at longer ranges. The test was carried out by an Arjun MBT at the KK ranges (ACC&S) Ahmednagar in continuation of earlier successful trials. Laser guided ATGMs lock and track targets with the help of laser designation to ensure precision hit accuracy. This has been developed with multiple-platform launch capability and is currently undergoing technical evaluation trials from main gun of the Arjun main battle tank.

Flight Test of SMART

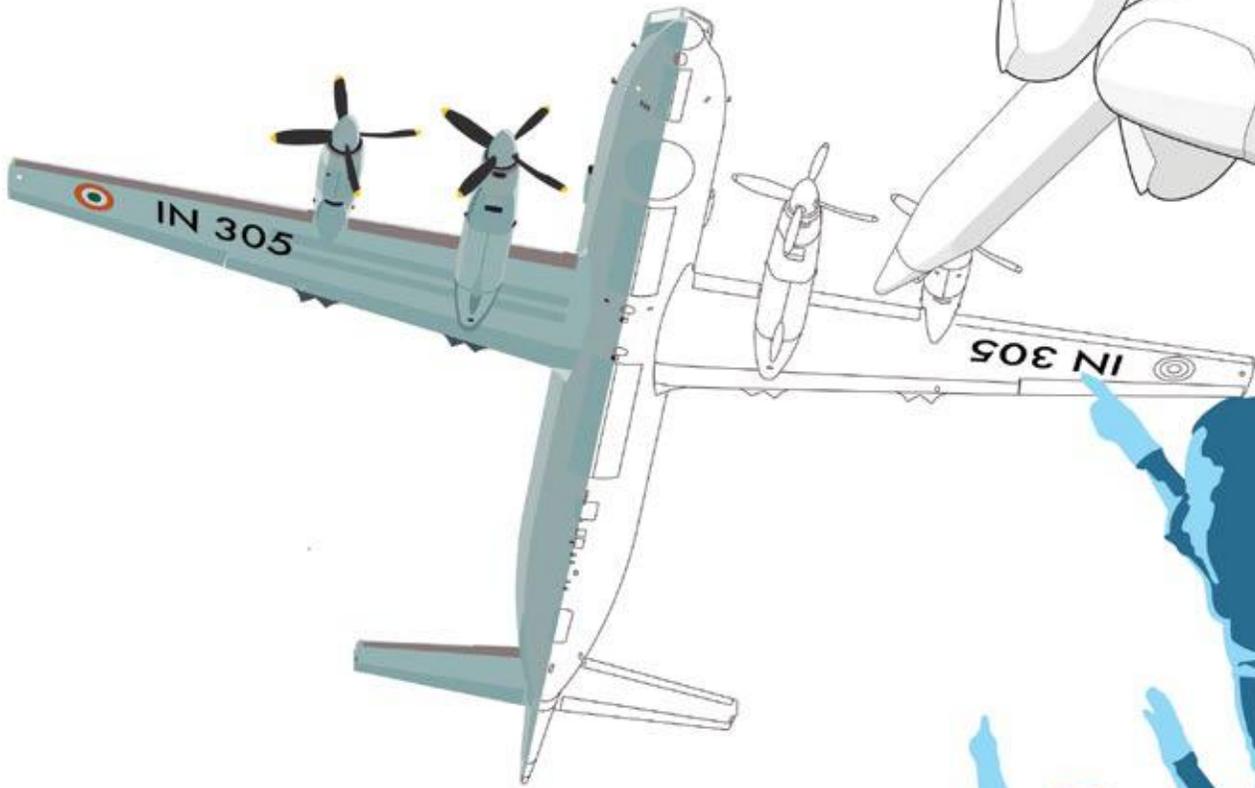
Supersonic Missile Assisted Release of Torpedo (SMART) was successfully flight tested on 5 October 2020 from Wheeler Island off the coast of Odisha. "All the mission objectives including missile flight upto the range and altitude, separation of the nose cone, release of torpedo and deployment of Velocity Reduction Mechanism were met perfectly". Tracking stations (radars, electro optical systems) along the coast and telemetry stations including down range ships monitored all the events. SMART is a missile assisted release of lightweight Anti-Submarine Torpedo System for Anti-Submarine Warfare operations, far beyond torpedo range.

DRDO developed Anti-Radiation Missile (RUDRAM)

The new generation Anti-Radiation Missile (RUDRAM) was successfully flight tested on 9 October 2020 homing in on a radiation target located on Wheeler Island off the coast of Odisha, the missile being launched from a Su-30MKI fighter aircraft. RUDRAM is the first indigenous anti-radiation missile of the country for the Indian Air Force missile integrated on the Su-30MKI fighter aircraft as the launch platform, with capability of varying ranges based on launch conditions. "The missile is a potent weapon for IAF for Suppression of Enemy Air Defences (SEAD) effectively from large stand-off ranges".



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Industry Support Measure by DRDO

To encourage more participation of Indian industry, including Start-ups and Micro, Small & Medium Enterprises (MSMEs) in defence research & development for achieving 'Atmanirbhar Bharat', Defence Minister Rajnath Singh released a new version of Defence Research and Development Organisation Procurement Manual 2020 in October 2020. In addition, and as measures to support indigenous industry, requirement of 'Performance Security' for 'Development Contracts by DRDO has been waived off, but the 'Warranty Bond' would continue to be obtained from successful development partner to cover DRDO's interest during the warranty period.

Final user trials of NAG missiles

Final user trial of the Nag 3rd generation anti-tank guided missile (ATGM) was carried out on 22 October 2020 at the Pokhran ranges. The missile was integrated with an actual warhead and the tank target was kept at designated range. Launched from the NAG Missile Carrier NAMICA, the missile hitting the target accurately and penetrating the armour.

Enhanced version of PINAKA rocket system tested

The 'Enhanced' PINAKA rocket, developed by DRDO was successfully flight tested from the Integrated Test Range, Chandipur off the coast of Odisha on 4 November 2020. "Development of Enhanced Pinaka system was taken up to achieve longer range performance compared to earlier design with reduced length".

