defexpo INDIA 2020
MAKE IN INDIA
VAYU DAILY Day 2
6 February 2020

"Make in India...for India...and the World"

Prime Minister Narendra Modi inaugurates DefExpo 2020

At the inaugural ceremony, Prime Minister Narendra Modi is seen flanked by Defence Minister Rajnath Singh and UP Chief Minister Yogi Adityanath

The Prime Minister of India Mr. Narendra Modi inaugurated DefExpo 2020 in the afternoon of 5 February at a largely attended ceremony at the Expo site in Vrindavan Yojna, a new development area of UP's capital Lucknow. The PM was forceful in his address that India needed to not only enhance its defence production capability and range but become a major defence exporting nation which is intrinsic to the objective of achieving an economy of USD five trillion.

The new mantra is "Make in India...for India...and the World", the Prime Minister quoting some telling statistics in that from Rs 2000 crore worth of defence equipment exported in 2014, it increased to Rs 17000 crore in 2019.

Referring to the theme of this, the 11th edition of this biennial event, the first time in Uttar Pradesh where the second defence corridor in the country is being implemented, the PM stated that "Digital transformation of defence is very important for the future of Indian armed forces" and gave the objective of developing 25 products based on artificial intelligence in the next five years.

Mr. Modi also referred to the strides made by DRDO which has created new products and systems and Indian industry could benefit from such transfer-of-technology without any cost. Further, the licensing regime has been liberalise to specially benefit MSMEs: "The target is to increase their numbers to reach 15,000 in the next five years".

The Indian Prime Minister announced that the government was working to attract increased foreign direct investment (FDI) in the defence sector, making it more liberal. "The path to 100% direct investment has been cleared and 49% of this can be through the indirect route... which has the potential of attracting Rs 17,000 crore of FDI in the near future."

Admiral Karanbir Singh, CNS Indian Navy visiting the MBDA stand at DefExpo 2020 seen with Mr. Loïc Piedevache, India Country Head, MBDA

TopGun - Transforming Standard Artillery Into a Precision Strike

IAI's TopGun: A Revolutionary Add-On Fuze that Converts Standard 155mm Artillery Ammunition Into a High Precision Weapon

- Very high accuracy
- Fire for effect from 1st round - preserving the element of surprise
- Minimal collateral damage and uninvolved casualties

www.iai.co.il • mlm_marketing@iai.co.il

Meet us at
DEFEXPO 2020
Hall 1, Booth R33

IAI
Where Courage Meets Technology

L&T MBDA Missile Systems establish Missile Integration Facility in Tamil Nadu

L&T MBDA Missile Systems (LTMMSL), a joint venture between Larsen & Toubro (L&T), and MBDA, have set up a Missile (inert) Integration facility. With an eye on domestic and global markets, LTMMSL has set up the assembly, inert integration (without explosives) and testing facility for Missile Sub-systems and Missile Weapon Launch Systems spread across an area of 16,000 sq. meter in a Special Economic Zone at Coimbatore. It forms a part of the Tamil Nadu Defence Industrial Corridor. Founded in 2017, LTMMSL has received export orders and the new facility shall start delivering sophisticated weapon systems using state-of-the-art test equipment such as Missile Launchers and Airframe segments, including control actuation units, from CY 2020.

IAI in Strategic UAV Collaboration with HAL and DTL at DefExpo

Israel Aerospace Industries (IAI) has signed a strategic collaboration MOU (memorandum of understanding) with a focus on UAVs with Hindustan Aeronautics Limited (HAL) and Dynamatic Technologies Limited (DTL). The MOU will reflect existing UAV capabilities developed by IAI over the years and promote the production of Indian UAVs, in line with the Indian Government's "Make in India" policy. The strategic partnership with the Indian corporations will implement optimal solutions for the needs of the local customer based on their specific technologies and needs.

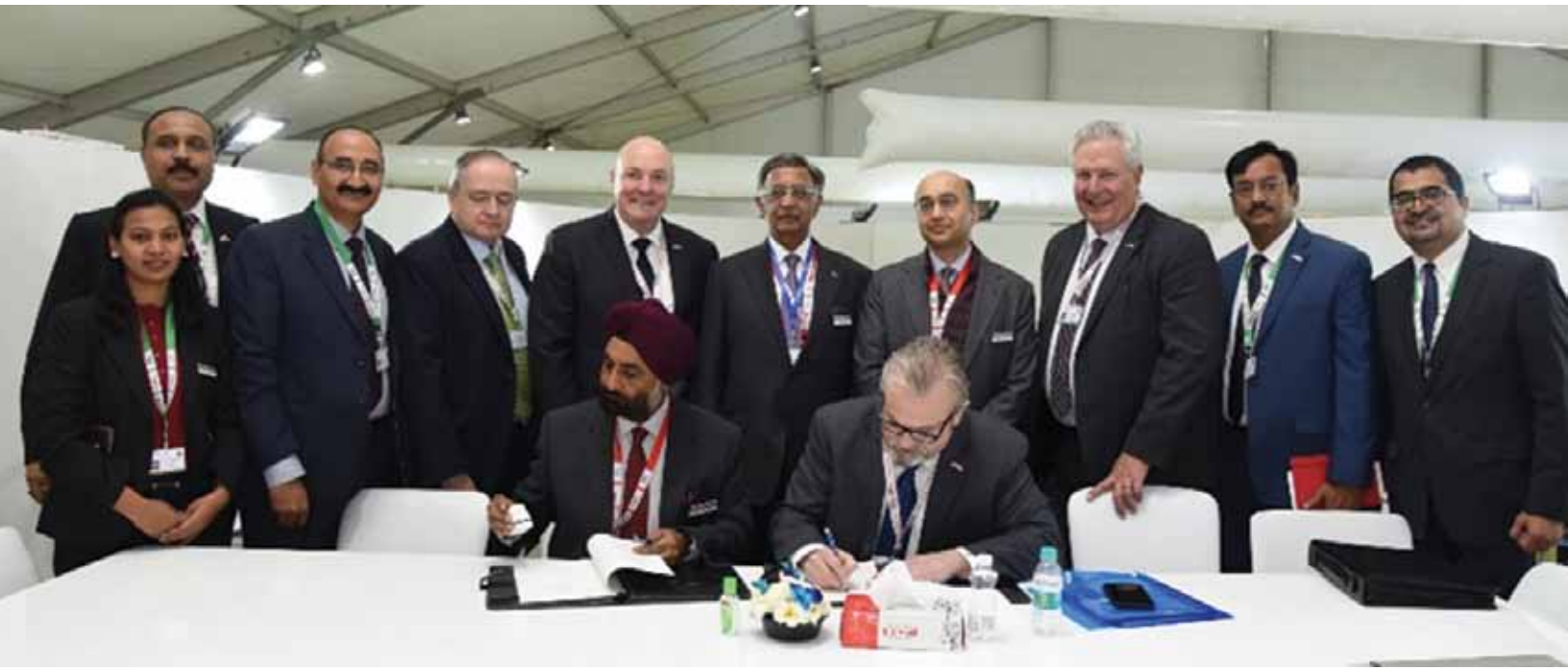
IAI has also established, with local collaboration, an MRO dedicated to UAVs to provide operators with high-availability responses and quick maintenance.

IAI and BEL in co-operation for Air Defence Systems

Israel Aerospace Industries (IAI) and Bharat Electronics Limited (BEL) have signed a Memorandum of Understanding (MOU) for collaboration on establishing a new centre for providing product life cycle support including repair and maintenance

services for air-defence systems in India. The new centre will provide the required technical and maintenance support to the Indian Defence Forces who will be operating the air defence systems. The collaboration will leverage the synergetic capabilities of IAI and BEL, which have already been proven in other collaborations.

Bharat Forge signs MoU with General Atomics, USA



Bharat Forge Ltd (BFL)., the world's leading technology solutions provider and forging company signed a Memorandum of Understanding (MOU) with General Atomics, US, a global leader in the research, design, and manufacture of a diverse portfolio of electromagnetic and advanced power and energy technologies. Under the terms of the MOU, BFL and General Atomics' Electromagnetic Systems Group (GA-EMS) will investigate opportunities to develop and integrate power generation, storage, control and distribution technologies related to surface and undersea naval platforms, and advanced projectiles for weapon system platforms to address Indian defence requirements.

HAL and New Space Research and Technologies Pvt Ltd sign NDA

Hindustan Aeronautics Limited (HAL) and New Space Research & Technologies Pvt. Ltd. signed a Non Disclosure Agreement (NDA) to explore cooperation for joint development and manufacturing of various products and systems in the area of unmanned systems, swarm technology and space systems at DefExpo 2020, here yesterday. The NDA was signed by Mr D Maiti, General Manager (Planning) for HAL and Mr Sameer Joshi, Director, New Space Research & Technologies Pvt. Ltd.

Go where others can't.

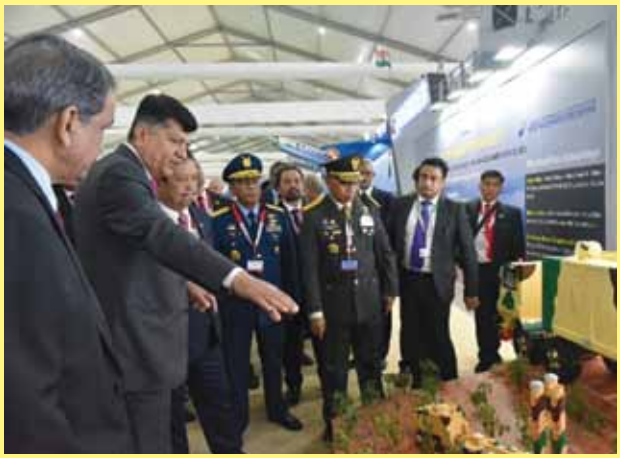
The mission requirements supported by the Indian Air Force are as varied and vast as India's landscape. From the highest landing strip in the world to landscapes destroyed by the forces of nature, the C-130J goes everywhere to support any mission. Tactical and strategic, versatile and reliable, tried and tested, proven and ready. The C-130J Super Hercules, India's workhorse.

Learn more at lockheedmartin.com/india.

Lockheed Martin. Your Mission is Ours.®

LOCKHEED MARTIN

Busy day at Brahmos!



Deputy Defence Minister of Indonesia Mr Wahyu Sakti Trenggono at the BrahMos pavilion yesterday

Mohammed bin Ahmad Al Bawardi, Cabinet Member and Minister of State for Defence Affairs, UAE also visited BrahMos on the first day of the show

BEML and the COAS

India's Chief of the Army Staff General M. M. Naravane inaugurated the BEML Stall yesterday at Defexpo in the presence of Deepak Kumar Hota, CMD, BEML and other senior officials of the company.

BAE Systems Exhibits

One of the key BAE Systems' exhibits at DefExpo 2020 included 155mm ULH Titanium cast cadle cap. Highlighting BAE Systems' commitment to investing in the UP Defence Corridor, these castings for the Ultra Light Howitzer are manufactured in India by PTC Industries, a Lucknow based company.

Modernising and strengthening Indian artillery capabilities

BAE Systems is proud to be a founding partner of defence manufacturing in India, committed to sharing knowledge, skills and technology across our capabilities in land, air and sea domains.

We take pride in supporting the Indian Army's Artillery Regiment with the M777 Ultra-Lightweight 155mm Howitzer, providing superior artillery capability and an operational advantage – backed up by local assembly, integration and testing.

Visit us in Hall 7. R32. UK Pavilion.

baesystems.com

Photo credit U.S. Marine Corps

BAE SYSTEMS

Growing India-US ties

LockheedMartin are very encouraged by the positive trend we are seeing in India-US relations, notably on the defence-industrial partnership front. Defence-industrial partnerships have long been a hallmark of strategic ties and trust between both the nations. As Dr. Vivek Lall stated "For example, in collaboration with Tata Advanced Systems, we have established an industrial base in Hyderabad where we currently produce C-130J empennages – which incidentally are on all Super Hercules aircraft globally – and a metal-to-metal bonding facility at the same location. This bears testimony to our contribution to the development of Indo-US defence industrial partnership."

"We see tremendous strength and opportunity in India's defence industry – both private and public. We are always looking for strategic Indian industry partners across the country – Indian companies of all sizes, including Micro, Small & Medium Enterprises (MSMEs) and suppliers throughout India – to collaborate and explore security solutions which are unique to India. Many foundational agreements have been made between India and the United States that put bilateral defence ties on a strong trajectory. Dating back to 2009, both countries signed the End-Use Monitoring Agreement, allowing US inspectors to verify the location of US-supplier material. This was followed by the Logistics Exchange Memorandum of Agreement (LEMOA) in 2016, permitting both country's militaries to carry out re-supply or repairs on each other's bases."

"In 2016, the US recognised India as a 'Major Defence Partner' allowing India to procure more advanced and sensitive platforms and technologies. In 2018, the US changed the name of United States Pacific Command (USPACOM), the oldest and largest US unified combatant command, to United States Indo-Pacific Command (INDOPACOM) – a clear signal of India's critical and growing role in the Indo-Pacific region. Arguably the most significant agreement to date is the Communications Compatibility and Security Agreement (COMCASA). Signed during the historic 2+2 dialogue in September 2018, COMCASA enables both countries to transfer secure communications and data equipment in India."

"Most recently, the US Government established the US-India Security Cooperation Task Force, which is comprised of multiple services and agencies across the US Department of Defense (DoD), Department of State, Commerce Department and other federal agencies to collectively identify and address opportunities to further US defence partnerships with India.

thalesgroup.com

THALES

Decisive technology for decisive moments

50 countries

across the globe protect their populations **with Thales technologies**

Search: Thalesgroup

Rafael at DefExpo 2020

C-Dome

For more than two decades, Rafael Advanced Defense Systems has been supporting the Indian Armed forces with state-of-the-art systems, during which Rafael has stood by India to supply systems at short notice in various operational contingencies, including air-to-air, air defence, ATGMs, targeting and reconnaissance pods, SDR communication and more.

Rafael is already working with different branches of the Indian military and the Indian security apparatus and has cooperated to integrate its electro-optical systems, advanced ordnance, as well as its air-to-air and air defence systems. The company has been working steadily to create technology partnerships or joint ventures with major Indian companies to address various projects and has created structures to ensure technological transfer to India.

Over the last few years, Rafael has continued to realise its commitment to the Indian market and to its economy, including last summers' inauguration of a state-of-the-art facility at Hardware Technology Park, Hyderabad for local manufacturing of the SDR BNET communication system for the Indian Air Force, with a $30 million purchase order. In addition, Rafael has placed a $100 M order for Barak-8/ MRSAM missile kits for the Indian Army and Air Force from KRAS (Kalyani Rafael Advanced Systems Ltd. India). This, among other steps, is part of Rafael's compliance with the "Make-in-India" policy of the Indian government and is testimony to Rafael's global commitment to local production, knowledge transfer and industrial cooperation.

Here at DefExpo 2020, Rafael is showcasing a variety of solutions and capabilities in various fields that include the SPIKE family of missiles, Spyder missile system (a quick reaction, low level surface-to-air missile system designed to counter attack by aerial threats), C-Dome: Naval Defence System and the Iron Dome.

For defence against hostile UAVs, there is the Drone Dome- an end-to-end system designed to provide effective airspace defence against hostile drones (micro and nano UAVs).

Then there is the guidance kits for rockets which is the EPIK. This is a new concept of Rafael to upgrade existing Rocket Artillery Systems for Autonomous, Pin-Point hit accuracy and increased range capability.

On the communication front, there is the BNET which is a broadband IP SDR (software defined radio), supporting the modern digital battlefield's needs with high-speed, low-delay, reliable connectivity for broadband data, voice and video on the move. Delivering unprecedented network capacity in terms of data rates, number of users and minimal delay, BNET enables all land, sea and air radio units to participate in a single, seamless, scalable mobile ad hoc network (MANET).

On dispay is the Sea Spotter, a new generation infrared, passive staring system designed to be installed on naval vessels and capable of automatically locating all types of surface and aerial targets/threats. For naval platforms, Rafael offers the Typhoon, a family of lightweight, stabilised, remote controlled weapon systems with a full range of weapons, including small or medium caliber guns, coaxial machine guns and missiles.

Last but not the least, there are displays of UAS by Aeronatics (a Rafael subsidiary) at the Rafael Pavilion. The Orbiter 4 STUAS is an advanced multi-mission platform and delivers top mission performance with its lightest, most versatile and most advanced covert platform available today, for both land and maritimeoperations. The Pegasus 120 is a multi-rotor platform, designed especially for defence and security missions.