Major milestone for QRSAM missile system



The Quick Reaction Surface to Air Missile (QRSAM) System recorded a major milestone with its direct hit on a Banshee pilotless target aircraft at medium range and medium altitude. This took place from ITR Chandipur on 13 November 2020 off the Odisha Coast. The missile uses all indigenous subsystems and was followed by another test on 17 November 2020.

Successful trials of 5.56x30 mm joint venture protective carbine

The DRDO-designed 5.56x30 mm protective carbine (JVPC) has successfully undergone final phase of user trials on 7 December 2020 meeting all GSQR parameters, paving the way for its induction into service. A series of user trials had been carried out in extreme temperature conditions in summer and high altitudes in winter, the JVPC meeting the performance criteria



of reliability and accuracy in addition to quality trials conducted by DGQA.

Quantum communication between DRDO laboratories

Secure communications are vital for defence and strategic agencies with distribution of encryption keys from time to time being an important requirement in this context. Sharing of keys over the air or wired links requires encryption, which in turn requires encryption keys to be pre-shared. Quantum based communication offer a robust solution to sharing the keys securely, and DRDO has undertaken the project for development of this technology. A milestone was achieved on 9 December 2020 when DRDO-developed Quantum Key Distribution (QKD) technology underwent trials in Hyderabad between two DRDO labs to ensure secure communication.

Inauguration of Hypersonic Wind Tunnel at DRDO Hyderabad

Defence Minister Rajnath Singh inaugurated the advanced Hypersonic Wind Tunnel (HWT) test facility at Hyderabad on 19 December 2020. This state-of-the-art HWT Test facility is pressure vacuum driven enclosed free jet facility having nozzle exit diameter of 1 meter to simulate Mach 5 to 12 hypersonic speeds. After the USA and Russia, India is the third country in the world to have such a large facility in terms of size and operating capability, being an indigenous development and an outcome of synergistic partnership with Indian industries.

DRDO's initiatives during COVID Pandemic

DRDO has undertaken product development in fighting the COVID-19 pandemic, developing 19 technologies and more than 100 products which include PPEs, hand sanitiser, UV blaster, Germi Klean and the like, which have direct utilisation to combat COVID 19. DRDO established three dedicated COVID hospitals at Delhi Cantonment, Patna and Muzaffarpur for strengthening the medical infrastructure there. *Sardar Vallabhbhai Patel Covid Hospital* is DRDO's 1000 bed facility. All the beds are provided with oxygen support. Apart from this, 500 bed Covid hospitals with 125 ICU beds have been set up by the DRDO in Bihar at Patna and Muzaffarpur.

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At Aero India 2021

HAL showcases 'Aatmanirbhar Formation Flight'



A unique flying display of HAL's indigenous platforms (both fixed and rotary wing) aptly titled *Aatmanirbhar Formation Flight* were part of the flying display at start of the 13th edition of Aero India on 3 February 2021 at Air Force Station, Yelahanka. HAL are showcasing their prowess in defence and aerospace centered on the theme 'Conceive. Indigenise. Collaborate' at this, the world's first hybrid exhibition.

The *Aatmanirbhar Formation Flight* consisted of HAL products such as the LCA trainer (LIFT Trainer), HTT-40, IJT, Advanced Hawk Mk.132 and Civil Do-228 flying in a special formation showcasing the spectrum of trainers and signifying self-sufficiency in this segment. The HTT-40, Advanced Hawk Mk 132 and Civil Do-228 are available for customer demonstration flights. The Sukhoi Su-30MKI, Dhruv Advanced Light Helicopter (ALH), Light Combat Helicopter (LCH), Light Utility Helicopter (LUH) are also taking part in the flying display, while the static display includes the Do 228 light transport aircraft Hindustan Turbo Trainer (HTT)-40, LUH and the Dhruv ALH Mk III.

HAL's major attraction at Hall-E is the Combat Air Teaming System (CATS) simulator. The simulator will have Tejas-Max cockpit as the mother-ship platform with the embedded air teaming intelligence concepts to demonstrate the fully integrated as well as autonomous wingman platforms and swarming of drones to engage in the mission. Immersive mission visualisation are projected over a wider screen apart from the command and display at Tejas-Max cockpit.

The outdoor display adjacent to HAL stall features rotary-wing products including the LCH, ALH Mk.IV Rudra and ALH Civil variant.

HAL's indoor pavilion is spread over an area of around 1126 sqm in Hall-E and showcases indigenously designed and developed fixed and rotary wing platforms, technologies covering power plants and future generation combat capable airborne solutions. With the central theme of the *India Pavilion* being rotary-wing capabilities in India, HAL's rotary platform Light Utility Helicopter (LUH) is the centre piece of the display with scaled models of the IMRH, ALH, LUH, LCH and the Indian helicopter manufacturing ecosystem/supply chain partners arrayed around it.

HAL are promoting indigenously-built platforms to visiting defence delegations and holding business meetings with OEMs and customers besides signing agreements and contracts with its business partners for various projects. Product launches, handing over ceremonies and major announcements on key activities are part of the HAL schedule during the Show.



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Light Combat Aircraft

Rafael awarded contracts for SPICE, Spike and Bnet

Rafael Advanced Defense Systems Ltd. have been awarded a \$200 million contract to provide an "Asian country" with the SPICE 2000 air-to-surface, the Spike ATGMs, tactical, electro-optically guided missiles and advanced communication systems.

SPICE is a family of stand-off, autonomous, air-to-ground weapon systems that strike targets with pinpoint accuracy and at high attack volumes, independently of GPS navigation, based on autonomous electro-optic Scene-Matching Artificial Intelligence (AI) Algorithms. The SPICE family, operational and combat proven in the Israeli Air Force and other international users, consists SPICE-250, SPICE-1000, and SPICE variants, with ranges of up to 100 km.

The Spike family consists of five variants (SR, MR, LR2, ER2, NLOS) of electro-optical, multi-purpose, multi-platform missiles, with ranges of up to 32 km and fire-and-update capabilities. To-date, Spike has been sold to 35 countries, including 19 NATO nations, with over 33,000 missiles already supplied and more than 6,000 fired in tests and in combat. Spike missiles have been integrated onto 45 different vehicular, helicopter and naval platforms.