Spike on Tiger


Spyder

MULTI-ROLE COMBAT-PROVEN BUILT FOR THE FUTURE

As the most advanced and lowest-cost fighter per flight hour, the F/A-18 Super Hornet will deliver next-gen superiority and survivability to India. By assembling, testing and certifying this aircraft at a state-of-the-art Factory of the Future in India, Boeing will help grow the country's aerospace ecosystem. And with a plan for growth, the F/A-18 Super Hornet will continue to outpace threats—and make India stronger.

BOEING

'Last' Boeing C-17 Globemaster III for IAF

Boeing delivered the 11th and last C-17 Globemaster III for the IAF on 26 August, 2019, joining the earlier 10 aircraft serving with No.81 Squadron *(Skylords)*. A USAF spokesman said that "it's an increase in strategic airlift for the Indian Air Force, it strengthens the partnership between our two nations and increases the interoperability of our militaries so we can assist each other on humanitarian and defence issues". IAF had lately deployed several C-17 Globemaster III strategic airlift aircraft to transport paramilitary forces to J&K from different parts of the country in late July 2019. "The C-17s are ferrying CAPF for counter-terrorism, crowd-control and law and order duties" according to an official statement.

Additional BEL Akash SAMs for IAF

On 13 September 2019, PSU Bharat Electronics Limited (BEL) formalised a contract with the Ministry of Defence, for supply of seven additional squadrons of Akash Missiles for the Indian Air Force. This is a turnkey contract with specialist infrastructure, the total value being Rs.5,357 crore with delivery to be completed in three years.

IAF C-17 sustainment follow-on support

The US State Department has made a determination approving a possible Foreign Military Sale to India of C-17 sustainment follow-on support for an estimated cost of $670 million. "The Government of India had requested to buy equipment for C-17 follow-on support, to include spares and repair parts; support equipment; personnel training and training equipment; publications and technical documentation; support and test equipment; US Government and contractor engineering, technical and logistical support services; and other related elements of logistics and programme support."

Ensure Your Advantage

SPYDER™ Family
Short-to-Long Combat-Proven
Mobile Air Defense Systems

► Visit us at
DEFEXPO 2020
Hall 1, Stand S46

RAFAEL
ADVANCED DEFENSE SYSTEMS LTD.

In Conversation with Rolls-Royce India

Working closely with India

Rolls-Royce India and the Indian Air Force have a shared history and a common vision. In 1933, much before India because an independent nation, Rolls Royce engines powered IAF aircraft. The IAF played its part during World War II and Rolls-Royce was a partner in supplying state-of-the-art engines for its aircraft back then. That tradition of world class engines, technology and training has continued for close to nine decades.

To build on this relationship, we need to invest in programmes that help co-develop products and co-create solutions customised to the security needs of this country. This will enable the country to own Intellectual Property (IP) for these solutions, because we believe the future is about India owning the IP.

This is the space that Rolls-Royce want to build on and we are working closely with India's Ministry of Defence, DRDO, HAL and others to co-create products and solutions for the Indian market because we believe that joint IPs between countries will lead the way in the future.

Even while global and regional geo-strategies are undergoing fundamental changes. India will have to enhance its air power manifold in the coming years to meet its changing defence needs, in particular, speed and technology becoming defining factors in future warfare.

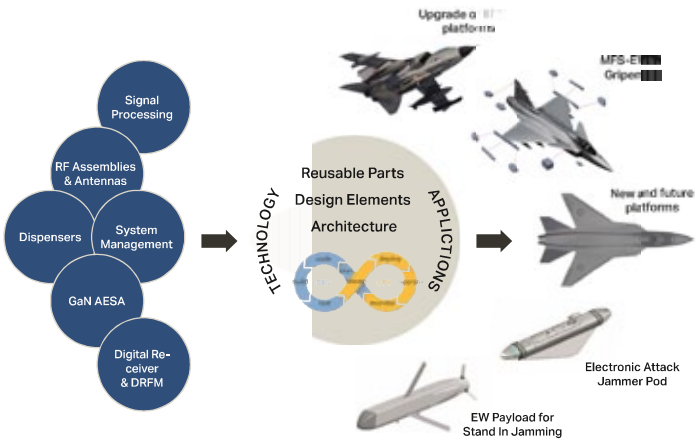
The government can invest in programmes where companies can participate and work together to co-create products and solutions. For example, in defence, when there is co-creation of aircraft technology, it could then be a joint IP between governments. Whether it is then manufactured here in India or elsewhere, India could be a co-owner of that IP and that is what makes this a powerful proposition for the future of combat.

Further, as India seeks to make manufacturing as a core part of its economy, there is also an opportunity for the country become the supply chain capital for the world. Singapore and other countries have been investing in programmes that create IP, and this in turn creates manufacturing and export opportunities, which create jobs in the market. There is a cost-arbitrage equation and a value equation that is pertinent to India, but to leverage it, the country will need to attract investment by investing in such programs.

Looking at the future, Rolls-Royce remains committed to developing the Indian aerospace industry and furthering self-reliance. An excellent example of this is the Adour Mk804/Mk811 (which powers the Jaguar) which was made in India and continues to be supported by HAL in partnership with Rolls-Royce.

AREXIS ELECTRONIC WARFARE FAMILY

Enabling mission success



In a constantly changing, increasingly complex and demanding mission environment, **Arexis** – Saab's family of Electronic Warfare systems for aircraft – will arm your fighter pilots with superior situational awareness, unrivalled survivability and the advantage of having the freedom act.

Arexis key features

360° platform protection – situational awareness combined with jamming and expendables

Electronic Attack – support and escort jamming against modern anti–stealth radars

EW independence – fully programmable system and support tools creates sovereign capability

Handles complex signal environment – state-of-the-art ultra-wideband digital receivers and DRFMs

GaN-based AESA – very high output power combined with good efficiency and redundancy

Proven – architecture proven in Gripen, Tornado and Saab's airborne early warning & control platforms

Adaptable – can be fitted to all fighters and is easy to integrate due to a highly modular design

Learn more at saab.com

SAAB TECHNOLOGIES

SAAB

IAF Jaguars are powered by R-R engines

With a growing engineering footprint in India, we are working towards establishing a robust ecosystem that will engage in co-creation across the entire value-chain – from research, design and development to manufacturing, integration, maintenance and repair. This will further enable the vision of *Make in India*, not only for India but for the world. India is among the top 5 countries spending on defence, with the FY 2018-19 budget allocation for defence being pegged at around US$ 45.61 bn3 (excluding defence pension).

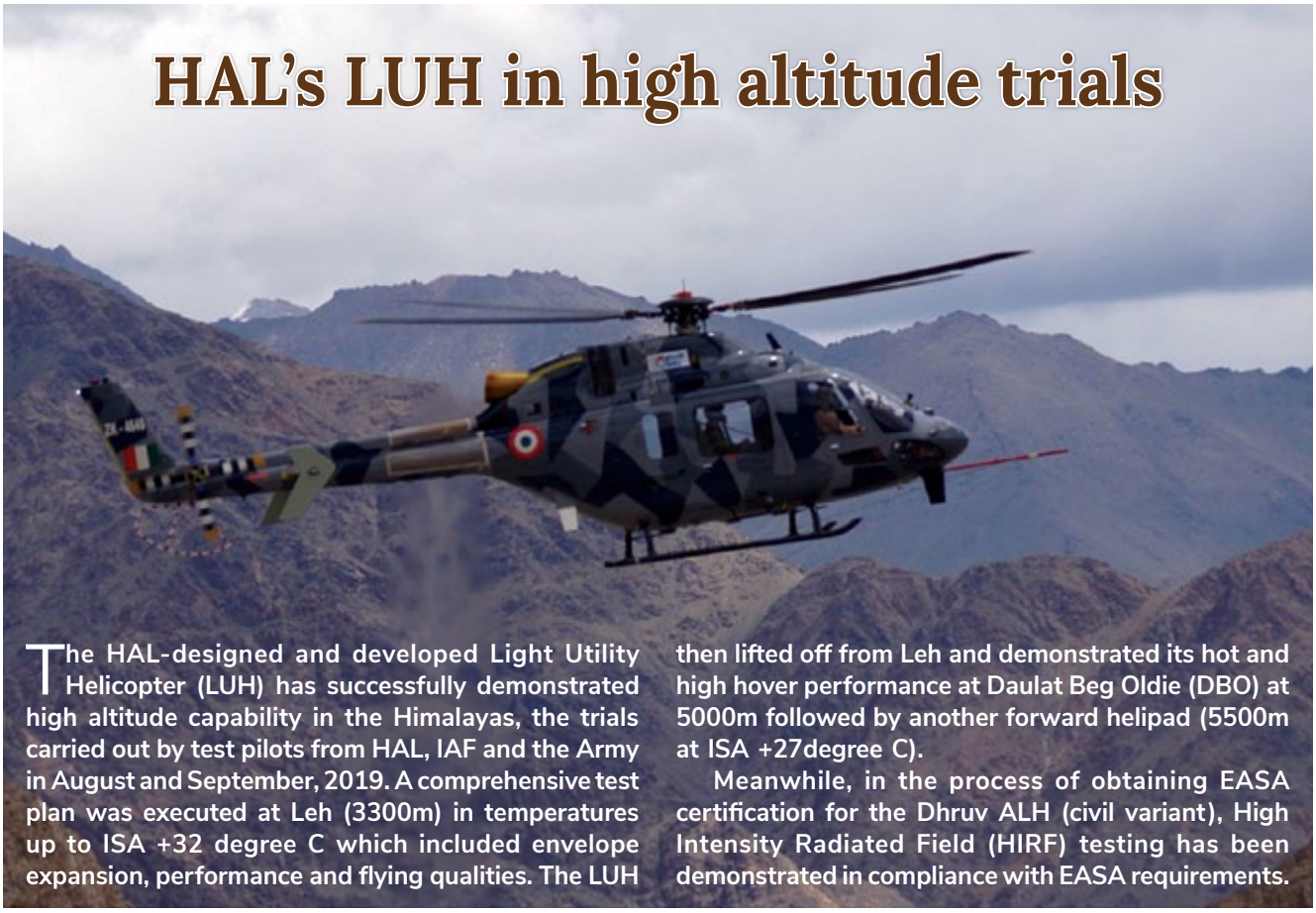
The RR Defence Service Delivery Centre (SDC) in Bengaluru, the only one in Asia, specifically supports the Indian Armed Forces and Hindustan Aeronautics Limited, and aims to further improve our responsiveness, while enabling the customer to continually improve engine availability. The SDC will be able to respond to many queries in-country with its team of qualified Indian engineers, which is another source of pride.

RR will continue to support today's fleets, including those that have been in service for many years. With this, India not only benefits from global best practices but also gets the best of research and development expertise. In tandem with the country's priority of indigenisation, we further support the IAF with technology transfer and training programmes. At the heart of all we do is the mission to help power the people that protect our skies.

At this time, as we nurture our 85 years' relationship with India, we re-commit ourselves to build on our shared legacy and to co-create the future of Indian combat, in line with the country's growth vision of indigenisation and self-reliance.

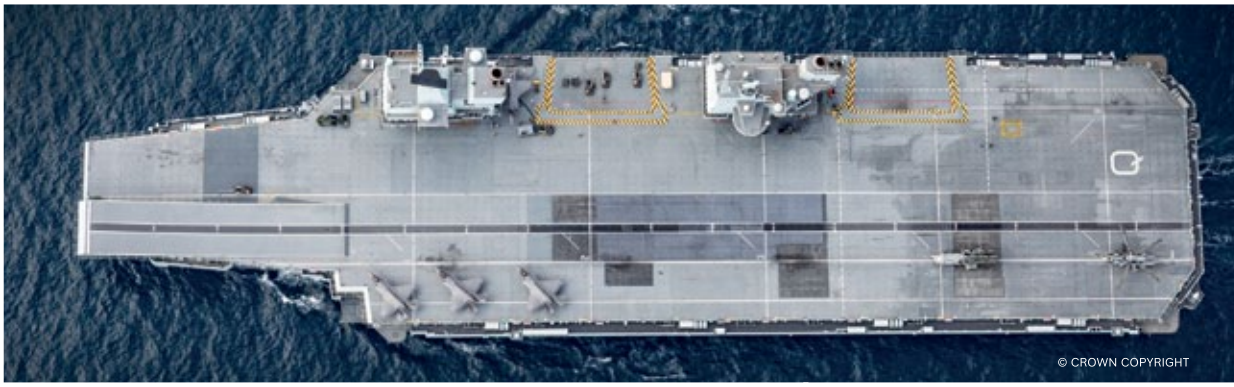
Kishore Jayaraman
President, Rolls-Royce, India and South Asia

HAL's LUH in high altitude trials



The HAL-designed and developed Light Utility Helicopter (LUH) has successfully demonstrated high altitude capability in the Himalayas, the trials carried out by test pilots from HAL, IAF and the Army in August and September, 2019. A comprehensive test plan was executed at Leh (3300m) in temperatures up to ISA +32 degree C which included envelope expansion, performance and flying qualities. The LUH then lifted off from Leh and demonstrated its hot and high hover performance at Daulat Beg Oldie (DBO) at 5000m followed by another forward helipad (5500m at ISA +27degree C).

Meanwhile, in the process of obtaining EASA certification for the Dhruv ALH (civil variant), High Intensity Radiated Field (HIRF) testing has been demonstrated in compliance with EASA requirements.



MT30 - Powering the future

MT30 is the most power dense naval gas turbine available today, proven to deliver superior performance, operational flexibility and reliability. That is why it is already the engine of choice for seven ship types. Rolls-Royce combines innovative naval technology with a proven high performing naval pedigree to deliver the most cost effective and efficient ship power, propulsion and through-life solutions for customers worldwide.

ROLLS ROYCE

www.rolls-royce.in @RollsRoyceIndia #PartnersInProgress

Boeing showcases advanced defence and services capabilities

Boeing is showcasing a range of advanced defence capabilities here at DefExpo 2020, including the F/A-18 Super Hornet, KC-46 tanker, AH-64E Apache and the P-8I.

India is a crucial defence partner for Boeing, with some of its most mission-critical platforms integrated with the Indian armed forces. Today, India has 11 C-17 Globemaster IIIs, eight P-8Is (with four more on order), 17 AH-64 Apaches (against an order of 22) and 10 CH-47 Chinook (against an order of 15). Boeing's local sustainment and training capabilities are making Indian armed forces mission ready.

Boeing's exhibit at Hall 3, Booth S16 with the theme 'Building The Future Together' is focussing on its partnerships with India's armed forces, and highlight the strategic investments the company has made in developing India's indigenous aerospace and defence ecosystem. These include the engineering and technology centre in Bengaluru and Chennai, the joint venture with Tata Advanced Systems, and work with over 200 suppliers and partners in support of "Make in India" and "Skill India."

"We're honoured to support India's armed forces with advanced platforms such as the P-8I, C-17, AH-64 Apache and the CH-47 Chinook that are delivering superior capabilities. Additionally, our support and services have played a significant role in ensuring enhanced operational readiness," stated Salil Gupte, President, Boeing India. "We continue to remain committed to strengthening the Indian aerospace ecosystem and look forward to engaging with our customers, partners and industry at DefExpo 2020."

Boeing is also providing visitors a virtual flying experience with the F/A-18 Super Hornet Block III simulator to understand a wide range of missions, carrier-based aviation and capabilities the aircraft can offer the Indian Navy. The F/A-18 Super Hornet serves as the frontline multi-role fighter of the US Navy and air forces of several countries, and is currently on offer to the Indian Navy and Indian Air Force. The combat proven F/A-18 Block III Super Hornet will 'bring the most contemporary next generation war fighter technologies' to the Indian Navy through battle-space situational awareness, counter stealth targeting, greater range and improved survivability, reduced radar signature and room for growth.

In addition to defence platforms, Boeing is also focussing on its local sustainment and training capabilities for its Indian customers. As Boeing steadily increases its sourcing from India, and expands its supplier network, it is highlighting its contribution towards 'Make in India' that 'fully harnesses India's manufacturing capability, talent, innovation and productivity'.

CONTROP

Turning Vision Into Reality

Innovative EO/IR Systems for Air, Land & Maritime Surveillance, Defense and Homeland Security





www.controp.com

BrahMos air-launched from Su-30MKI

An air-launched version of the BrahMos missile was successfully fired from Su-30MKI on 22 May 2019, having first been fired against a sea target on 22 November 2017. The air-launched version of the BrahMos supersonic missile weighs 2.5 tonnes, has a range of near 300 km and is designed and developed by BrahMos Aerospace Pvt Ltd (BAPL). Software development of the aircraft was undertaken by IAF engineers while HAL carried out mechanical and electrical modifications on the aircraft.