The new contract also includes Rafael's Bnet system, a family of advanced Broadband IP MANET (Mobile Ad-hoc NETWORK) Software Defined Radios for tactical operations, supporting the modern digital battlefield's needs with high-speed, low delay, reliable connectivity for data, voice and video on-the-move.



Rafael is a developer and manufacturer of advanced weapon systems and provides "forefront technological solutions that address the defensive and offensive requirements of the modern battlefield". Rafael is one of Israel's top three defence companies, with some 8,000 employees and numerous subcontractors and service suppliers domestically and internationally.



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Boeing Underscores Commitment to India



Boeing on 28 January 2021 shared its 2021 growth strategy for the Indian market, underscoring its confidence in the fundamentals of India's aviation and defence industry, and projecting future growth for the sector. The company reiterated its commitment to being trusted partners to the Indian armed forces and airline customers as the world weathers the challenges of the pandemic.

"India's aerospace industry is persevering through the global pandemic, which has brought significant challenges. The nation's fundamental growth drivers remain resilient and robust, making India an attractive business destination globally, and Boeing is committed to the advancement of India's aerospace industry," stated Salil Gupte, President, Boeing India. "We are excited about the potential for partnership and growth in India and look forward to the dialogue with our customers, partners and industry at Aero India 2021."

Boeing's exhibit at Aero India at Hall C (C5.2 and C5.3), themed "Building The Future Together", focusses on its partnerships with India's armed forces and highlights the strategic investments the company has made to develop India's indigenous aerospace and defence ecosystem. At the exhibit, Boeing is featuring a range of advanced capabilities including the F/A-18 Block III Super Hornet, F-15EX, KC-46A, AH-64E Apache, P-8I, Chinook, 737-10 and 787-9.

At a Boeing India news conference held 28 January 2021 at New Delhi, Boeing discussed the advantages of the F/A-18 Block III offering for the Indian Navy. The Super Hornet's unique differentiators for the Indian Navy include its two-seater carrier-compatibility capability which provides operational flexibility, and opportunities to integrate future technologies related to manned-unmanned interface from aircraft carriers. The F/A-18 Super Hornet recently successfully concluded ski-jump tests at Naval Air Station Patuxent River, Maryland, demonstrating its compatibility with Indian Navy carriers.

Boeing also shared information about the F-15EX, which is the latest and most advanced version of the combat-proven, multi-role, all-weather day/night F-15

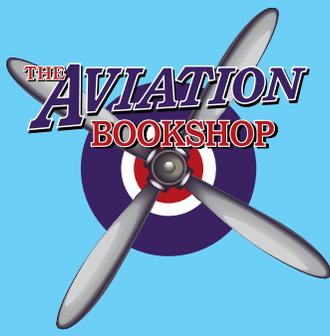
aircraft family. The F-15EX can offer a future-ready, multi-role solution to the Indian Air Force in the form of unmatched payload, performance, and persistence by integrating leading edge technologies, networks, and weapons and sensors.

In addition, Boeing announced the Boeing India Repair Development and Sustainment (BIRDS) hub initiative that envisions a competitive MRO ecosystem for engineering, maintenance, skilling, repair and sustainment services of defence and commercial aircraft in India, as part of its commitment to supporting and strengthening indigenous aerospace and defence capabilities in the country.



Boeing continues to invest in partnerships across the ecosystem in skilling, research & technology, and manufacturing that contribute to the Aatmanirbhar Bharat vision of the government of India. Boeing's advanced aircraft and services focus plays an important role in mission-readiness for the Indian Air Force and Indian Navy. Boeing is focused on delivering value to Indian customers with advanced technologies and remains committed to creating sustainable value in the Indian aerospace sector – developing local suppliers, and shaping academic and research collaborations with Indian institutions. Boeing has strengthened its supply chain with 250 local companies in India and a joint venture to manufacture fuselages for Apache helicopters. Annual sourcing from India stands at \$1 billion. Boeing currently employs 3,000 people in India, and more than 7,000 people work with its supply chain partners. Boeing serves communities and citizenship programmes to inspire change and make an impact on more than 300,000 lives in India.

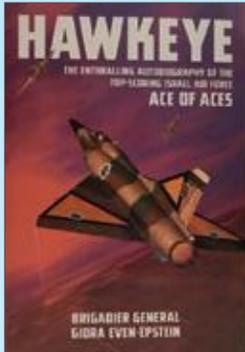
Courtesy: Boeing



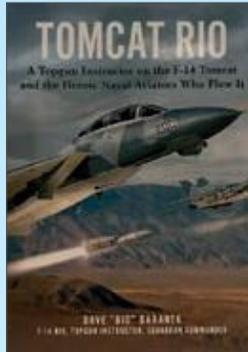
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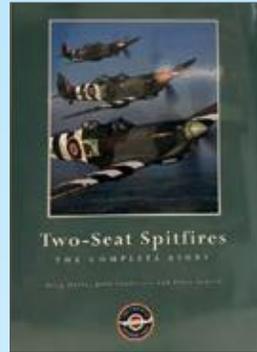
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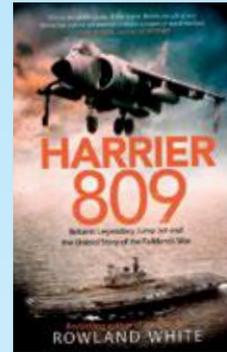
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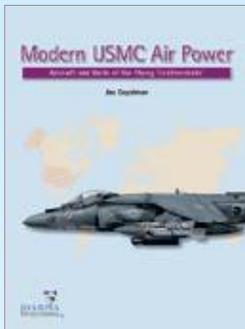
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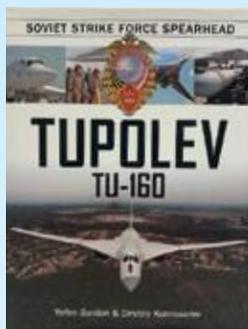
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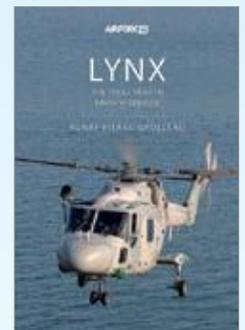
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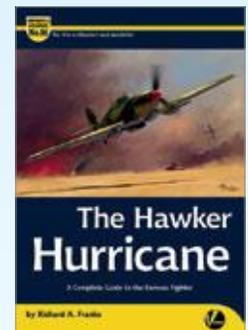
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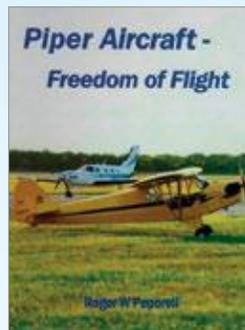
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Rolls-Royce reaffirms India commitment at Aero India 2021



Adour powered IAF Hawk



Rolls-Royce MT30

Rolls-Royce is exhibiting its technology prowess and steadfast commitment to an 'Atmanirbhar Bharat' at Aero India 2021. The Aero India show this year is seeing Rolls-Royce familiarising customers and potential partners with its advanced technology offerings in naval and aerospace defence, as well as exploring opportunities to expand its 'Make in India' footprint.