Meanwhile, the land-based version of BrahMos has recently been test fired by a unit of the Andaman & Nicobar Command from a site in the Car Nicobar islands in the southern Bay of Bengal "as part of joint services training on long range and accurate engagement of targets in depth."

Safran inaugurates M88 maintenance training centre at the Istres AFB

Safran Aircraft Engines has inaugurated a maintenance training centre for the Rafale's M88 engine at Air Base 125 in Istres, southern France. This state-of-the-art training centre includes the latest educational tools, such as virtual and augmented reality. To carry out this project, Safran Aircraft Engines benefited from the support of the French air force, the DGA's flight testing department, the Istres Air Base, the Istres defence infrastructure department and Dassault Aviation, which also has a facility at the base.

In October 2019, 12 mechanics from the Indian Air Force arrived at Safran for on-the-job training.

India : The Emerging Defence Manufacturing Hub

DEFEXPO 20 INDIA

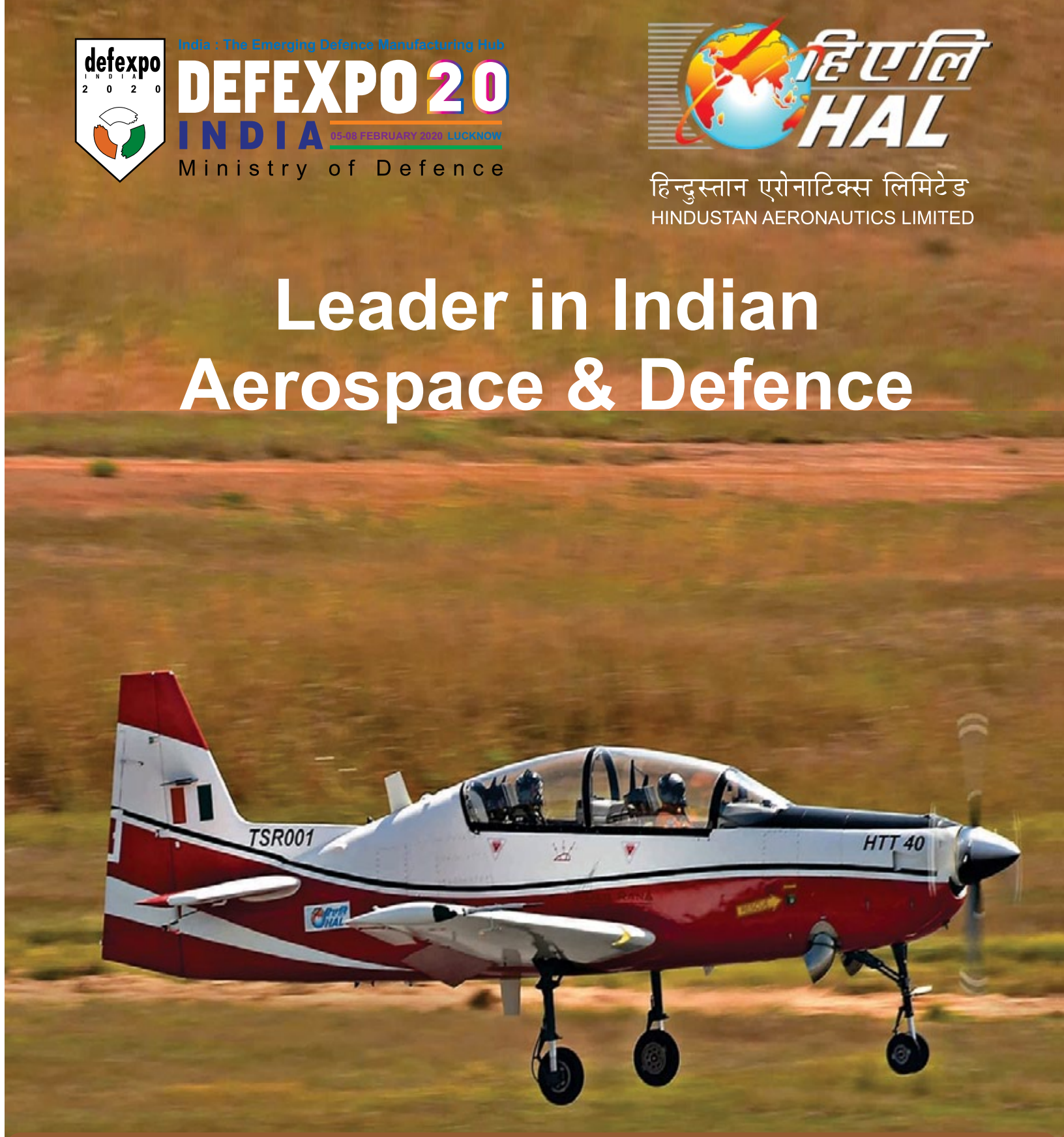
05-08 FEBRUARY 2020 LUCKNOW

Ministry of Defence

हिन्दुस्तान एरोनाटिक्स लिमिटेड

HINDUSTAN AERONAUTICS LIMITED

Leader in Indian Aerospace & Defence



The **Hindustan Turboprop Trainer-40** (HTT-40) is an initiative under Make in India by HAL with an internal funding support. The indigenous content on HTT-40 is close to 80% and almost 50% of the components on HTT-40 are manufactured by private players of the Indian aerospace ecosystem.

www.hal-india.co.in

Saab's Flight into the Future

With rapid development of core technologies for enhancing computational power and software performance, a product being evaluated and compliant today may well be obsolete, or not fully operational or relevant by the time of delivery – unless of course, there is an ability for continuous upgradation.

The Saab Gripen has been designed for continuous upgrades so as to counter and defeat new combat challenges, such an approach having been proven many times. The Gripen E's inherent upgrade potential and design philosophy as well as the highly efficient manufacturing processes, ease of maintenance and supportability, provides significantly lower upgrade, maintenance and operating costs. The Gripen E will deliver significant cost savings over the expected 40+ years of operation, in comparison with alternative platforms, which enables relevant training for and enhancing operational capabilities of the Indian Air Force.

Such an upgradeable design, together with transfer of design and upgrade capabilities are the pre-requisites and enablers to provide the IAF indigenous upgrades and sustainable capability, thus continuously meeting evolving operational needs. These capabilities for systems integration in performing upgrades, needs to be emphasised. Transfer of design capabilities for system integration includes supporting processes, ICT environment, engineering methods, tools and rigs, which will deliver a systems integration capability, most essential to secure the full system performance potential over time.

The cost and complexity of upgrades can be daunting in aircraft programmes, but that is not 'the Gripen way'. Upgrades are essential, but should be relatively easy to manage, quick to implement and affordable so as to sustain. As a Gripen operator, the IAF would be able to control the path, pace and progress of such upgrade programmes, and should not be forced into costly upgrades by an external party, instead always having a fighter which is on the front line. The Gripen assuredly sustains maximum operational effectiveness over its entire lifecycle

Saab is conscious that the "money-is-no-object" manner of defence spending is a thing well of the past. As with other fighters, all costs must be agreed to at the outset and predictable over the aircraft's entire life-cycle. The Gripen programme typically comes as a full package of aircraft, equipment, training and support.

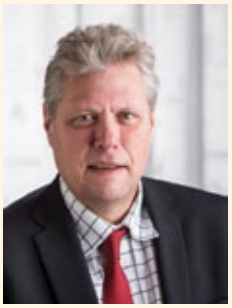
Additionally, Saab delivers economic benefits: the Gripen brings skills, technology and shared intellectual property even as the Company looks to creating industrial partnerships and long-term relationships.

Gripen of the Swedish Air Force

Saab has filed a definite flight plan for the Indian Air Force and India's aeronautical Industry. In aviation parlance, they await take off clearance from the Indian government for a joint journey for over the next half a century!

Mats Palmberg,
Vice President, Industrial Partnerships, Saab,
and Head of Gripen India Campaign

Mats Palmberg, Vice President, Industrial Partnerships, Saab, and Head of Gripen India Campaign says that, "Saab's Gripen E is the most modern multirole fighter aircraft in the world, developed to counter and defeat the most advanced threats in this modern battlespace. Its unique architecture makes it the intelligent fighter system that continuously evolves, rapidly embracing new technology and tactics in a way that will always keep its operator one step ahead. The range and depth of the capabilities offered to be transferred is unprecedented. Whereas others offer to set up production lines, the Swedish true partnership offer includes also the underlying know-how and know-why that will bring long-lasting benefits not only to the aerospace domain but also to multiplying effects to the wider economy. We will manufacture 85% of the fighters locally in India covering all aircraft manufacturing phases, provide maintenance capabilities to ensure self-reliant and uncompromised operations by the IAF. In addition, we are also prepared to provide capabilities to further develop and upgrade the product in country".



Mats Palmberg

Orbiter® 4

Unmatched ISTAR features in a Small Tactical UAS

See us at
DEFEXPO 2020
Rafael's booth Hanger 1
booth #: O1 & O2

- Long endurance - up to 24 hrs
- Simultaneously carries multiple payloads
- Multi mission
- C4I connectivity
- Low logistical footprint
- Minimal operating crew
- Maritime application - deep sea reconnaissance

Aeronautics Group

Ahead of Time

www.aeronautics-sys.com

Boeing and Nammo to jointly develop Guided Artillery Projectile

Boeing and Nammo have signed a teaming agreement to jointly develop and produce the next generation of extended range artillery projectiles. The strategic agreement will leverage the companies' combined expertise in guided munitions, projectiles and ramjet propulsion to provide a superior, affordable capability for the United States and its partners and allies. "Boeing is a world leader in precision guided munitions and Nammo is a world leader in projectiles and propulsion. We look forward to building a best-in-class industry team that will deliver operational capability and industrial value to both countries," stated Maria Laine, vice president, International Strategic Partnerships for Boeing Defense, Space & Security.

The partnership is a result of the growing need by US and allied forces to address the range gap between their own artillery systems and those operated by potential adversaries. The US Army now ranks the introduction of long range precision fire as its highest acquisition priority, with several allied countries also showing interest in acquiring similar capabilities. "We are really pleased to have partnered with Boeing, and together we have assembled a world-class group of engineers that will help us meet these new requirements," stated Morten Brandtzæg, Nammo President & CEO. "Boeing and Nammo also have highly complementary skill sets that will allow us to complete development far faster and more efficiently than each of us could have done on our own."

The work will be performed by Nammo's development team at Raufoss in Norway and by Boeing's Phantom Works advanced research division in St. Charles, Mo. In addition to delivering such revolutionary new capability, Boeing's investment into the 25-year agreement will also support the company's industrial participation plan related to the acquisition of five P-8A Poseidon maritime patrol aircraft by the Royal Norwegian Air Force in 2017.

REDEFINING THE SUPREMACY OF INDIAN ARMED FORCES

UNMATCHED FIREPOWER | DEEP PRECISION | ULTIMATE WEAPON SYSTEM

BRAHMOS SUPERSONIC CRUISE MISSILE
...THE BEST IN THE WORLD

BrahMos
An India - Russia Joint Venture

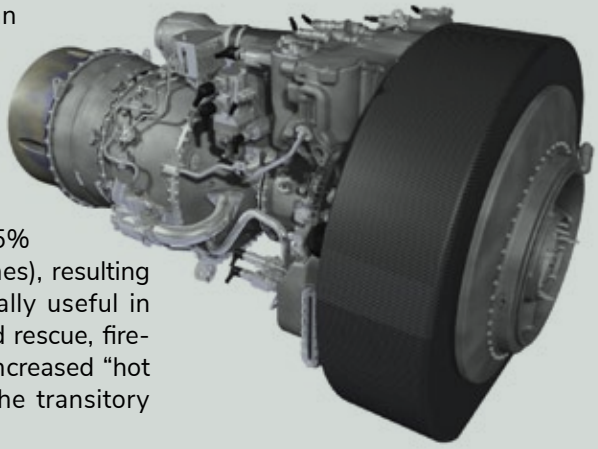
BrahMos Aerospace
16, Cariappa Marg, Kirby Place, Delhi Cantt., New Delhi - 110010 INDIA
Tel.: +91-11-3312 3000 **Fax:** +91-11-2568 4827 **Website:** www.brahmos.com **Mail:** mail@brahmos.com

Hall 7
S 16

Safran and MTU Aero Engines partner on engine of the FCAS

The FCAS (Future Combat Air System) programme has taken a major step ahead with Safran Aircraft Engines and MTU Aero Engines settling the details concerning their partnership to develop the engine of the next-generation European fighter aircraft (also called the NGF). This industrial agreement relies on the principles of the Letter Of Intent (LOI) signed between the two companies in February 2019, which specifies that Safran will take the lead in engine design and integration, and MTU Aero Engines will take the lead in engine services.

EASA certifies Safran Aneto-1K



Safran Helicopter Engines has received EASA (European Aviation Safety Agency) Type Certification for its Aneto-1K engine, as fitted to the Leonardo AW189K. Intended for super-medium and heavy helicopters, the Aneto family produces between 2,500 and 3,000 shp. The 1K is rated at 2,500 shp and its first flight in the AW189K took place in March 2017. Thanks to an 'exceptional' power-to-volume ratio, it delivers 25% more thermal power (over existing similarly-rated engines), resulting in increased mission capabilities. This will be especially useful in demanding roles such as offshore transport, search and rescue, fire-fighting, law enforcement or military transport, where increased "hot and high" power margins and solid performance in the transitory regime must be assured.

ALPHA DESIGN TECHNOLOGIES

- Technology Focus
- Joint Venture and Collaboration Approach
- Local Production and Offsets
- Indigenous R&D and Co-development
- System Integration
- Technical / Warranty Support

Serving Indian Frontiers and beyond.....

Visit us at

India : The Emerging Defence Manufacturing Hub

DEFEXPO 20 INDIA

05-08 FEBRUARY 2020 LUCKNOW

Ministry of Defence

HALL | 01

STALL | S-16

5th-8th February, 2020 Lucknow

Alpha Design Technologies Pvt Ltd

09, Service Road, HAL II Stage, Indiranagar, Bangalore - 560008
Tel: +91-80-4255 6909 Fax: +91-80-2521 6541
E mail: alphacorp@adtl.co.in **Website: www.adtl.co.in**

RAFAEL's new SPIKE SR Weapon system

In a recent series of tests in the Negev Desert in southern Israel, Rafael demonstrated the Spike SR (Short Range) Precision guided missile, proving its unique lethal capability. Spike SR is an electro-optical guided missile designed for shoulder launch by infantry. It is the smallest and lightest variant of the Spike Missile family, weighing only 10kg, in use today by several nations, including within NATO. The entire SPIKE Family is now operational in 34 nations, with more than 33,000 rounds produced and supplied, and as many as 45 different platforms integrated, including attack helicopters, ground vehicles, marine vessels and more.

Spike SR was designed for the maneuvering forces, allowing standoff engagement ranges of 2000 meters, formerly covered only by heavier ATGMs. Designed as a portable, fully disposable munition the SPIKE SR carries a powerful High Explosive Anti-Tank (HEAT) warhead, joined with a frontal precursor for clearing of ERA (Explosive Reactive Armor) tiles. During the demonstration, operators hit targets located 2000 meters away, presenting both a great standoff range to enhance the survivability of maneuvering infantry, as well as lethality, with impressive armor penetration results.

Mr. Gal Papier, director of marketing and business development at Rafael's Precision Tactical Weapon Systems directorate stated, "We are very proud of this small missile, which proved to be as lethal as other large calibre missiles, with great agility for the warfighter due to its light weight, as well as its ability to act rapidly within six seconds from cold start, engaging fast moving targets, highly-demanded capabilities in today's warfare".

Dassault Aviation Group in 2019

During the year 2019, 26 Rafales were exported compared with 12 Rafales (9 exported plus 3 for the French Forces) in 2018. In 2019, 40 new Falcons were delivered compared with 41 in 2018 : 2019 was a difficult market.

However, in 2019, 40 new Falcons were ordered, compared with 42 the previous year. As on 31 December 2019, the backlog includes 75 Rafale (47 for export and 28 for French Forces) and 53 Falcons, compared with 101 Rafales (73 export and 28 for French Forces) and 53 Falcons as on 31 December 2018.

"To build European Defence, we need to maintain collective momentum"

Two years ago, French President Emmanuel Macron and German Chancellor Angela Merkel agreed to jointly develop the *European Future Combat Air System* (FCAS), this initiative being of major importance for European Defence which should move forward with the programme's demonstrator phase. Launching of this FCAS demonstrator phase would commence the first development phase of this 21st century European defence project. In the current geopolitical context, it ensures that Europe can maintain its industrial and operational sovereignty and meet with future threats. The objective is for FCAS to enter operational service in 2040 at the latest, which deadline might seem a long way in the future, but planning needs to start well in advance.

A Franco-German industrial organisation has been defined under the respective national leadership of Dassault Aviation and Airbus. A Franco-German Joint Concept Study (JCS) was launched in January 2019 to define the main features of the system and Spain has since officially joined the programme as the third partner nation.

IAI's 5th Generation UAS Multi-Layered Mission Control Station


iUCS

IAI is fielding the 5th generation of its UAS control station. The iUCS is a game changing new 4D Innovative Unified Control System (iUCS) is the latest in UAS control, build-to-meet the multi-sensor, high-definition, multi-layered complex missions challenge designed to fly the Heron family. It brings refreshing and patent protected automation, planning, control, simulation, ergonomic and modular design to support multi-tasking easily performed mission by a single operator.

The challenges in 2020s missions have extremely increased with the development of new technologies (High-definition EO/IR/ LD, SAR, MPR, GMTI, ESM, COMMINT, ELINT, etc), bringing new demands to link to external C^2 and C^4 networking while using more and more unmanned solutions.

The iUCS is part of a solution that offers a powerful machine with maximum automation, advanced tools for mission editing and planning, automated flight, remote automated taxi, take-off and landing and latest mission operational tools. It provides synergy for the information gathered from all sources combined for better battle field situational picture and decision making.

The iUCS and Heron family provides a whole new level of complex missions handling such as: ISTAR, maritime patrol, aerial persistence, border patrol, HLS, disaster relief, time critical situations and many more.

iUCS reflects extensive investment in ergonomics and man-machine engineering, based on the extensive experience gained through over 40 years of UAS operations in more than 50 world-wide customers and over 1.7M flight hours, continuous evolution addressing user requirements and operational experience. Utilising a compact, modular design iUCS is operable as a stand-alone unit in a vehicle, or with multiple consoles grouped in a mobile (land or sea) shelter or fixed location.

iUCS can also operate in large groups, supporting multi-UAS operations centers (MOIC - Mission Operation and Intelligence Centre).

iUCS panoramic multi-screen view comprises two 32"/24" (space depended) high-resolution display screens locating the operator in the centre, providing ample viewing area for simultaneous mission planning and control, with simultaneous live sensor feeds and access to local or remote information sources accessed online.

The iUCS operation implements a fighter pilot 'Hands on Stick and Throttle' concept, patent protected, for a user centric operation, using the joystick and the touch screen to maintain directional control of the payload. An ergonomic 'throttle' type multiple controls module is operated by the one hand, controlling various aircraft systems and payload functionality. A retractable tablet-shaped touch-sensitive display provides the main interface for mission planning and control, location pointing and system interface, enabling the controller to input changes in the flight plan, employ procedures, route management, altitude changes, communications control, etc.

Special attention was given to reducing operator workload under routine operation and in emergency. Voice commands are part of the user-machine interface, as the system understands spoken instructions, repeating the command and requests user approval before carrying out the command. Handling alerts is another way for the system reducing workload. Audio warning are triggered in addition to visual alerts when required. Weather warning, limitations crossing or when approaching restricted areas, are indicated visually and verbally, drawing the operator attention to the problem by double checking appropriate action.

The entire system uses Commercial off the Shelf (COTS) hardware, and implements an open and modular architecture that allows both hardware and software to be portable, scalable, and upgradeable. Supporting international standard including all relevant NATO standards including STANAG 4545, 4586, 4607, 4609, 4668, 4669, 4671 and 7023.The system operates with multiple servers, dual redundant database and RAID storage for redundancy.

Providing Battlefield All-Terrain Mobility & Support to Armed Forces

बी ई एम एल
beml
NEW FRONTIERS. NEW DREAMS


ARMOURED VEHICLES


REPAIR & RECOVERY VEHICLES


ASSAULT BRIDGING SYSTEMS

- Variants of High-mobility Vehicles & Platforms for Varied Applications
- Repair & Recovery Vehicles
- Bridging & De-mining Systems
- Tank, Trailers & Aggregates
- Military Wagons & Coaches
- Crew Protected Vehicles
- Aerospace Aggregates


MOUNTED GUN SYSTEMS


QRSAM SYSTEM


DOZERS

Mining & Construction | Defence & Aerospace | Rail & Metro

BEML LIMITED
Schedule A Company under Ministry of Defence, Govt. of India

defexpo India : The Emerging Defence Manufacturing Hub DEFEXPO 20 INDIA 05-08 FEBRUARY 2020 LUCKNOW Ministry of Defence

Visit us at : BEML Pavilion, Indoor S-16, Hall-5 & Outdoor OD-11,
Wed. 5th - Sun. 9th Feb. 2020, Vrindavan Yojna, Sector-15, Lucknow, UP, India

www.bemlindia.in

VAYU Interview with

Anandi Ramalingam-Director Marketing-BEL

Mrs Anandi Ramalingam, Director (Marketing), BEL

***VAYU*: Please give us an overview of BEL's displays at DEFEXPO 2020?**

Mrs Anandi Ramalingam: BEL is showcasing its state-of-the-art products and systems spanning every domain of its business – Military Communication, Radar Systems, Missile Systems, Naval Systems, C4I Systems, Electronic Warfare Systems, Avionics, Anti-Submarine Warfare Systems, Tank Electronics, Electro Optics, Gun/ Weapon System Upgrades, Shelters, Unmanned Systems, Homeland Security, Cyber Security, Artificial Intelligence based systems and professional electronic components. BEL is also showing its R&D capabilities by launching/ demonstrating some of its new products / technologies.

BEL's display in the area of Radar includes products/ models/panels of Active Electronically Scanned Array Radar (AESA), Radar for Quick Reaction Surface-to-Air Missile, Radars for automatic detection of first-round location of artillery weapons (Weapon Locating Radar) and Border surveillance and Detection of low flying targets (like Battlefield Surveillance Radar and Air Defence Fire Control Radar - Atulya).

BEL's display in the area of Military Communication includes products such as Software Defined Radios, Single Box Communication Solution, Secure Versatile IP Terminal, Cyber Security products/services, Encryptors, High Capacity Radio Relay, Data Diode used to create a physically secure one-way communication channel from one network to another, SDR VPX with NCW Applications, Configurable Live Mk II, etc.

Electronic Warfare and avionic products on display include Tethered UAV, EW Suite for Airborne Application, Quadcopter UAV, Drone Guard System, Directed Infra-Red Counter Measure (DIRCM), Combined Interrogator and Transponder (CIT), CLIFF, EOS CoMPASS, etc. as well as the complete range of Electro Optics, such as Holographic Sight, TI Sights, Image Intensifier based Passive Night Sight, Target Acquisition System, Day Night Sights for Tanks, LRF Modules, Pan & Tilt – Electro Optical Director for long range surveillance applications like coastal surveillance, border surveillance, etc.

BEL is showcasing its Naval Systems capability through Dipping Sonar, Airborne Sonar, Ship Communication Systems and Long Range Surface-to-Air Missile system.

Components/Technology modules on display include TR modules (X band and C band Quad) for Radar application, Smart cards, MPM / TWT Transmitter, Low Band receiver Modules, LTCC substrates / MMR Chips, Solar Products, Electric Batteries for two / three Wheelers, Electronic Fuses for Artillery, etc.

Other Innovative solutions and Artificial Intelligence systems on display are Face Recognition System, Social Network Analysis, Software based Record and Replay System, Video Management System, Ytterbium Fibre Laser, Power Amplifier for sonar application, LTE- Secure Mobile, Machine Intelligence & Robotic Unmanned Ground Vehicles, Radar Pulse De Interleaver, Digital Pre-distortion for Linearization of Power Amplifier, Electronics Target Systems, Decision Support Systems for Coastal Surveillance System, Imagery Solution, Automatic Train Supervisory System, Comprehensive Integrated Border Management System, Speech to Text Technology, Smart City Solutions, Space-based products, etc.

The highlight of BEL's outdoor display is the Weapon Locating Radar – Mountain Version, KU Band SATCOM – vehicle based; X-PAR Compact version, High Altitude Shelters, Missile Containers, Indigenous Fire Control System, Advanced Landing Ground Communication

CoMPASS on ALH Mk-IV

www.mku.com

mku®

INCREASING CAPABILITY, REDUCING RISK

FOR OUR HEROES

Visit us at:

India : The Emerging Defence Manufacturing Hub
DEFEXPO 20 INDIA
05-08 FEBRUARY 2020 LUCKNOW
Ministry of Defence

Hall #1, Booth #R16 | 5th - 8th February, 2020 | Lucknow

BODY ARMOUR, HELMETS, SHIELDS AND PLATFORM PROTECTION
NIGHT VISION & THERMAL WEAPON SIGHTS, MONOCULAR, BINOCULAR

MKU Limited
13, Gandhi Gram, Kanpur - 208 007 (UP) INDIA.
Tel: (+91-512) 7102710. Fax: (+91 -512) 7102727. email: protection@mku.com

Terminal (ALG-CT) and Air Defence Tactical Control Radar (ADTCR). The entire set of state-of-art equipment on offer will be a force multiplier for any defence force.

VAYU: What are your plans to increase BEL's exports?

Mrs Anandi Ramalingam: The Government is encouraging defence exports through many policy initiatives and has set a target of Rs.35,000 crore by 2024-25. BEL has identified Exports and Offsets as one of its priority areas and has drawn up plans to offer its select products and systems to various export markets.

BEL is giving increased thrust to harnessing the export potential of its products and systems including Homeland Security solutions, Border Protection systems and state-of-the-art systems and solutions which represent its core areas of business. Having established a Coastal Surveillance System (CSS) for some neighbouring countries, BEL is interacting with the Ministry of External Affairs for supply of CSS to other "friendly countries". BEL is also exploring civil markets for Smart Cities, Solar Power Generation, etc, in third world countries.

BEL is focusing on addressing Offset obligations in various RFPs of the MoD, on account of the Offset policy incorporated in the Defence Procurement Procedure. BEL has identified contract manufacturing (build to print and build to spec) for foreign OEMs and partnerships in the form of Transfer of Technology of the latest systems and solutions as areas of emerging export opportunities. Efforts are also on to establish long term supply chain relationship with global players.

In our bid to develop new markets in the Indian Ocean Region (IOR), BEL has established overseas marketing offices in Vietnam, Sri Lanka, Oman and Myanmar. BEL has also expanded its Singapore and New York Regional Offices to handle marketing activities. BEL plans to work closely with Companies in other countries to increase the geo-spatial presence.

VAYU: What are the main products that you export and to which countries?

Mrs Anandi Ramalingam: BEL has been exporting products including Communication Systems, Coastal Surveillance System, Missile Systems, Radars, Electronic Warfare Systems, Electro Optic Systems and Electro Optic Fire Control Systems, Radar Finger Printing System, Naval Systems, Radar Warning Receivers, Electronic Voting Machines and various other equipment to USA, UK, Russia, Italy, Brazil, Germany, France, Israel, Indonesia, Honduras, Malaysia, Maldives, Mauritius, Myanmar, Namibia, Seychelles, South Africa and many other "friendly countries".

In 2018-19, BEL sold products and systems worth $21.6 million and had an export order book of $158 Million in late 2019.

VAYU: What about BEL's diversification initiatives?

Mrs Anandi Ramalingam: The Defence segment continues to be BEL's main business domain covering about 85% of its revenues. However, BEL is continuously exploring diversification opportunities in Defence and allied non-defence areas for enhanced growth, leveraging its strengths and capabilities acquired in the defence electronics domain.

Segments like Radars and Weapon Systems, Communication and Network Centric Systems, Tank Electronics, Gun Upgrades, Electro Optic Systems and Electronic Warfare & Avionics Systems will continue to drive the Company's growth in the coming years. As part of its diversification strategy, BEL is also continuously exploring opportunities in Defence and allied non-Defence sectors by offering spin-off technology products.

Some of the areas BEL has already diversified into are Homeland Security and Smart City, Electronic Ammunition Fuzes, Composites, Energy Storage Systems, RF Seekers, Imaging Infra-Red (IIR) Seekers, Real Time Information System for Railways, Automatic Fare Collection Gating System for Metro rail, Intelligent Traffic Management System, Satellite Integration, Cyber Security, Unmanned Systems, Composites and Solar Power Plants.

Other areas of focus include Next Generation Indigenous Surface-to-Air Missile (SAM) System, Airborne Radars, Thermal Imager Detectors for Night Vision Devices, Indian Regional Navigation Satellite System (IRNSS), Direct Energy Weapons (DEW), Helmet Mounted Display Systems (HDMS), Directed Infra-Red Counter Measure (DIRCM), IT & Cloud Services, Ring Laser Gyro, Explosives, Propellants, Smart Bombs etc, in the Defence segment, and Space Grade Solar Cells, and Air Traffic Control Radars in the non-defence segment.

BEL has signed an MoU with Tamil Nadu Industrial Explosives Limited (TEL), an undertaking of the Tamil Nadu Government, for co-operation in the explosives segment where BEL is eyeing business growth, keeping in view of its ongoing and upcoming ammunition programmes. BEL is investing for the upgradation of existing facilities and addition of new facilities, as well as setting up of a world-class centre of excellence for ammunition related technologies for both Defence and Space requirements. The strategic partnership with TEL will also boost BEL's business opportunities in the explosives segment.

Atulya Radar from BEL

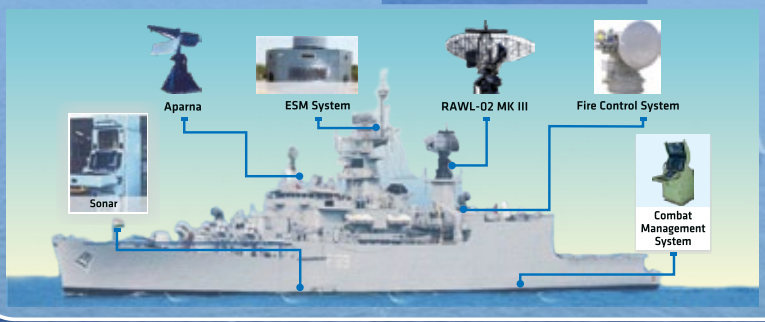
Empowering the Nation's Defence Forces

भारत इलेक्ट्रॉनिक्स
BHARAT ELECTRONICS

QUALITY, TECHNOLOGY, INNOVATION

GOING THAT EXTRA MILE TO SAFEGUARD OUR SEA SPACE

NAVAL SYSTEMS



Visit us at
Hall - 5
Defexpo
2020
Lucknow
from 5th-9th
February, 2020

PRODUCT PROFILE

- Radars • Missile Systems
- Defence Communication
- Electronic Warfare & Avionics
- Naval Systems
- Electro Optics
- Network Centric Systems
- Tank Electronics & Gun Upgrades
- Non - Defence Products
- Professional Components

A Navratna Defence PSU

MAKE IN INDIA

Bharat Electronics Limited
Registered & Corporate Office:
Outer Ring Road, Nagavara, Bangalore-560045

Phone:+91-80-2503 9300 | Fax: +91-80-25039305
Toll Free 1800 425 0433 | CIN: L32309KA1954GOI000787
www.bel-india.in

The Gripen's Smart Support Solution

The Gripen is a unique fighter system, bringing about a perfect balance between performance and cost-efficiency. Throughout its design and construction, Saab has ensured that the Gripen is easy to service and repair, making it possible to offer moderate operational and maintenance costs that no other aircraft comes close to matching.

The genesis of Gripen's smart support solution dates back more than 80 years, and all started back in 1937 when it was clear that Europe was on the brink of a major conflict. Although Sweden, a small neutral country had been at peace for more than a century, its government and industry decided to prepare for the worst. Saab was founded with the mission to secure the nation's supply of military aircraft as part of its drive to maintain national security and sovereignty.

Being a country with very limited resources, but at the same time placed at a strategic location and hence vulnerable, it soon became apparent that something very special was required to mitigate the threats but within available resource limits. By applying smart and innovative thinking, the Swedish Government its defence forces and Saab managed evolve basic requirements that would apply to all aircraft designed and produced, these requirements being as they were in 1937.

Essentially, the approach was that the aircraft be able to operate from regular Swedish roads with a straight length of at least 1 km, so establishing 'secret' road bases. This meant that, in case of war, it was possible to spread the operations to a large number of locations all over the country, rather than being confined to known air bases. Such a spread out made it almost impossible for an enemy to take the air force out of the war equation.