In focus is the mighty Rolls-Royce MT30, the world's most power-dense marine gas turbine for naval vessels in service today. With a history of pioneering high-end technology solutions, Rolls-Royce's prowess in naval defence solutions dates back over 80 years. The MT30 offers unique capabilities of a 21st century machine derived from the Aero Trent engine family. Offering a superior power-to-weight ratio and generating up to 40MW from a 30-tonne packaged unit, including most of the auxiliary systems, the MT30 gives navies more power in less machinery space than alternative engine types.

Kishore Jayaraman, President, Rolls-Royce India & South Asia stated, "Rolls-Royce has been a strong partner in the mission readiness of India's defence forces and are proud of our shared legacy of over eight decades. Aero India 2021 is an important platform for Rolls-Royce to explore opportunities to further collaborate, co-create and co-manufacture in India with a view to support and enable the government's 'Atmanirbhar Bharat' vision. We are also excited to discuss how our naval defence offerings such as the MT30 gas turbine can propel the Indian Navy's modernisation programme by providing integrated

power and propulsion solutions. We believe the future will be led by meaningful partnerships to 'Create in India' customised technology solutions that will pave the way for a stronger ecosystem to make in India, for India and for the world."

Alex Zino, Executive Vice President – Business Development & Future Programmes (Defence), Rolls-Royce stated, "We recognise that India's defence requirements are evolving, making indigenous development of modern defence hardware and technology a top priority for the Indian government. We also understand what it takes to build future-ready defence capabilities, and have been working closely with our Indian partners to strengthen the entire ecosystem including supply chain, sourcing, service and repairs, research and development and manufacturing capabilities. We remain firmly committed to building on Rolls-Royce's rich heritage of partnership with the Indian defence forces with co-developed and customised advanced technology products that can best serve the nation's power needs. Invested in building a strong ecosystem for manufacturing in the country, Rolls-Royce is well-positioned to explore opportunities to 'create in India' and to achieve India's goals of self-reliance in the defence sector."

Rolls-Royce has been manufacturing in India for over 60 years in partnership with Hindustan Aeronautics Limited (HAL) and other Indian supply chain partners, and remains keen to partner on the co-development programme of an indigenous engine for the Advanced Medium Combat Aircraft (AMCA).

Courtesy: R-R



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Nucon Alkan Aerospace Pvt Ltd (NAAPL) at Aero India'21



French Rafale at Aero India 2019 (photo: Vayu)



The weaponised HAL ALH (photo: Vayu)



The LCA seen here at Yelahanka in 2019 (photo: Vayu)

Two years after creating the Joint Venture Nucon Alkan Aerospace Private Limited (NAAPL) to strengthen the 'Make in India', we are proud to announce that this merger from the Indian pioneer in control systems and the French leader in ejector racks is paving the way to the future!

This JV has driven both companies to share its knowledge, skills and technology to achieve its vision and ambition for Indian market.

A joint cooperation with Hindustan Aeronautics Limited (HAL) for a Transfer of Technology of carriage system for Indian-armed helicopters ALH and LCH is already going on. As a partner of Dassault, we are on-board the Rafale by providing the latest technology for ejection system: the pneumatic energy. We also work on Mirage 2000 to support IAF fleet through a global MRO of all airborne carriage systems.

We aspire to become a leading beacon of indigenous manufacturing and complete customer support in aerospace domain for all Indian requirements of 'military airborne carriage systems' which is a very critical part of combat worthiness of various fleets. NAAPL company objective is to provide IAF the ultimate technology on new aircraft and the top support on existing ones, ensuring an optimum operational capability of their fleet.

Mounted on more than 60 different aircraft, including Gripen, ALH-WSI, Black Hawk, and the Light Combat Aircraft, we look forward to continuing this cooperation with the Indian industry.

Courtesy: Alkan

Visit NAAPL at Hall A, Stall No. A7.6

Indian and French Rafales in joint air exercises



The CDS General Bipin Rawat visited Jodhpur on 21 January and also flew onboard the MRTT along with Major General Laurent Lherbette of the FASF to witness air-to-air refueling operations. On 23 January 2021, Air Chief Marshal RKS Bhaduria visited AFS Jodhpur along with French Ambassador to India Mr Emmanuel Lenain.

In the first such bilateral event, Indian Air Force and French Armée de l'Air et de l'Espace (Air and Space Force) Dassault Rafales participated in exercise *Desert Knight 2021* at IAF Station Jodhpur over four days in the week preceding Republic Day. Apart from its Rafales, the Indian Air Force deployed Su-30MKIs and Mirage 2000s along with AEW&C aircraft while the French participated with their Rafales as well as A330 MRTTs and A400Ms.



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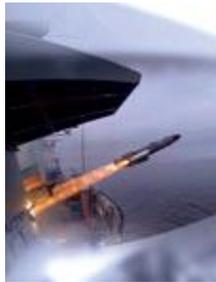
Developments at Saab

Second GlobalEye delivered

Saab has delivered the second GlobalEye Swing Role Surveillance System to the United Arab Emirates on 30 September 2020. This follows Saab's delivery of the first GlobalEye aircraft in April 2020 to the UAE, which has ordered three GlobalEye aircraft. GlobalEye is Saab's new airborne early warning and control solution. It provides air, maritime and ground surveillance in a single solution. GlobalEye combines Saab's new Erieye Extended Range Radar and a range of additional advanced sensors with the ultra-long range Global 6000 aircraft from Bombardier.

Anti-ship missiles for Germany

Saab has received an order from its German partner Diehl Defence for the RBS15 anti-ship missile for provision to the German Navy with deliveries between 2022 and 2026. This order is part of a framework agreement between Saab and Diehl Defence, which offers the possibility for additional procurement in the future. The RBS15 missiles and launcher systems provided in this order will be placed on the German Navy's Braunschweig-class corvettes. In addition to the missile systems, the order also includes associated equipment and services. The German Navy has been a user of RBS15 since 2011.



Saab radar system components for the USMC

Saab has received a US \$36.7 million order for the US Marine Corps' AN/TPS-80 Ground/Air Task Oriented Radar G/ATOR; Saab received the order from Northrop



Grumman Systems Corporation, the prime contractor for G/ATOR. The order includes components and subsystems in support of the Full Rate Production phase. Saab's deliveries relating to this contract will take place between 2020 and 2021 from its facility in Syracuse, New York, USA.

Order for Combat Training Centre support from Norway

Saab has received an order for service and maintenance of the Norwegian Combat Training Centre. Saab's commitments in the contract covers operational system support and setup of an additional site in the northern part of Norway. Saab has worked together with and supported Norway with training and simulation systems since 2004.



MiGs in the skies over India

(Part II)



IAF MiG-29UPG (photo: MiG)

Corresponding with modern approaches on the supply and operation of aviation equipment, the 'MiG' Corporation is ready to offer a wide range of services for post-sales support and training of aviation personnel, including the complex maintenance systems, in cooperation with local partners and also long-term maintenance LTA contracts.



MiG-35 (photo: MiG)

It is also important to note that the 'MiG' Corporation offers a comprehensive offset programme, and also that the most important and demanding parts of this programme within the framework of previously concluded contracts are already being implemented by the Corporation. Thus, joint ventures and high-tech opportunities are created in India, with the most advanced technologies absorbed by the industry.

A new and significant opportunity in development of military-technical cooperation between the countries the potential tender for supply of 114 multi-role fighters for the Indian Air Force. To participate in the tender the 'MiG' Corporation has worked on a proposal for local

production of the MiG-35 fighter in keeping with the strategic cooperation agreement involving the Indian industrial partner.

The MiG-35 aircraft is considered as pinnacle of the 'MiG' aircraft family, and designed for operation in high-intensity armed conflicts, in conditions of extensive and layered enemy air defence systems. The MiG-35 can perform complex multipurpose missions in a continuously changing operational and tactical environment against air, ground and surface targets. Incorporating fifth-generation fighter technologies, radar with active phased array antenna, a modern cockpit, wide range of weapons including those foreign-made, having high rate of operational reliability and with an infrastructure already existing in India, plus experience of the Indian Air Force pilots, this could give great advantage to the MiG-35 in the upcoming tender.

Proposal of the 'MiG' Corporation involves full transfer of technology to the Indian Government, providing the full scope of manufacturing technologies, operational and repair documentation. Implementation of the project for supply and indigenous production of MiG-35 aircraft will allow the Indian aviation industry to exploit advanced manufacturing technologies and developing of key systems of 5th generation aviation equipment, as well as to increase scientific knowhow for the development of other national aviation projects.

This time-tested partnership is one of the important components of the two countries foreign policy. Over the years of being friendly ties in various fields, the peoples of India and Russia have greatly benefited from each other's strengths. Thus, it is important that New Delhi and Moscow continue to expand and strengthen their military-technical cooperation in order to meet modern challenges.

This is the very basis of freedom, independence and prosperity of the 'two' countries for many years to come.

Article courtesy: MiG

VAYU Interview with **Hamad Salem Al Ameri,** **Chief Executive Officer, CARACAL, Abu Dhabi**

VAYU: In CARACAL's understanding, what is the current stage of procurement of the CAR 816 deal with the Indian Government?

Caracal: CARACAL was selected to supply the Close-Quarter Carbine to the Indian Army in 2018, following a rigorous selection process. CARACAL has additionally fulfilled all the requirements and procedures laid out in the Defence Procurement Procedure (DPP), with CAR 816 undergoing extensive trials across different terrains in India, as well as outside the country, to ensure that it is fully customised to the requirement of the Indian soldier. The company surpassed global competitors in terms of performance and technicalities to win the bid and we are expecting the Ministry of Defence to take the process of awarding the contract to its logical conclusion.

We would like to reiterate our commitment to the 'Make in India' initiative and the fast-tracked supply of the CAR 816 assault rifles - we remain on standby to supply the product to the customer.

VAYU: What are the various steps and investments you are taking as part of the deal?

Caracal: We are committed to fulfilling all obligations under the 'Make in India' initiative and will make sure that CARACAL oversees technology transfer. We have already identified the required land, facility and are in talks with potential local partners to be able to commence production. We remain completely invested in this deal and await for a formal communication to commence supply.

VAYU: About the contract, how do you propose to discharge it while meeting the 'Make in India' norms?

Caracal: CARACAL is committed to enhancing India's defence preparedness through the 'Make in India' Initiative. We have already identified the required land and facility to be able to commence production immediately. CARACAL has been in touch with potential partners in India who have the capability and capacity to manufacture components of the weapon. We will phase in the manufacturing fully in India, once the contract is awarded officially. We strongly affirm that CARACAL remains committed to its bid and is fully aligned to the 'Make in India' initiative.



VAYU: Has there been a response from the Indian government regarding the deal?

Caracal: We await an official confirmation from the Government of India to start up manufacturing. We remain on standby and will commence production immediately once we receive the formal award.

VAYU: The Indian Army has a very urgent requirement for the carbines - how quickly can the first lot be delivered by CARACAL?

Caracal: On the technical side, we are fully equipped to supply the CQB's to the Indian market in 12 months as per the fast track procurement terms. We await an official communication from the Indian Ministry of Defence to commence the process of supplying the carbines. Our focus remains on delivering a product which is best in quality and tailor-made as per the requirements of the Indian soldier.