Also, the aircraft should be so easy to maintain and that maintenance could be done by a small number of conscript mechanics with only one certified technician. Finally, the aircraft should allow for very fast air-to-air turn-arounds on the road bases as well as a very quick engine replacement if required. After the final decision to implement the road base system in the 1950s, the road network in Sweden was adapted to meet such requirements.

During years of the Cold War, Sweden felt threatened by the Warsaw Pact countries, and the country needed an aircraft that could outperform and out manoeuvere a larger force of contemporary fighters. Northern Sweden is an unforgiving land with long, freezing winters and largely unpopulated areas, presenting a harsh environment in which to operate an aircraft : yet it was this place that gave birth to the Gripen : defending such vast areas required a fighter that could perform air-to-air, air-to-surface and reconnaissance missions.

Sweden's relatively small defence budget and the tough conditions for which the Gripen was designed, led Saab to make the fighter as efficient as possible. A fundamental aspect of this approach is Gripen's modular and open avionics architecture and efficient maintainability, which enables the integration of off-the-shelf products wherever possible, as well as continuous development of new functions to meet future needs.

The decision to develop the Gripen JAS-39 was taken in 1982, and its first flight performed in 1988. With its unstable design and equipped with a fly-by wire system, increased use of composites and other state of the art technology, this was a completely different fighter compared to its predecessors. The basic maintainability and road base requirements were however the same, and the unique support solution was hence woven into its design from the very beginning and eventually this became inherent with the system.

ANANTH TECHNOLOGIES LTD.

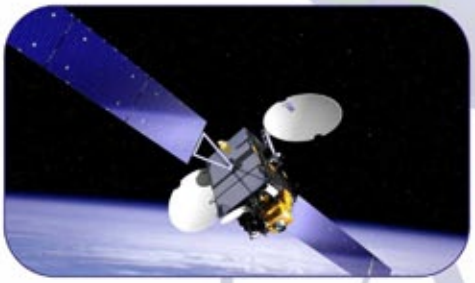
AN AS-9100D & ISO 9001:2015 CERTIFIED COMPANY
Committed Partner for Indian Aerospace & Defence Programs

Overview

- Inception in 1992
- Avionics Design, Fabrication and Qualification
- Class 100K Clean Room with SMT production lines
- Indigenous solution provider
- India's premier private defense and space player
- In-house environmental test facilities

Product range

- Digital & Embedded systems
- Navigation & Controls systems
- Laser Systems
- Sights for Tanks and weapons
- Telemetry & Tracking systems
- RF and Microwave systems
- Sensor Systems
- Mechanical systems






Meeting Quality & Reliability Standards for Space & Defence programs

Ananth Technologies Ltd., Ananth Info Park, Plot No: 39, Hitec City, Phase-II, Madhapur,
HYDERABAD – 500 081. Phone : 040 – 6615 6615; Fax : +91-40-6615 6531
E-mail : subbarao@ananthtech.com; mail@ananthtech.com
Website: www.ananthtech.com


Rotem 2


Harop launched

IAI's family of loitering weapons goes Naval

Loitering Munitions (LM) evolved in Israel in the mid-1970s, based on operational lessons during the Yom Kippur War, where Israel failed to achieve sufficient air superiority over enemy air defences. In the years that followed the 1973 war, the Israeli defence establishment encouraged industry research and development in unmanned and autonomous capabilities for the Suppression and Destruction of Enemy Air Defences (SEAD/DEAD), measures that paved the way for manned aircraft to strike those Surface-to-Air Missile (SAM) sites.

The Harpy 'suicide drone' conceived in the mid-1980s was one of these solutions developed by Israel Aerospace Industries (IAI) Missile Division. Harpy comprised of swarms of autonomous aerial platforms equipped with a radar-seeker and warhead. It could loiter for hours at high altitude inside a SAM- Defended Area and once threat radar became active, it rapidly engaged that radar, steeply diving to hit the radar with devastating effect.

Evolving through decades of operational service, the Harpy was recently modernised in two aspects: A-new Anti-Radiation (AR) seekers offering improved target location, identification and classification and extended frequency coverage, particularly in the lower frequency bands- utilising a modern and versatile platform, the system now offers longer loitering, of up to nine hours. Its unique autonomous capabilities and ground based operability turn Harpy into a disruptive capability against land-based adversary Anti-Access/Access Denial assets.

To excel as multi-mission combat system, IAI evolved its autonomous LM to be remotely operated, conducting reconnaissance and surveillance missions with the ability to attack targets immediately as they are detected. For such missions, 'Man in The Loop' control was first introduced with the Harop –a loitering platform with maritime capabilities powerful enough to carry a sophisticated multi-sensor EO payload, large warhead, data link and enough fuel for a 9-hour mission. Sharing a common platform with Harpy NG, Harop delivers imagery intelligence in real-time over a two-way data link. Once a target is detected by the operator, from distances hundreds of kilometres away, Harop is commanded to attack, dives in on the designated target and activates its large warhead. The approach azimuth, as well as the dive angle is selectable by the operator, to suit various operational scenarios.

Here at Defexpo 2020, IAI is displaying its LM family with its newest member- Mini Harpy, a newly-developed loitering munition, based on unique IAI development and technology, the Mini Harpy combines the capabilities of the company's two flagship loitering missiles, the Harop and the Harpy, offering detection of broadcast radiation with electro optical capabilities. The Mini Harpy is a tactical system designed for field or marine units. It can be launched from land, marine and helicopter borne platforms, providing complete independence in intelligence collection for an updated situational picture and closing the attack circle at low cost.

The system was designed to provide operators with control up to the last moment, including cessation of attach at any stage. Electrically powered, it is extremely quiet, carries shaped charge of approximately eight kg and operates in mission range of 100 km for duration of two hours and 45 kg in weight.

A smaller LM from IAI is the Rotem, designed specifically for warfare in complex terrain and urban areas. It employs a folding multi-rotor as a platform, multiple imaging and IR cameras for sensors and multiple acoustic transducers to detect and avoid obstacle and safely manoeuver narrow urban streets or dense vegetation. Its payload bay holds enough space to carry warhead of one kilogramme or extra batteries, extending the mission endurance from 30 to 45 minutes. It is operated by a single soldier using simple point and click commands on a tablet controller, similar to the one operating the Green Dragon.

Boaz Levi, IAI Corporate Vice President and General Manager of the Systems, Missiles & Space Group stated, "IAI's advanced loitering munitions offer an operational solution to the complex arena experienced by armies, with a special emphasis to the congested naval arena warfare. The new naval adjustments made to the loitering munitions provide an excellent solution for costal protection, Combat Ships, Offshore Patrol Vessels and Patrol Boats. The unique organic independent capabilities provide an operational flexibility to the naval commending level, both at the intelligence level and at the operational level."

MBDA : Excellence for the Indian Navy

Exocet MM40 Block 3

As Indian Navy warships patrol the seas, they have *excellence on their side*, with high-performing missile systems from MBDA such as Exocet on board their new *Kalveri*-class submarines.

MBDA has supported India's armed forces for over 50 years, providing over 40,000 missiles, many built in India during this time, and is working through its Indian joint venture – L&T MBDA Missile Systems Ltd – as part of *Make in India* programmes to provide new enhancements for the Indian Navy's fighting potency. L&T MBDA Missile Systems Ltd is offering Exocet MM40 Block 3 for the Indian Navy's Medium Range Anti-Ship Missile (MRAShM) requirement, the latest version of the venerable Exocet missile already in service with the Indian Armed Forces, and having improved electronics and an extended range.

For the Indian Navy's Short-Range Surface to Air Missile (SRSAM) requirement, L&T MBDA Missile Systems Ltd is proposing its next-generation Sea Ceptor system, which utilises the CAMM missile that features a next generation all-weather RF-seeker, two-way datalink and soft-vertical launch system to provide a step-change in performance compared with previous generation systems. These are designed to protect vessels from attacks from fast sea-skimming missiles attacking from multiple directions simultaneously. "Sea Ceptor is the most high-performance and modern air defence system on the market, while also providing easy platform integration and many space, weight and safety benefits compared with older systems."

Marte ER

MBDA has a full spectrum of missile systems to meet requirements of naval helicopters. For long-range requirements, MBDA's combat proven Exocet AM 39 missile is available, Marte ER provides excellent extended medium range capability, while Sea Venom/ANL provides unrivalled fire-and-forget or operator-above-the-loop ability to engage multiple targets at short to medium ranges in open waters or even challenging littoral environments.

The Indian Navy's Special Forces are evaluating the ATGM5, L&T MBDA Missile Systems Ltd being the world's only true 5th Generation Anti-Tank Missile as an Indian Designed Developed and Manufactured (IDDM) product under the *Make in India* approach. ATGM5 offers many unique capabilities, being truly network enabled, having a multipurpose warhead with selecteable effects, and high-performance seeker technologies, proven for use in the maritime environment from small Special Forces vessels.

Loïc Piedevache,
Country Head India, MBDA

Sea Ceptor/ CAMM

Israel's UVision Announces a JV with Aditya Precitech "AVision"

Hero 30

Israel's UVision Air Ltd., a global leader in the area of Loitering Munitions Systems of all sizes for a variety of missions, has strengthened its presence in India and announced a joint venture with Aditya Precitech, an Indian company, for the manufacture and marketing of loitering munitions under the brand PALM (Precision Attack Loitering Munition) Hero Systems.

These systems are already in service and combat-proven. AVision, the company formed under the joint venture agreement, addresses the needs of the Indian defence and paramilitary sectors.

AVision will explore various opportunities in India for Loitering Munitions Systems with the intention of initiating a full range of activities including the design, manufacture, sales, maintenance, support, upgrading, and lifecycle management. The partners will also maintain a supply of spare parts for the warranty and post-warranty periods for current and future versions of the smart munitions systems.

AVision will be responsible for and will provide the following: design, development manufacture and maintenance support for all PALM Hero series, marketing strategy development and implementation; facilities for the new company's operations; human resources and personnel; supply chain creation and implementation; platform integration; and, after-sale training and customer support services.

Commenting on the Joint Venture, Shane Cohen, VP Sales & Marketing at UVision and AVision Board Member, stated, "We are very pleased to have partnered with Aditya, a highly respected company with extensive experience as development partner for many of India's Defence Research and Development Organisation's (DRDO) most important projects. Aditya has a skilled team able to produce a wide range of complex components, and is an ideal partner for our innovative, cost-effective loitering munitions systems designed for the battlefield of the future."

Regarding this partnership, Aditya's representative and Avision's CEO, Col. (ret.) Anil Yadav, remarked, "This Joint Venture is a major step forward enabling India to achieve significantly higher levels of self-sufficiency in the defence sector with the transfer of state-of-art cutting-edge technologies for the futuristic loitering munitions. We look forward to producing the full range of loitering munitions, which will be offered to India's military, paramilitary forces as an effective response to multiple threats with minimal collateral damage."


Shane Cohen, VP Sales & Marketing at UVision and AVision Board Member


Col. (ret.) Anil Yadav, CEO, Avision

The PALM HERO Series and Simulation System are at the AVision booth Hall 1 R48

At Defexpo, the company is also displaying the entire PALM HERO Series of Lethal Loitering Systems highlighting the high-precision PALM Hero-30 and the Long-Range PALM Hero-400EC as well as the recently launched PALM Hero-120 a modular, customisable loitering weapon system fitted for a variety of missions.


Long-Range PALM Hero-400EC

CONTROP announces enhanced capabilities for the iSea-50HD: a new HD thermal camera and SWIR channel

CONTROP continues to strengthen its technical capabilities, while participating in several maritime tenders in India.

Controp Precision Technologies Ltd., a company specialising in the field of electro-optics and infrared (EO/IR) for defence and homeland security solutions has announced new capabilities for its iSea-50HD, replacing the thermal camera with a new HD thermal camera, and adding a SWIR channel which enables clear observation in the harsh environmental conditions typical of the Indian maritime climate.

The iSea-50HD system provides maximum-range surveillance using highly sensitive sensors, including an HD Thermal Imaging (TI) Camera working in the 3-5µ band with a continuous zoom lens, a high-sensitivity colour day camera, a SWIR channel and a long-range Eyesafe Laser Range Finder (ELRF). Among its additional features are advanced image processing and unique video enhancement algorithms.

Providing a full solution for naval and maritime operational requirements, Controp's compact, lightweight iSea surveillance systems have been mission proven since the 1990s, integrated across the globe on a wide variety of vessels and in daily operation for maritime missions such as search and rescue, maritime surveillance, law enforcement, EEZ protection, counter piracy and special operations.

In India, the iSea-30HD is already installed and active on multiple vessels belonging to the Indian Coast Guard. Controp is actively pursuing new contracts in this market and participating in local tenders from Indian shipyards, with the goal of continuing this successful cooperation.

"Controp continues to lead the development of customised technologies, tailored to meet customer demand and the challenging field conditions in which their forces operate," stated Mr. Hagay Azani, Controp's CEO & President. "Being able to operate in harsh environments with limited visibility, at specific times of day and night, is critical to customers in this region."

Controp specialises in the development and production of electro-optical and precision motion-control systems for surveillance, defence and homeland security. Controp's main product lines include: high-performance stabilised observation payloads used for day/night surveillance onboard UAS, small UAS and aerostats/balloons, helicopters, light aircraft, maritime patrol boats, remote weapon stations and ground vehicles; automatic intruder-detection systems for coastal and border surveillance, port/harbour security, the security of sensitive sites, ground-troop security and anti-drone applications; thermal imaging cameras with high-performance continuous zoom lens and state-of-the-art image enhancement features and more.

VAYU Interview with William L. Blair, Vice President & Chief Executive, Lockheed Martin India

VAYU: Lockheed Martin is bidding to supply 114 F-21s to the Indian Air Force. Please enumerate on capabilities of the platform.

LM: The F-21 will truly be a game-changer for the Indian Air Force, Indian industry and India-US strategic ties. We are confident the F-21 is the best solution to meet the Indian Air Force's capability needs, provide *Make in India* industrial opportunities, and accelerate India-US cooperation on advanced technologies, including but not limited to fighter aircraft.

The F-21 has unique capabilities including an advanced APG-83 Active Electronically Scanned Array (AESA) radar, which has detection ranges nearly double that of previous mechanically scanned array radars and the ability to track and attack more targets with higher precision; an Advanced Electronic Warfare (EW) System, developed uniquely for India, that provides enhanced survivability against ground and air threats; Long-Range Infrared Search & Track (IRST), enabling pilots to detect threats without getting detected; Triple Missile Launcher Adapters (TMLAs) allowing the F-21 to carry 40 percent more air-to-air weapons and a dorsal fairing enabling increased capacity and integration of indigenous systems in the future.

The F-21 is also the only fighter in the world with both probe/drogue and boom aerial fuelling capability. This, along with Conformal Fuel Tanks (CFTs), delivers greater range penetration and loitering staying power to the Indian Air Force: in fact, the F-21 delivers an advanced single-engine, multi-role fighter at the most optimal Life Cycle Cost for the Indian Air Force with the longest service life of any competitor: 12,000 flight hours.

VAYU: Kindly give an update on current Lockheed Martin programmes in India, including the 24 MH-60R Seahawk helicopters.

LM: We stand committed to fostering strategic, long-term international defence partnerships with India. The USN has offered the MH-60R via Foreign Military Sales to the Indian Navy. We are confident the MH-60R 'Romeo' is the right aircraft for the Indian Navy as it provides vital capability in the Indo-Pacific region. Apart from the MH-60R, Sikorsky has also responded to the Expression of Interest (EOI) for the Naval Utility Helicopter (NUH) programme in 2019.

VAYU: Please enumerate on the cutting-edge technologies that Lockheed Martin is bringing to India as a part of its offset requirement?

LM: Lockheed Martin has been diligently discharging its offset obligations in India since 2009, which has delivered extensive economic benefits through investment, skills training, transfer of technology and exports. Our two successful joint ventures in Hyderabad have been a key part of helping India achieve its goal of developing an aerospace and defence supplier ecosystem, promote indigenous manufacturing and participating in the global supply chain, contributing to '*Make in India*' initiatives. The investments related have contributed in manufacturing equipment, tooling, intellectual property and non-recurring engineering; and contributed to the private Indian industry revenues and exports. They have also resulted in the training and employment of more than 1,500 persons in aerospace engineering, manufacturing and management jobs in India.

VAYU: What is Lockheed Martin's focus at DefExpo 2020?

LM: We have partnered with India for nearly three decades, working with the Indian armed forces, industry, and other key stakeholders to advance the strategic security and industrial capability of the country. Our focus on 'Make in India — For India, From India' at the 11th edition of Defexpo highlights our commitment to fostering growth of India's defense industry well into the future. The Defexpo also provides us with an opportunity to highlight our platforms and programmes for India, some of which include the MH-60R, F-21, C-130J, S-92, CH-53K and a Javelin.

The F-21 "For India, From India"

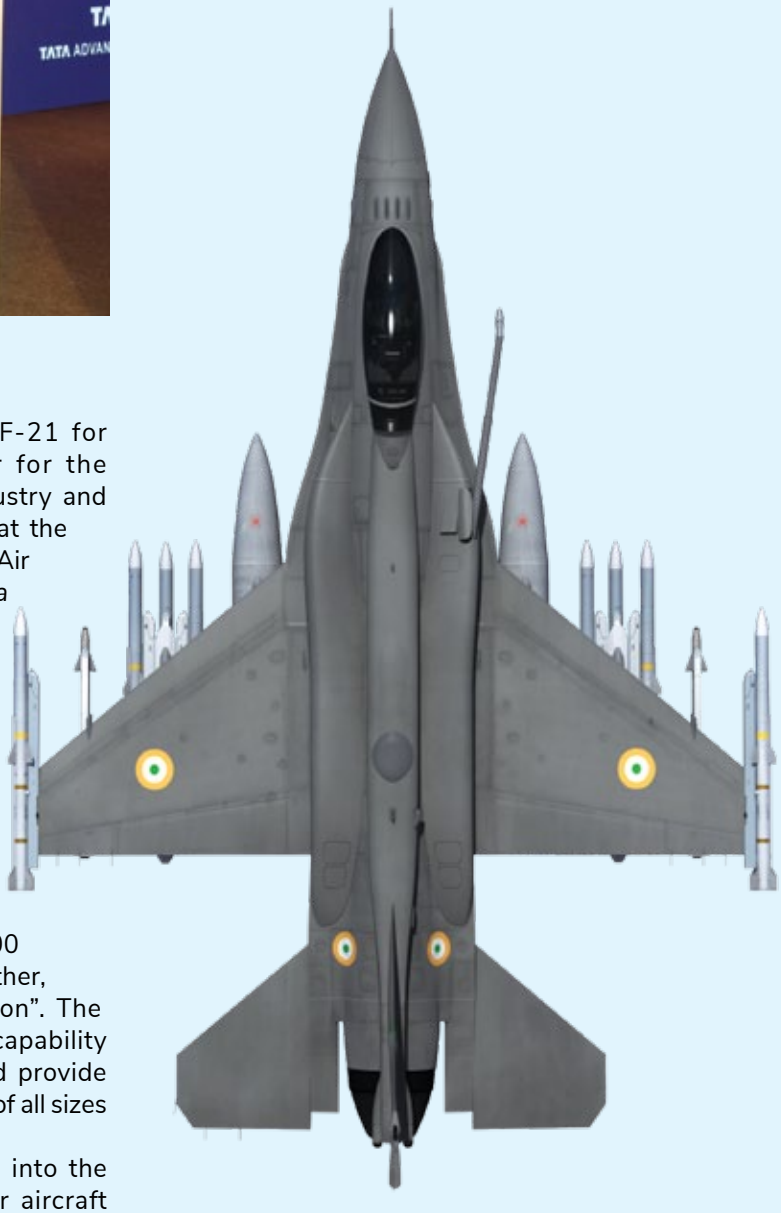
Dr Vivek Lall speaking at the Indian Supplier Conference 2019 in New Delhi.

"We are very excited about the F-21 for India – a true game-changer for the Indian Air Force, the Indian industry and India-US strategic ties. We are confident that the F-21 is the best solution to meet the Indian Air Force's capability needs, provide *Make in India* industrial opportunities and accelerate India-US cooperation on advanced technologies, including, but not limited to, fighter aircraft," stated Dr. Vivek Lall.

Specifically configured for the Indian Air Force, the Lockheed-Martin F-21 addresses the Indian Air Force's unique requirements. The F-21 is an advanced single-engine, multi-role fighter at the most optimal Life Cycle Cost for the Indian Air Force with the longest service life of any competitor, 12,000 flight hours. Simply put, "the F-21 goes further, faster, and stays longer than the competition". The F-21 will meet all of India's performance, capability and advanced technology requirements, and provide unmatched opportunities for Indian companies of all sizes and suppliers throughout India.

Such a partnership also integrates India into the world's largest and most successful fighter aircraft ecosystem : a $165 billion market which demonstrates Lockheed Martin's commitment to India: to deliver an advanced, scalable fighter to the Indian Air Force that also provides unrivaled industrial partnership opportunities.

The F-21 provides unmatched opportunities for Indian companies of all sizes, including Micro, Small & Medium Enterprises (MSMEs) and suppliers throughout India, to establish new business relationships with LockheedMartin and other industry leaders in the US and around the globe. In addition to creating thousands of new jobs for Indian industry, F-21 production in India also supports thousands of US jobs.



"Contributing to India's Growth Story"

VAYU Interview with Mr. Emmanuel de Roquefeuil, VP & Country Director, Thales in India

VAYU : Over the years, Thales has formed various partnerships and joint ventures in India. Please give an update on these associations.

Thales: Thales has formed co-operative partnerships with public and private sector industries, bringing its expertise for delivering high-end trusted technology solutions. We have been working closely with Hindustan Aeronautics Limited now for over 50 years and providing high-end avionics to equip the platforms that HAL is designing. Thales will continue to develop the partnership with HAL through transfer of technology, when appropriate, to jointly address the growth of Indian defence aerospace market.

Thales has successful JVs with Bharat Electronics Ltd (BEL), Samtel and Reliance Aerostructure Limited. The JV with BEL known as *BEL-Thales Systems Limited (BTSL)* is dedicated to civilian and select ground-based military radars. With BTSL, Thales is jointly developing the PHAROS fire control radar for gun and missile systems that will cater to both domestic Indian and international markets. BTSL is also undertaking the production of the LBREC – Low Band Receiver of the self-protection suite of the Rafale.

The JV with Reliance Aerostructure, known as *Thales Reliance Defence Systems Limited (TRDS)*,is developing Indian capabilities to integrate and maintain airborne radar and electronic warfare sensors. The JV is developing skills and activity in the Special Economic Zone of Mihan-Nagpur together with an Indian supply chain for the manufacturing of microwave technologies and high-performance airborne electronics. Thales also has JVs with Samtel for locally producing helmet mounted sights and displays, military avionics and airborne sensor systems and with L&T Technology Services for software engineering in avionics respectively.

In addition to this, we have also been strengthening our supply chain ecosystem in the country which over 75 local partners have been mobilized. Our footprint and capability portfolio continue to grow steadily. We have also formed co-operations with several Indian companies such as Bharat Dynamics Limited (BDL). Last year, we announced two other associations with the Kalyani Group and MKU Limited, in different areas.

These partnerships have positioned us to move from Transfer of Production to direct industrialisations which increase the design and development activities in India. With this, we seek to contribute to the government's ambition of positioning India as a global manufacturing hub.

VAYU : What are the latest announcements by Thales in India?

Thales: In April 2019, Thales completed the acquisition of Gemalto, with which Thales is stronger today having over 80,000 people working across 68 countries. We have combined complementary strength and expertise, which enables Thales to position itself as a new global leader in end-to-end digital security, playing a pivotal role in the digital transformation of the customers and markets we serve. This resonates with our overall strategy to strengthen the Group's expertise in digital technologies: Internet of Things, Big Data, Artificial Intelligence and Cybersecurity. Since 2014, Thales has invested nearly 7 billion euros in these digital technologies.

In India, Thales has tripled its employee strength to over 1600, working across various locations in the country. The Gemalto acquisition in fact positions us to

even better support the 'Digital India' Initiative of the government here.

Our historical business segments—defence, transportation and aerospace continue to remain very dynamic in India. Fully in line with the country's objective of developing a local manufacturing ecosystem, Thales is committed to 'Make in India' as well as 'export from India'. In addition to growing our own activity here, we have been strengthening the local industrial ecosystem by way of various partnerships as shared earlier.

A natural extension of this ecosystem is reinforcing our engineering presence. We are ramping up our own R&D activities in India, through the recent opening of an Engineering Competency Centre in Bangalore (that focuses on hardware, software and systems engineering capabilities for both the civil and defence sectors). Thales also has an engineering centre in Delhi National Capital Region (Noida and Gurugram) that is focused on digital identity and security. Thales presently has over 1000 engineers working in India.

At Thales, we are extremely proud to have contributed to India's growth story. We have been strengthening our local partnerships, generating business worth Rs 1000 crore for our Indian supply chain partners and creating hundreds of job opportunities. As a global technology leader, we remain committed to India and help our customers prepare for tomorrow, today.

VAYU: An update please on your engineering competence centre launched in India last year.

Thales: Going beyond production, Thales is reinforcing its engineering presence in the country. We are ramping up our own R&D activities in India, through the ECC launched in Bengaluru last year.

The centre in Bengaluru is the *first-of-its-kind* in India that focuses on both civil and defence sectors. It is currently dedicated to high value-added systems in the fields of Air Traffic Management, avionics, cockpit, flight management, in-flight entertainment and connectivity systems, radar software, airborne Intelligence Surveillance and Reconnaissance tactical management systems. The ECC is also creating capabilities in advanced hardware technology such as Radio Frequency/designs for radars and communication equipment, high performance processing units and in airborne digital processing functions.

With more than 250 R&D engineers currently employed at the centre in Bengaluru, we will be hiring more engineering staff in the country in the coming years.

VAYU: Can you elaborate on Thales' plans for DefExpo 2020?

Thales: In keeping with DefExpo 2020's focus – 'Digital Transformation of Defence' – Thales is showcasing defence technologies that are digitally driven and future focused. These technologies have the potential to enable

Talios mounted on Rafale fighter

India's armed forces to achieve high ambitions and master every decisive moment.

At our stand R17 in Hall 3, a wide range of products and solutions would be on display through a series of demonstrations across four categories – *Land, Naval & Aero, Digital Transformation and Security*.

In our Digital Transformation area, we are showcasing *Talios*, the Targeting and Reconnaissance pod, which combines targeting and tactical recce capabilities in a single pod which will be able to embed artificial intelligence in the future. We will also showcase *Pathmaster*, the first fully configurable unmanned mine counter measures system.

As for the land domain, we have combat systems such as fully integrated Soldier Systems capability, SYNAPS software defined radios among the family of communication devices, armaments and mock-up missiles under air defence systems such as STARStreak and lightweight multi-role missiles.

In the Security sector, we have the Live Face Identification System, a video-based biometric facial recognition system for tracking and recognition. Additionally, we will also present *Eagleshield*, a multi-sensor integrated drone countermeasures solution that can detect, identify, classify and neutralise rogue drones flying at low altitude at ranges of up to 7 km.

In the domain of air and maritime, Thales will showcase anti-submarine warfare systems such as Captas 1 and Aero & Naval connectivity & Identification solutions such as Nextwave, Interrogator Friend Foe TSB 2510 and others.

"We have exciting plans for DefExpo 2020 as it allows us to demonstrate our leadership in technologies that are helping the Indian Armed Forces to prepare, achieve and maintain tactical superiority and strategic independence".

Nucon Alkan Aerospace: Leaders in ejector racks

The ejector racks are mounted on more than 60 different aircraft types including the Gripen, ALH-WSI, Black Hawk and the Tejas

Just a one year after creating the Joint Venture *Nucon Alkan Aerospace Private Limited* (NAAPL) in support of the 'Make in India' initiative, merger of this Indian pioneer in control systems with the French leader in ejector racks is paving the way to the future. With this Joint Venture, the companies are contributing their knowledge, skills and technology to achieve the vision of the leaders and contribute to the Indian defence market.

The cooperation with Hindustan Aeronautics Limited for a *Transfer of Technology* of carriage systems for the HAL advanced light helicopter (ALH) and light combat helicopter (LCH) is proceeding.

As a partner of Dassault, the Company is on-board the Rafale omni-role fighter programme, providing the latest technology of ejection systems with pneumatic energy. The Company is also involved with the IAF's Mirage 2000s supporting the fleet through a global MRO of the airborne carriage systems.

NAAPL are displaying their products at DefExpo 2020 and aim to become leaders of indigenous manufacturing and complete customer support in the aerospace domain. This would support all Indian requirements of 'military airborne carriage systems', a very critical part to enhance combat readiness of the combat aircraft fleet.

"NAAPL's objective is to provide the IAF with ultimate technology for new aircraft and continuing support for existing ones, ensuring optimum operational capability of the fleet".

NAAPL is at stand M10, Hall 5

Defsys Solutions are 'Best SEZ MSME'

Defsys Solutions, Gurgaon has been named the Best SEZ MSME in the Engineering Category at the EPCES Export Awards, held by Export Promotion Council for EOUs & SEZs. The EPCES Export award, hailed as a prestigious award in the industry is a coveted prize honouring excellence in Exports.

According to Executive Director of Defsys Mr. Samar Bhargava, "This award is a testament to the skill, ingenuity, and vision of the Defsys family and we are proud of this momentous achievement. We aim to take the company to even greater heights in the coming years and are thrilled to have received this award which honours our expertise in the industry.»

Defsys Solutions Private Limited (Defsys), established in 2007, is a leading Indian Defence Integrated Systems company committed to providing a total solution from concept to realisation, with high quality and reliable products. Defsys is a Private Indian Entity and one of the fastest growing Defence MSMEs in the country, clocking an order book of over INR 2000 crores. With over 180 employees across four locations with group businesses including civil Aviation MRO & Technical Services, Defsys has successfully executed a large number of defence projects for global defence OEMs and Indian defence and aerospace customers like Indian Army, Indian Air force, HAL, DRDO and DPSUs.

Defence Industrial Corridor in Uttar Pradesh

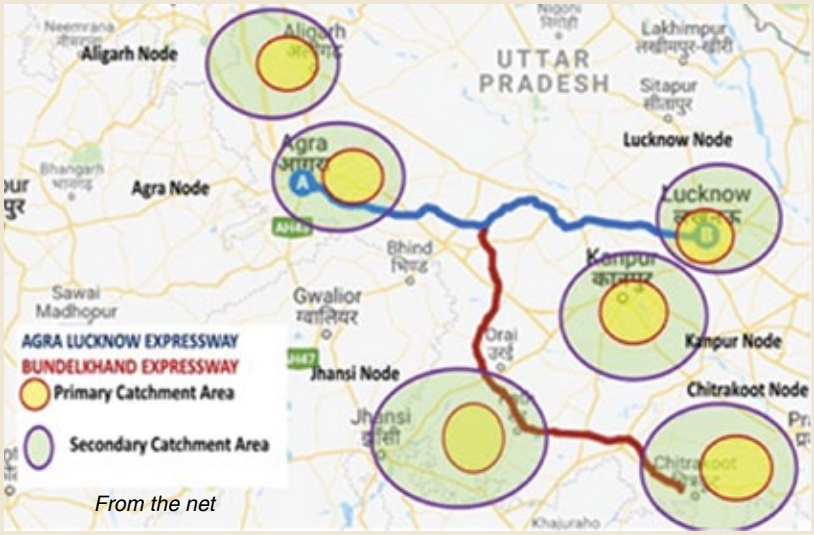
Selected as one of the geographical areas in India to host a Defence Industrial Corridor, the State of Uttar Pradesh has allocated over 5,000 hectares of land in Bundelkhand, Agra and Aligarh for the purpose of this becoming "a world-class manufacturing hub for Indian and global aerospace and defence (A&D) industry". This area would also encompass Chitrakoot, Lucknow, Kanpur and Jhansi, the Prime Minister Narendra Modi having laid the foundation stone at the last named city in 2018.

According to reports, the project is expected to attract Rs 20,000 crore investments and the UP Industry Department have plans for incentives to industry. To encourage private enterprises to establish industries without specifying areas, the UPDC would allow them to set their bases not only on earmarked government land but also cover entire cities in identified areas.

Prominent organisations which have expressed interest in setting up facilities in the UP Defence Industrial Corridor coming include Reliance Industries, Aditya Birla Group, Mahindra & Mahindra Ltd, ITC, Medanta Group, HCL Group, PepsiCo India, Tata Sons, Samsung India, Adani Group and the Torrent Group.

Public sector undertakings which have long had production facilities in the UP area include Hindustan Aeronautics Limited with their Accessories Complex headquartered at Lucknow, the Transport Aircraft Division at Kanpur and the Advanced Avionics Complex at Korwa (District Amethi).

Ordnance Factories have been functioning not only at Kanpur (where is located the small arms and field gun factories) but at Shahjahanpur (Ordnance Clothing Factory), Hazratpur and Muradnagar.