We reaffirm our commitment to the 'Make in India' initiative, the fast-tracked supply of the CAR 816 assault rifles, and remain on standby to supply the product to the customer upon instruction.

VAYU: What are the specifications of the CQB?

Caracal: The CARACAL CAR816 is a centre-fire, gas-operated tactical rifle, chambered in 5.56x45mm NATO. The CAR816 is a tactical weapon, available in semi-automatic and select-fire configurations, operated by a short-stroke pushrod gas piston with a rotating bolt system. Unlike previous technology utilised in the direct gas impingement systems, the CAR816, due to its



advanced piston system, remains clean and cool even after rapid succession firing. The CAR816 is capable of firing up to 900 rounds per minute in full-automatic mode. The rifle is also available in various barrel lengths and has an effective range of 550 metres. It has a weight of approximately 3.0kg without the magazine and enables soldiers to accessorise for various missions. Depending on the customer's requirements, the weapon can be completely ambidextrous, with all controls operational for both right-handed and left-handed shooters.

VAYU : In a recent press release, **CARACAL** said it is ready to manufacture the guns in India with a local partner. Can you please share details of the partner, what sort of local arrangement for division of work is expected and where would such a manufacturing plant come up?

Caracal: CARACAL has been in touch with potential partners in India who have the capability and capacity to produce the required parts of the weapon. We are

well equipped and committed to fully manufacture this product in India. More details about the partner and the manufacturing plant will be revealed once the contract is awarded.

VAYU : **CARACAL** is a wholly UAE govt owned company - what other projects are on for discussion between India and the UAE and what cooperation for the future is planned? What is the larger plan of **CARACAL** for the Indian market?

Caracal: Presently, the completion of the CAR 816 deal with India is our primary focus. CARACAL has a wide portfolio of 17 products of various calibre, and we are always available to engage with the Indian Ministry of Defence on new projects.

Also, India shares a strong bilateral relationship with the UAE. Mutual cooperation and understanding in the area of defence manufacturing will enhance and strengthen our existing ties. In fact, the completion of the CAR 816 deal will be a great and positive development for us, at CARACAL.

Lockheed Martin “Deepens ties with India’s Defence and Aerospace Supply Chain”



Reaffirming its continued commitment and focus on *Make in India*, Lockheed Martin announced its intent at the annual Suppliers Conference. The event was co-hosted with Society of Indian Defence Manufacturers (SIDM) and Confederation of Indian Industry (CII).

Themed ‘Making India part of the Global Supply Chain’, the five-day conference had more than 400 delegates, with more than 200 companies of all sizes large, MSMEs and start-ups, participating in the conference. 62 companies joined the conference as exhibitors and used the virtual exhibition area of the ‘CII HIVE’ platform to showcase their company.

During the conference, Lockheed Martin shared new partnership opportunities with Indian industry on its business areas including Aeronautics, Rotary and Mission Systems (RMS), Missiles and Fire Control (MFC) and Space.

A highlight from the company’s RMS group is future work with MH-60R for India. There is an offset requirement for the programme, and Lockheed Martin will put more indirect work over in India. The RMS team will work with capable Indian companies over the next 7-8 years and provide opportunities to the industry to integrate into the global supply chain. RMS’ Supply Chain team already works with several industrial partners in India and plans to expand that list, strengthening its commitment to the country.

Israel's IMDO and the US MDA test

Advanced Version of the David's Sling

The Israel Missile Defence Organization (IMDO), of the Directorate for Defence R&D together with the US Missile Defence Agency (MDA), successfully completed a series of live-fire intercept tests of the David's Sling weapon system, against threat-representative cruise and ballistic missiles in mid-December 2020. The tests conducted were led by Rafael Advanced Defense Systems Ltd., from a testing site in central Israel, with participation of the Israel Air Force and Navy. This successful series is a critical milestone in the augmentation of Israel's operational capabilities in defending itself against current and future threats.

The series tested the capabilities of a new and advanced version of the David's Sling weapon system, and included a number of scenarios simulating future threats. The results of this test will enable IMDO and industry engineers to evaluate and upgrade the system's capabilities.

In the framework of the series, the IMDO and Rafael also successfully demonstrated the capabilities of the Iron Dome in intercepting a variety of threats including UAVs and cruise missiles. The test also demonstrated the interoperability of the multi-layer air defense mechanism (Arrow, David's Sling and Iron Dome). This indicates that the systems will be capable of intercepting threats simultaneously during conflict.

Representatives of the MDA and Israeli defence industries, as well as Air Force soldiers participated in the test. Rafael is

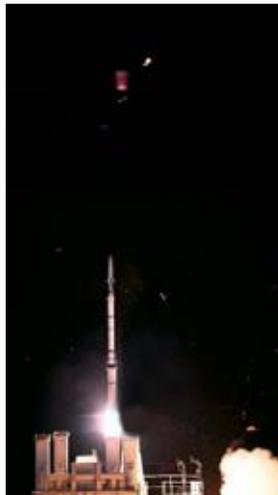
the prime contractor for the development of the David's Sling weapon system, in cooperation with US Raytheon. IAI's Elta division developed the MMR radar, and Elbit Systems developed the Golden Almond BMC.

David's Sling is a significant component of Israel's multi-layer air defence mechanism. The development of this mechanism is led by the IMDO and consists of four layers: Iron Dome, David's Sling, Arrow-2 and Arrow-3. These are all operational with the Israel Air Force.

Israeli Defence Minister, Benny Gantz said "I commend the successful test, which for the first time, assessed the combined interception capabilities of the multi-layer air defence system of the State of Israel. This is one of the most advanced air defence mechanisms in the world and it protects the State from threats near and far. These systems have been developed in a fantastic

manner by the Directorate of Defense Research and Development in the Ministry of Defence and by Rafael. The systems in this multi-layer mechanism provide Israel with a top-tier strategic capability, enabling us to operate effectively in every scenario.

Executive VP and Head of Rafael's Air and Missile Defense Division, Brig. Gen. (Res.) Pini Yungman stated, "The capability that was demonstrated in this series of tests ensures the security of the State of Israel and its ability to contend with current and future threats. When the different systems in the multi-layered mechanism are combined, they can handle a variety of simultaneous threats and defend the citizens of the State of Israel."





Pratt & Whitney, a division of Raytheon Technologies Corp. has been awarded a \$1.5 million contract to conduct an F135 modernisation study and operational assessment by the F-35 Joint Programme Office to determine specific propulsion system growth requirements for Block 4.2 F-35 aircraft and beyond. The study is expected to conclude in March 2021.

Under this award, Pratt & Whitney will assess F135 engine enhancements required to support future F-35 weapon system capability requirements across all F-35 variants beginning with Block 4.2 aircraft. The scope of the assessment focuses on enhancements addressing improvements to up and away thrust, powered lift thrust, power and thermal management capacity, and fuel burn reduction.

Leveraging significant US Government and Pratt & Whitney investment in next generation adaptive propulsion technologies, Pratt & Whitney's EEP approach offers low risk, variant-common upgrade options for the F135 that provide increased performance aligned with the programme's continuous capability development and delivery (C2D2) strategy and serve as a critical enabler for future capability growth of the F-35 weapon system.

The combat-proven F135 is the most advanced operational fighter engine in the world, delivering 26% more thrust, 116% more powered lift, and more than a 300% increase in power and thermal management over 4th generation fighter engines – all with a demonstrated mission capability rate of greater than 94%.

Courtesy: P&W



GA-ASI News

GA-ASI awarded ID/IQ Contract for Advanced Battle Management System



General Atomic Aeronautical Systems, Inc. has been awarded a \$950,000,000 ceiling Indefinite-Delivery/Indefinite-Quantity (ID/IQ) contract for the maturation, demonstration and proliferation of capability across platforms and domains, leveraging open systems design, modern software and algorithm development in order to enable Joint All Domain Command and Control (JADC2).

General Atomic & Boeing partner on high energy laser weapon system

GA-EMS and Boeing are partnering to jointly pursue opportunities for a 100 kW-class scalable to 250 kW-class High Energy Laser (HEL) weapon system to support a variety of air and missile defence applications. The partnership combines both companies' expertise in directed energy to build a best-in-class HEL solution capable of delivering superior, combat-ready protection for the warfighter on an accelerated timeline.

Developmental Contract for GA-EMS Naval Propulsor Hardware

General Atomic Electromagnetic Systems has been awarded a developmental contract by Naval Surface Warfare Center Carderock Division (NSWCCD) to



provide manufacturing design drawings, engineering, fabrication, inspection, and assembly of prototype propulsor, shafting and bearing components as well as the equipment needed to support propulsor research & development, testing and evaluation. GA-EMS will work with NSWCCD to develop new propulsor components for both surface ships and submarines.

GA-ASI with AFRL's Agile Condor Pod



GA-ASI, with the support of SRC Inc., has successfully integrated and flown the Air Force Research Laboratory's (AFRL) Agile Condor Pod on an MQ-9 Remotely Piloted Aircraft (RPA) at GA-ASI's Flight Test and Training Centre in Grand Forks, North Dakota. The Agile Condor Pod provides on-board high-speed computer processing coupled with machine learning algorithms to detect, correlate, identify, and track targets of interest.

Smart Sensor contract award

General Atomic has been awarded a \$93.3 million contract from the Joint Artificial Intelligence Centre (JAIC) to enhance the autonomous sensing capabilities of unmanned aircraft. The goal of the JAIC Smart Sensor project is to advance Artificial Intelligence (AI) technology by demonstrating object recognition algorithms using an unmanned aircraft, as well as employing onboard AI to control the aircraft's sensors and direct autonomous flight.



BEL enters into Offset Contract with Rosoboronexport

At the 6th India-Russia Military Industrial Conference, held at Bengaluru, Bharat Electronics Limited (BEL) entered into an Offset Contract under invest in kind with Joint Stock Company Rosoboronexport, Russia, for setting up industrial facilities for the manufacture of a wide range of aviation hoses at BEL Optronics Devices Limited, Pune, a subsidiary of BEL.

Mr Suresh Kumar K V, General Manager, Technology Planning, BEL, exchanged the contract documents with Mr Vadim Belyaev, Deputy Head, Offset Division, JSC Rosoboronexport, in the presence of Mr M V Gowtama, CMD, BEL, and Mrs Irina Ryazantseva, Coordinator, Offset Programmes.

Setting up of industrial facilities under the contract for manufacture of aviation hoses is fully consistent with the Government of India's 'Make in India' programme. As a result of the implementation of the Offset project, BEL will obtain a cost-effective, state-of-the-art technology based on modern production and testing machinery and proven technological processes manufacturing high-quality aviation hoses certified for international standards for all types of aircraft operating in India. The active operation of numerous aircraft of the Indian Air Force creates constant demand for aviation hoses, which are consumables in nature.



Rostec increases life of IJT's AL-55I engine to 1200 hrs



The HJT-36 training aircraft took to the skies yesterday powered by the AL-55I jet engine, manufactured by United Engine Corporation of Rostec. The event took place at Aero India 2021. The service life of the engine was recently increased to 1,200 flight hours.

AL-55I is a double-circuit turbojet engine designed by UEC-Saturn and produced in cooperation between UEC-Saturn and UEC-UMPO. It is specially designed for the Indian HJT-36 trainer aircraft. The power plant has a number of advantages: its modular design ensures high level of manufacturability and low

operating cost, and its modern digital control system ensures safe piloting and ease of maintenance. The engine has a maximum thrust of 1760 kgf.

Among various tests with the power plants are performance tests when being struck by foreign objects, such as birds or hail, and several specialized tests for confirming calculated parameters. The performance of the engine was confirmed under varying weather conditions. Due to its unique characteristics, the AL-55I engine has great potential, together with the HJT-36 aircraft, to become an integral part in the training of Indian Air Force specialists



DRDO HSTDV and Abhyas HEAT flight tested



DRDO has successfully demonstrated hypersonic air-breathing scramjet technology with the flight test of a Hypersonic Technology Demonstration Vehicle (HSTDV) from Wheeler Island, off the coast of Odisha.

The hypersonic cruise vehicle uses a solid rocket motor, boosting it to an altitude of 30 kilometres, where the aerodynamic heat shields separate at hypersonic Mach number. The cruise vehicle separated from the launch vehicle and the air intake opened as planned, the hypersonic combustion sustained and cruise vehicle continued on its desired flight path at a velocity of Mach 6, demonstrating critical systems including fuel injection and auto ignition of scramjet.