From the net

HAL HJT-36 back in flight testing

After several years, the dormant HAL intermediate jet trainer programme has been revived with first flight of a modified HJT-36 taking place at Bangalore. Flight testing of the IJT, designed and developed by HAL for stage-II training of IAF pilots was put on hold after the aircraft had experienced some spin-test problems during 2016. "HAL continued its R&D efforts and undertook modification of IJT LSP4 aircraft based on extensive and comprehensive wind tunnel studies", stated Mr R Madhavan, CMD, HAL.

The HJT-36 is planned as successor to the earlier HAL HJT-16 Kiran basic jet trainer for which HAL was given go ahead in 1999 for development, testing and certification of two prototypes, the first of which flew in March 2003. After further development and extensive testing, the Indian Air Force placed an order for 73 aircraft. After over 280 test flights, the aircraft entered limited series production in 2009 with an initial batch of 12 aircraft to be delivered. The first flight test for the limited series aircraft occurred in January 2010, and initial operational capability was expected by July 2011, the total requirement for both the IAF and Navy being over 200 aircraft. However, there were issues associated with critical stall and spin characteristics and after some consultancy inputs, the airframe was modified leading to resumption of flight testing.

HAL will bid for NUH requirement

HAL has submitted its response to the Indian Navy's Expression of Interest (EOI), to identify an Indian Strategic Partner (SP) to build 111 Naval Utility Helicopters (NUH) to meet the Service's requirement. The SP model, which project is estimated at Rs 21,738 crore, envisages the indigenous manufacture of major defence platforms by Indian firms (SPs), in collaboration with a foreign original equipment manufacturer (OEM) for technologies and production expertise. Indian private defence manufacturers who have been awaiting progress of the NUH programme have reportedly been surprised by HAL's move, the public sector undertaking to submit two responses, one for an indigenous helicopter and the other for the Kamov 226T which is to be built by the Indo-Russian Helicopters joint venture.

Indian Navy's Rotary Guards

Kamov Ka-31 AEW helicopter

The Government of India has recently cleared the proposal for procuring an additional ten (or possibly 6) Kamov Ka-31 Airborne Early Warning (AEW) helicopters for aircraft carrier operations and deployment on various warships, the decision having been taken at a meeting of the Defence Acquisition Council (DAC).

The Indian Navy had first ordered four Ka-31 AEW helicopters in 1999 with a further five in 2001. The first batch entered service with the IN in April 2003, the second batch in 2005 plus another five in 2013. INAS 339 '*Falcons*' operates the type, with a fleet of 14 helicopters based at INS *Hansa* in Goa.

Powered by twin Klimov TV3117VMAR turboshaft engines (rated at 1,633 kW each), essential mission of the helicopter is long-range detection of airborne threats including fixed-wing aircraft and helicopters. Surveillance, target tracking and transmission of target data to command posts is carried out onboard the helicopter, thereby increasing the combat efficiency of associated naval units concerning interception of aerial threats plus Over-The-Horizon (OTH) strikes against at hostile units.

Airframe of the Ka-31 is based on the proven Kamov Ka-27 helicopter which has co-axially mounted contra-rotating main rotors. The distinctive antenna of the AEW radar either rotates when operational, or remains folded and stowed under the fuselage. The Ka-31 has a maximum take-off weight of 12,200 kg, the operating altitude being up to 3,500 m, with a patrol speed of 100km/h and operational range, with the antennas in the stowed position, of 600 km. The mission duration is two hours 30 minutes.

The key sensor, its E-801M Oko ('Eye'), AEW radar, was developed by the Nizhny Novgorod Radio Engineering Institute, the 6m² radar antenna stowed flat against underside of the fuselage until deployed.

The radar has 360° azimuthal coverage, the surveillance range against a fighter aircraft size target bring up to 150 km, while surveillance range against a surface ship is typically 100km to 200km. The radar is capable of simultaneously tracking 40 targets.

Sayan Majumdar
(Photos by Angad Singh)

IAI to unveil the Heron MK II at Singapore Airshow

Israel Aerospace Industries (IAI) will unveil the Heron MKII, a Multi Altitude Long Endurance (MALE) Unmanned Aerial Vehicle (UAV), at the upcoming Singapore Airshow 2020. The Heron MK II is an updated model of the Heron UAV, which is used by the Israeli Air Force and is operational with over 20 other organisations worldwide. Using the most advanced technologies developed by IAI to date, this UAV is a strategic and versatile aircraft capable of carrying diverse payloads. As a member of the Heron family, the Heron MK II has a significant appeal to Heron customers around the world as it operates under the same operational concepts. The operational concepts are based on the vast knowledge and experience gained by IAI in the field of UAV's for nearly 50 years of operation, more than 1,800,000 cumulative flight hours, and over 50 operational customers.

IAI follow-on agreement on MRSAM systems

Israel Aerospace Industries has entered an agreement for provision of complementary Naval MRSAM (Medium Range Surface-to-Air Missile) systems, the contracts entered with the Indian Navy and MDL Shipyard. Under the contract, IAI will provide complementary systems for a range of maintenance and other services for various sub-systems of IAI's advanced MRSAM systems. Earlier, the Indian Navy had recorded a significant milestone with firing of the MRSAM undertaken by the guided missile destroyers INS *Kochi* and *Chennai*, missiles of both ships controlled by one ship to intercept different aerial targets at extended ranges. The MRSAMs are fitted onboard *Kolkata*-class destroyers and are also to be integrated with future major warships of the Indian Navy.

FOC for HAL Jaguar DARIN III

Certifying agency RCMA (A/c) has accorded Final Operation Clearance for the HAL-built Jaguar DARIN III strike fighter. So far, three Jaguars have been modified at HAL Bangalore to DARIN-III standard and subjected to a series of ground and flight trials for the full navigation and attack capabilities. The upgrade incorporates new generation avionics systems including the in-house developed Open System Architecture Mission Computer (JD3MC), Engine and Flight Instrument System (EFIS) replacing traditional electro mechanical instruments, Solid State Video Recording System, INS/GPS System with GPS + GLONASS, Multi-Mode Radar, EW Suite, Autopilot and Glass Cockpit. Some 61 Jaguars are to be upgraded to DARIN III standard.

Collins Aerospace to provide FAA with HUDs

The US Federal Aviation Administration (FAA) has ordered a Head-Up Display (HUD) Virtual-Reality (VR) training device from Collins Aerospace Systems, a unit of United Technologies Corp., to be used in scientific research in areas such as pilot-HUD interface, pilot performance and crew workload. The HUD VR trainer provides a unique out-of-the-window view of what a pilot would actually see when flying with a HUD that uses Collins Aerospace's Head-up Guidance System (HGS) and Enhanced Vision System (EVS). The design of this VR device provides the FAA scientists a great deal of flexibility, efficiency and effectiveness in conducting research in the domain of advanced vision systems on HUDs.

Collins Aerospace provides HGS and EVS technologies to a variety of business, commercial and military aircraft operators. The technologies add an improved level of safety and confidence when flying at night, low visibility or adverse weather conditions. HGS and EVS can also help improve military mission success with tactical aircraft such as the C-130J, helping aircrew more accurately see drop zones, runways or other targets regardless of the conditions.

Elettronica Group and its EuroDIRQM

Elettronica Group and Indra have teamed up for development of a next generation Quantum Cascade Laser (QCL) based Direct Infrared Countermeasure (DIRCM) system for protection of rotary and fixed wing aircraft. Elettronica and Indra's plans are based on high level of their know-how and technological capabilities synergy with the aim to build an innovative DIRCM system, with proprietary technologies from several EU countries, to deliver a 'truly European self-protection solution fully ITAR-free to facilitate international commercialisation'. The system, first to be fully developed in Europe and one of the most advanced in the market, has been dubbed EuroDIRQM, to reflect its European roots and its application of QCL technology for DIRCM purposes.

The two companies have completed development of a first EuroDIRQM prototype system, with QCL operational ground tests successfully performed last year, with cooperation of the Italian Air Force. The EuroDIRQM is conceived as 'all-in-one' equipment usable for multi-platform and multi-mission that will provide self-protection capabilities to all kind of aircraft, from helicopters to transport/tanker to fighter aircraft.

"The EuroDIRQM solution will bring together about 30 years of combined experience in the DIRCM field by the two companies and the collaboration will benefit from their long term cooperation in other international successful programmes". Indra and Elettronica have successfully applied their DIRCM capabilities on different platforms and scenarios. The new QCL technology will expand Indra DIRCM capabilities, already consolidated with the InShield DIRCM system, contracted by OCCAR for the A400M fleet and operationally demonstrated in a CH-47 Chinook in 2017. In the same way, Elettronica DIRCM portfolio, with the ELT/572 DIRCM, contracted by Italian Air Force and operative on-board its C-130J aircraft, AW101 helicopters in Combat Search And Rescue configuration as well as operationally demonstrated in a C-27J in 2016, will also be enlarged with this QCL based solution.

MANPADS (Man Portable Air Defence Systems) are the main cause of military aircraft losses in conflict, and also pose an international threat and a global concern because of their proliferation and use by terrorist and uncontrolled groups.

DIRCM systems are self-protection airborne solutions to protect aircraft from heat-seeking missiles and are specially required for protection against MANPADS missile attacks. The concept is based on detection of the incoming threat during missile launch and countermeasures of the missile guidance using a directed laser beam that deviates trajectory of the missile. The process is quick and automatic, and the system reacts against attacks of any IR seeker with a jamming sequence that ensures successful countermeasures.

SU-30MKI

ONLY THE BEST

IRKUT
ИРКУТ

UAC member

www.irkut.com

Naval Group launches the 'Suffren'

Latest generation of nuclear submarines (SSN)

During a ceremony presided over by President of the French Republic Emmanuel Macron, Naval Group launched the *Suffren* in Cherbourg, the first of six nuclear submarines of this latest generation. This event is a key step for the *Barracuda* programme of the French Navy.

As Hervé Guillou, Chairman and Chief Executive Officer of Naval Group, stated, "We are proud to have presented to the President of the French Republic the first submarine of the *Barracuda*-class, a symbol of our exceptional know-how and our ability to master the most advanced technologies and the most complex products. The construction of the *Suffren* is a collective success, the result of a strong cooperation with our long-standing partners: the French Navy and the French Defence Procurement Agency (DGA), but also the Atomic Energy and Alternative Energies Commission (CEA), TechnicAtome and all the manufacturers of the sector.

Now, we are all focused on finalising the *Suffren* tests at the shipyard, with the start-up of the nuclear boiler room in the coming weeks, but also on producing the complete series. Maintaining our knowledge and adapting to new technologies are among our main priorities."

Vincent Martinot-Lagarde, Director of the *Barracuda* programme at Naval Group, also commented: "To successfully complete this extraordinary project, several thousand women and men worked together, driven by the same values of team spirit and technical excellence. Today, on the occasion of this exceptional ceremony, we are very proud to present our work, which is the result of the extraordinary diversity of our skills."

As a result of Naval Group's know-how and technological expertise, the *Suffren* is first of the *Barracuda*-class series, designed to replace the *Rubis*-class generation. Naval Group is in charge of the construction of this submarines series, including the design and construction of the ship and information systems as well as the manufacturing of the main components of nuclear boiler rooms.

Naval Group is the overall prime contractor of the ship's architecture and TechnicAtome is the prime contractor for the nuclear reactor. The French Defence Procurement Agency (DGA) is in charge of the overall programme, with the Atomic Energy and Alternative Energies Commission (CEA) responsible for the nuclear reactor.

Naval Group provides employment for more than 10,000 people involving some 800 companies. All the skills within the group are called upon to design and produce the *Suffren* and follow-ons of the *Barracuda* series. All Naval Group sites are simultaneously mobilised including Nantes-Indret, Angoulême-Ruelle, Brest and Lorient to design and produce different systems and modules.

The Ollioules site is responsible for design and production of the combat system. The entire programme is managed from Cherbourg, where the submarines are assembled and tested. The Toulon site is in charge of the maintenance of the *Suffren* and gradually that of the entire series. The in-service support was taken into account from the submarine's design stage to limit the number and duration of interventions, thus optimising the availability of the *Barracuda*-class at sea.

Certification imminent for Irkut's MC-21

Irkut Corporation (part of UAC) is the established OEM for MC-21 airliners and have been carrying out certification tests of this new aircraft. Three MC-21-300s are involved in the tests and by end of 2019, another aircraft joined the certification campaign. The Irkut Corporation envisages initially receiving the Russian type certificate with further validation by the EASA. Within framework of the validation process EASA specialists have already carried out a number of test flights with the MC-21-300, including those at various altitudes and speeds as required for commercial operations. During these tests, altitude of 12,500 metres, maximum speed of M=0.89, true speed of 949 km/h and flight duration of 6.2 hours were achieved, validating major design parameters and technological aspects of the airliner.

First public presentation of the MC-21-300 aircraft was at Paris Air Show 2019, with representatives of various airlines then having an opportunity to experience enhanced comfort of the passenger cabin. The MC-21-300's economy cabin offers comfortable seats 18" wide with an aisle of 22,5" which makes it easy to bypass a trolley during cabin service, thanks to the wide fuselage (4,06 m) of the aircraft. Another cabin option is to have a high density configuration to seat up to 211 passengers on 18,5" wide seats and aisle width of 19.6". The seat pitch in high density layout will be 28" in the forward section and 29" in the aft section of the cabin.

Such increased 'living space' not only enhances passenger comfort but the cabin pressure during cruise flight corresponds to an altitude of 6000 feet, which is currently only available in wide-bodied long range airliners while competing narrow bodies have that equivalent to 8000 feet altitude.

"MBDA ready to meet challenges of Europe's missile defence"

Council of the European Union has given "go ahead" to the TWISTER (Timely Warning and Interception with Space-based TheatER surveillance) capability project for implementation within the Permanent Structured Cooperation (PESCO) framework. This international missile defence project which already includes five European countries, seeks to develop, with support from the European Defence Fund, a European multi-role interceptor to address emerging threats and be brought into service by 2030.

This new endo-atmospheric interceptor will address a wide range of threats including manoeuvring ballistic missiles with intermediate ranges, hypersonic or high-supersonic cruise missiles, hypersonic gliders, and more conventional targets such as next-generation fighter aircraft. This Interceptor will integrate existing and future land and naval systems.

"MBDA is committed to meeting this need through next generation technologies and architectures building on national and company funded studies which have been conducted over the past five years. We will also draw on experience of industrial cooperation at European level, its long heritage of leading complex air defence programmes and its solid industrial relationships across the wider European landscape to establish a skills and capability led team", stated company officials.

The TWISTER project is the second missile systems project to be supported under the new European defence agenda following the Beyond Line Of Sight (BLOS) capability programme which became part of PESCO in November 2018 and for which MBDA has put forward its 5th generation ground combat system, the only solution under European design authority that gives front-line combat units the ability to fire beyond the direct line of sight while maintaining man-in-the-loop decision-making.

Serbia orders MBDA Mistral 3s

Serbia has signed a contract for the acquisition of Mistral 3 short-range air defence systems, becoming the 32nd customer country for the Mistral missile and the 10th country invited to join the Mistral user club. The contract is for the acquisition of missiles, launchers for dismounted soldiers, related equipment and logistics, and the provision of technical and material assistance for integration of Mistral missile on the PASARS vehicles of the Serbian Armed Forces. As the latest generation of Mistral family in service today, Mistral 3 features a very high resistance to infrared countermeasures and a capability to engage air targets presenting a low thermal signature, including missiles and UAVs.

Rafael's Typhoon Mk-30c

Rafael Advanced Defense Systems Ltd. is presenting its Typhoon Mk-30c, the newest member of the company's reputable Typhoon family of stabilised, small calibre naval guns. It benefits from the experience gained by Rafael over two decades of R&D greatly enhanced by actual experience of its customers. In this new product, emphasis was put on compact design, ease of maintenance, low Life Cycle Cost (LCC), and on extending the capabilities against the latest emerging aerial and asymmetric swarm attack threats.

Equipped with the highly-reliable ATK Mk44 Bushmaster 30 mm gun and its full complementary high explosive and Air Burst Munition (ABM), the Typhoon Mk-30c offers superior capability in defending against multiple threats in swarm attack scenarios.

The Typhoon Mk-30c incorporates an on-mount Electro-Optical Director with a state-of-the-art Fire Control System to optimise effective surveillance and engage threats in all weather conditions, day and night. Its high level of stabilisation and pointing accuracy, result in a high hit probability, even against small and fast maneuvering targets. The system can be operated 24/7 in surveillance mode, offering multi-mission capability to the ship.