A successful flight test of the Abhyas, High-speed Expendable Aerial Target (HEAT), was conducted by Defence Research and Development Organisation (DRDO) from the Interim Test Range, Balasore in Odisha. During the trials, two demonstrator vehicles were successfully test flown.



Boeing and Air Works Announce Strategic Collaboration

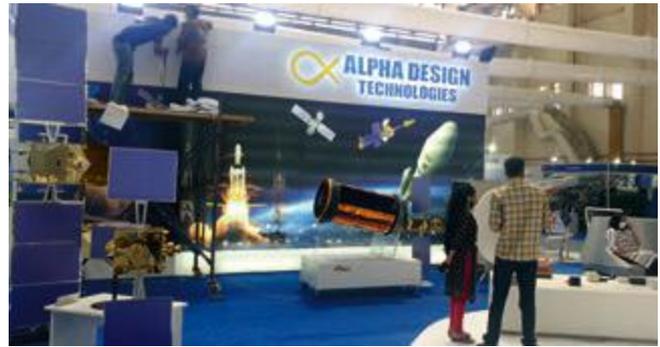
Boeing has announced strategic agreements with Air Works for the maintenance, repair and overhaul (MRO) of two key Boeing defence platforms in India, the P-8I operated by the Indian Navy (IN) and the VIP transport fleet operated by the Indian Air Force (IAF).

Boeing India's strategic collaboration with Air Works is an important first step under its recently launched initiative, the Boeing India Repair Development and Sustainment (BIRDS) hub, which is an in-country network and alliance of suppliers led by Boeing in India that envisions a competitive MRO ecosystem for engineering, maintenance, skilling, repair and sustainment services of defence and commercial aircraft. The hub aims to grow capabilities in India in the areas of heavy maintenance, component repairs, training and skilling of IAF and IN maintainers.

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.



Alpha Design Technologies at Aero India 2021



Boeing F-15EX in first flight

The new Boeing F-15EX fighter made its first flight at St. Louis in the US on 2 February 2021, "paving the way for early delivery of the first two such jets to the US Air Force later this quarter". Flown by Boeing F-15 Chief Test Pilot Matt Giese, the multirole fighter's avionics, advanced systems and software were flight tested.

This modern variant of the F-15 includes fly-by-wire flight controls, an all-new digital cockpit, modern AESA radar and the ADCP-II, the world's fastest mission computer, the US Air Force having a stated requirement for 144 F-15EXs.



BEML Signs MoU with CSIR-NAL



BEML Limited signed a Memorandum of understanding (MoU) with Council of Scientific and Industrial Research (CSIR)-National Aeronautics Laboratory (NAL) to develop in the areas of advance composite and autoclaves, mini unmanned aerial vehicles, design and analysis of aircraft structure and systems.

BEML also teamed with NAL for joint development of 2 seater trainer aircraft through Technology of transfer (ToT).

At Yelahanka. Mr. A K Srivastav, Director Defence & Aerospace exchanged the copies with Mr. R Venkatesh, Director Business Development, NAL in the presence of Mr. MV Rajasekhar, CMD, BEML. This will help BEML to increase its footprint in the aerospace sector.

HAL & MIDHANI in MoU for Production of Composites Raw Materials



HAL and MIDHANI signed a Memorandum of Understanding (MoU) for development and production of composite raw materials. The MoU was signed by Mr R. Madhavan, CMD (HAL) and Dr S K Jha, CMD (MIDHANI) and this is the first time that such an MoU has been signed for composite raw materials. Mr R Madhavan said composites are one area where HAL will collaborate. Composites raw materials, mainly in the form of Prepregs used in platforms like LCA, ALH, LCH and LUH are currently imported.



The Vayu Team at its stand in Hall A



MBDA showcasing the combat capabilities of Mistral to Chief of the Army Staff General M. Naravane



Pillars of the Show: Mr R Sethi of RE Rogers flanked by Surendhar and Manoj at the Show



Defence Minister at Thales' stand at Aero India 2021

'Air India One': B-777s for VIP travel



The first of two Boeing 777-300ERs for transportation of India's President, Vice President and Prime Minister (VT-ALV) arrived at Palam Airport Delhi on 1 October 2020. Formerly with Air India, cabins of the two 777s were extensively refitted and the aircraft equipped with missile defence systems, known as *large aircraft infrastructure counter measures* (LAIRCM) and self-protection suites (SPS). 'Air India One' is equipped with an advanced and secured communication system that allows availing of audio and video communication functions in flight without concerns of hacking or being taped.

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BAE Systems at Yelahanka

BAE Systems is exhibiting a number of its capabilities alongside its commitment to 'Make in India' here at the Show. Under the theme of 'Partnering in India to Make in India', the Company is demonstrating how its products and services, across land, air and sea, provide a vital advantage to its Indian customers, as well as drive indigenous production.

Ravi Nirgudkar, India, Managing Director, BAE Systems, stated, "BAE Systems is proud to take a lead role at Aero India 2021. The Company's participation endorses our place as a founding partner of defence manufacturing in India and as a key supporter of Atmanirbhar Bharat and Make in India in the defence sector. Whilst Aero India 2021 will be a different event to other years, it will still provide a great opportunity for the BAE Systems team, from India and overseas, to engage with our key stakeholders and partners and explore ways to expand the company's in-country supply chain."

The BAE Systems stand is displaying a model of the Make in India Hawk advanced jet trainer, which is in service with the Indian Air Force and the Indian Navy, the APKWS laser-guided rocket and details of the Mk45 Mod 4 Naval Gun System (this 5-inch/127-mm 62-caliber Mk 45 Mod 4 Naval Gun system is in US Navy service today). There is also a video of the M777 Ultra-Lightweight Howitzer (ULH). Under an agreement between the US and Indian governments, the 155mm M777A2 ULH systems are being assembled, integrated, and tested in India by Mahindra Defence Systems Ltd. (MDSL), as part of the Make in India programme. To date, BAE Systems has produced and delivered 41 guns to the Indian Army.



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