The Typhoon Mk-30c fires all NATO standard 30x173 ammunition with adjustable rates of fire, from single shot, up to 200 rounds per minute. Its magazine holds 200 ready rounds on mount. With 70 degree elevation, coupled with ABM, the Typhoon Mk-30c can defeat small and medium UAS including the latest emerging drone threats.

Navantia at Defexpo 2020

Navantia is exhibiting the model of its S-80 submarine, the 'most advanced conventional submarine in the world'. After completion of the resistant hull of the S-81 '*Isaac Peral*' under construction for the Spanish Navy, that took place last December at Navantia's Cartagena facilities, the submarine is near completion. The next round of work will focus on activities leading to commissioning of the unit, following a formal and regulated process, based on safety milestones. This process begins with tensioning, when the submarine begins to receive electric current; then the batteries start up, to gain autonomy in power generation, and finally floating scheduled for October 2020 and then sea trials.

The S-80's main features are: length: 80.81m, width: 11.68m, draft: 13.69m, diameter: 7.30m, surface displacement / immersion 2,695 / 2,965t, accommodation: 32 crew + 8 special forces.

Conventional submarine of high autonomy, state-of-the art anaerobic propulsion developed by Navantia and Collins Aerospace, Extremely low acoustic signature, Excellent maneuverability at low speed, Systems with high automation, Next generation combat system, Air independent propulsion system (AIP) and a High complexity integrated design.

Navantia has been present in India since beginning of the *Scorpene* programme, being co-designer of the six *Scorpene* submarines and is also participating in the tender for future Indian LHD projects, being 'excellently' positioned thanks to the experience of having designed four units built for the Spanish, Australian and Turkish Navies, the last under a transfer of technology scheme.

Both products, submarine and LHD have been offered to the Indian Navy, under transfer of technology programmes, in association with local companies, so that they can be "Made in India". Navantia is committed to continue the collaboration with local shipyards which was started with the construction of *Scorpene*-class submarines, and still remain. Both projects represent state-of-the-art and technologically mature design solutions that will contribute to the creation of quality jobs in India and strengthen the capabilities of the Indian Armed Forces.

Courtesy: Navantia

Airbus showcases its range for India

Airbus is showcasing its military products and defence technologies here at Defexpo and their displays demonstrate its capabilities and commitment to 'kick-start a defence industrial base in the country'.

Airbus is showcasing its fleet of defence products at Stand S46, Hall 07. Visitors to the stand can find scale models of the C295 aircraft which is proven around the world as a tough, reliable and high-performance workhorse with 'outstanding lifecycle costs and excellent performance' on short or unpaved runways. Airbus has bid to manufacture the C295 in India together with Tata Advanced Systems. Visitors can also learn about the A330 MRTT, the new generation aerial refueller.

In addition, exhibits of the AS565 MBe Panther, the H145M and the H225M helicopters are on the display. Airbus has offered to build the Panther or the H145M in India under the government's Strategic Partnership (SP) model for the Naval Utility Helicopters (NUH) programme. The H225M has been offered as part of the Naval Multi Role Helicopter (NMRH) programme. Designed to cater to all the needs of India's armed forces, these helicopters would be produced in India in partnership with Mahindra Defence.

"Airbus is uniquely placed to participate in the ambitious growth journey of the Indian defence industry and will take it to new heights. Defexpo is a key platform to showcase our commitment to the country's ever-growing aerospace and defence needs," stated Anand Stanley, President & Managing Director, Airbus India & South Asia.

Airbus currently works with more than 45 suppliers in India and the annual procurement from them is worth more than $650 million. Airbus' network of Indian suppliers provides engineering and IT services, aerostructures and materials for several of Airbus' aircraft. Over 7,000 people, including 1,500 engineers, are currently employed across Airbus projects in the country.

Safran and MTU partnership on NGF engine

Involved with the FCAS (Future Combat Air System) programme, Safran Aircraft Engines and MTU Aero Engines have formalised their partnership to develop the engine for the next-generation European fighter aircraft NGF. This follows the Letter Of Intent (LOI) signed between the two companies in February 2019, which specifies that Safran will take the lead in engine design and integration, while MTU Aero Engines will lead the engine services. In the framework of the contractual scheme defined by France and Germany, Safran Aircraft Engines will be the prime contractor and MTU Aero Engines main partner for the first phase of Research and Technology (Phase 1A). The two partners also agreed on the foundation of a 50/50 joint venture that will be incorporated by the end of 2021 to manage the development, the production and the after-sales support activities of the new engine.

MKU introduces BPJs conforming to new BIS standards

MKU, a leading manufacturer of electro-optic devices and ballistic solutions recently participated in the India Defence & Security Expo (IDSE) 2019 at IIT Delhi organised by ASSOCHAM (Associated Chambers of Commerce and Industry). The objective of IDSE was to showcase India's capabilities, innovations and latest technologies in defence, as well as to hold discussions and deliberations on key issues with participation of all stakeholders. This is the first time there was the participation of Indian Defence Forces under Ministry of Defence and CAPFs under Ministry of Home Affairs together on a single platform.

Vaibhav Gupta (Director MKU)

MKU is focused on technological advancements and capacity building in line with the 'Make in India' initiative of the Prime Minister. While MKU products are already being used by 230 forces in over 100 countries, the company is focused on increased indigenisation to add multiplier solutions that enhance the night fighting capabilities and also provide a wider shield of protection to the soldiers, platforms and future soldier systems for the next gen soldier.

Prime Minister Narendra Modi has acknowledged industry efforts in boosting Defence Exports and exporting world class Made-in-India Bullet Proof Jackets to over 100 countries. As manufacturer/ exporter of Bullet Proof Jackets, MKU's Director Mr. Vaibhav Gupta, acknowledged that this has been made possible because of favourable policies of the current government.

Another laudable effort of the Government is the launch of India's own Body Armor Standards by BIS. The committee under the leadership of Dr. SK Saraswat was instrumental in promulgating the BIS standards IS 17051:2018 for Bullet Proof Jackets, making India the fourth country in the world to have its own standards for this product. Some major benefits of the new BIS Standards for BP Jackets are that it is based on Indian End User requirement and it is commonly being adopted by all forces including Armed Forces, CAPFs and State Police forces.

Australia Selects MQ-9B for Project Air 7003

General Atomics Aeronautical Systems, Inc. (GA ASI), has been advised that the Australian Government has selected GA-ASI's MQ-9B SkyGuardian variant to provide the Armed RPAS for the Australian Defence Force (ADF) under Project Air 7003. This follows the Government's announcement in November 2018 that GA-ASI would provide Armed RPAS to the ADF. The ADF expects to take first delivery in the early 2020s.

"We have worked closely with the ADF to determine the right RPAS to meet their needs," stated Linden Blue, CEO, GA-ASI. "MQ-9B will provide the all-weather, multi-mission support, and interoperability that the ADF requires. We look forward to working closely with our Australian industry partners to provide a highly capable RPAS to the ADF, while creating high-tech jobs in Australia."

The ADF joins other top-tier military forces in choosing a GA-ASI RPAS because of its proven multi-role combat performance. MQ-9B is part of GA-ASI's Predator series of RPAS, which is the world's most trusted and capable armed Medium-altitude, Long-endurance (MALE) RPAS, and hails from a family of aircraft that has flown more than six million flight hours.

The UK Royal Air Force (RAF) is acquiring the MQ-9B as part of its Protector RG Mk1 programme and is scheduled for first delivery in the early 2020s. The Government of Belgium has approved Belgian Defense to negotiate for the acquisition of MQ-9B to meet the nation's RPA requirements.

MQ-9B is provisioned for the GA-ASI-developed Detect and Avoid (DAA) system, which consists of air-to-air radar, Traffic alert and Collision Avoidance System (TCAS II), and Automatic Dependent Surveillance-Broadcast (ADS-B). The MQ-9B is built for all-weather performance with lightning protection, damage tolerance, and de-icing system.

GA-ASI announced its intention to offer a MALE RPAS to the ADF during AVALON 2017 with the launch of Team Reaper Australia, a robust group of Australian industry partners. The team currently consists of ten world-class Australian companies providing a range of innovative sensor, communication, manufacturing and life-cycle support capabilities including Cobham (lead industry partner), CAE, Raytheon, Flight Data Systems, TAE Aerospace, Quickstep, AirSpeed, Collins Aerospace, Ultra, and SentientVision.

GA-ASI 'Gray Eagle' ER Modernisation Contracts

General Atomics Aeronautical Systems, Inc. (GA-ASI) has teamed with the US Army to enhance the capabilities and survivability of the MQ-1C ER Gray Eagle Extended Range (GE-ER) Unmanned Aircraft System (UAS). The Army awarded GA-ASI multiple contracts to upgrade the Gray Eagle ER's avionics, datalinks and software in order to improve the UAS's operational capability in contested environments. The modernisation initiative provides an open architecture concept on the aircraft that is capable of hosting government-owned software, as well as increased autonomy required to support Scalable Control Interface and the rapid integration of long-range sensors. These enhancements will enable the Army's vision for Multi-Domain Operations (MDO).

Glass cockpit of HAL Dornier 228 unveiled

MoU Between HAL and Elbit Systems ISTAR Division.....

An MoU was signed between HAL and Elbit Systems ISTAR Division, Israel by Arup Chatterjee, Director (Engg. and R&D), HAL and Roy Zentner, VP (Business Dev. & Marketing), Elbit Systems in the presence of R Madhavan, CMD, HAL and senior officials from HAL and Elbit Systems.

The MoU is aimed at assessing the feasibility of a joint development of a Vertical Take-off and Landing (VTOL) Unmanned Aerial Vehicle (UAV) (Rotary UAV of 2000 kilo class) for maritime and land based military operations which caters to the domestic as well as the global requirements. "This will promote mutually beneficial cooperation between HAL and Elbit in terms of technology, manufacturing, marketing and maintenance of the UAV globally."

... and a second MoU with Elbit for Digital Head-Up Displays

HAL has signed an MoU with Elbit Systems for promoting and marketing Digital Head Up Displays (HUD) units. The MoU was signed by Arun Krishna, General Manager on behalf of HAL and Roy Zentner, VP (Business Dev. & Marketing), Elbit Systems.

The MoU envisages extending cooperation for new HUD technologies and promote Digital HUD to the Indian Defence Services and other potential customers. The digital HUD would incorporate new features like Wide Instantaneous and Total Field of View with Minimal Binocular Disparity, Large Eye Motion Box and Digital Image Source for increased pilot's situational awareness. The HUD system is also compatible with Night Vision Imaging Systems having improved maintenance features.

FLYING HIGH THE COLORS OF INDIA

DEFEXPO, LUCKNOW 5-8 FEB, 2020

PEMA ZIM © Dassault Aviation - S. Randé

www.rafale.co.in

OVER 60 YEARS. 6 AIRCRAFT TYPES. 1 NATION

TOOFANI | MYSTERE IV | ALIZE | JAGUAR | MIRAGE 2000 | RAFALE

RAFALE INTERNATIONAL

DASSAULT AVIATION • SAFRAN • THALES

BAE Systems' IFV CV90 tested with Rafael's SPIKE LR missile

BAE Systems has fired an integrated, long-range anti-tank guided missile from the CV90 Infantry Fighting Vehicle in a recent series of tests. "This advancement further diversifies the CV90's operational capabilities on the battlefield by enabling indirect fire at long distances or at air targets, boosting the vehicle's lethality while increasing crew safety." The testing, which took place in difficult arctic conditions, used a Rafael Advanced Defense Systems' Spike-LR (long range) missile mounted on a BAE Systems Hägglunds' CV90 to destroy a target at more than 2,000 metres. The exercise marks the first time an integrated version of an anti-tank guided missile has been launched from the CV90, and also demonstrates the platform's versatility to perform a wide range of missions, to prove that the CV90 can adapt to new technologies for meeting current and future customer needs.

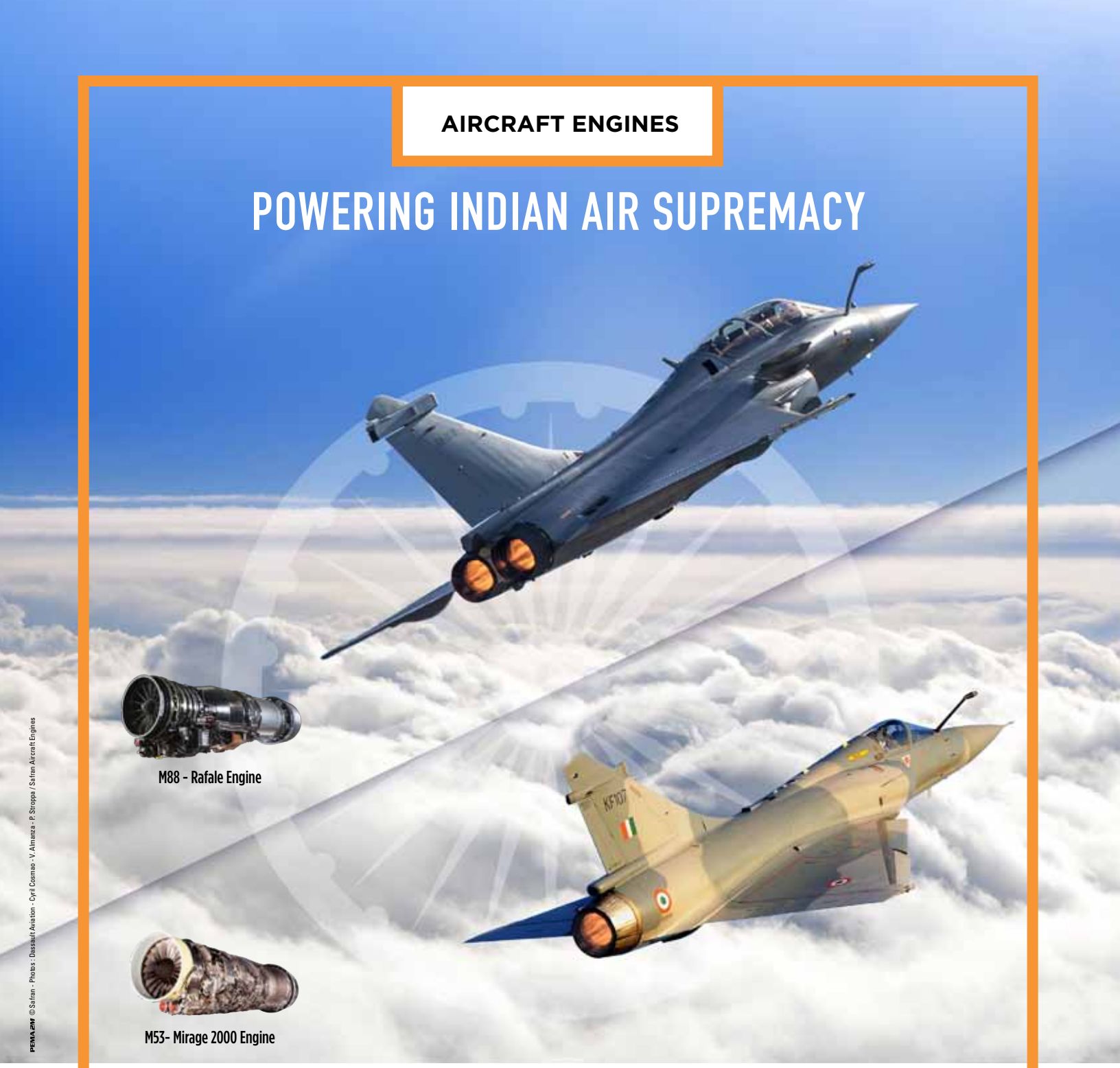
The long-range missile testing is another recent example of improved lethality on the CV90. BAE Systems is currently executing a Swedish government contract to provide a mortar variant of the CV90 called *Mjölner* that adds greater mobility to close indirect fire support. More than 1,200 CV90s of numerous variants are in service with Denmark, Estonia, Finland, Norway, Sweden, Switzerland and the Netherlands. The vehicle has a combat-proven track record and is designed to accommodate future growth to meet evolving missions.

BAE Systems contract for US Navy guided-missile cruiser modernisation

BAE Systems has received a $175 million contract from the U.S. Navy to modernise the guided-missile cruiser USS *Vicksburg* (CG 69). BAE Systems initiated the first phase of *Vicksburg's* modernisation programme in May 2017. Under the new contract, the shipyard's employees and industry partners will work on the ship's weapons and engineering equipment, including its gas turbine propulsion system; restore crew habitability spaces, and support the installation of a new Aegis combat system, communication suite and CANES (Consolidated Afloat Network Enterprise System). The *Vicksburg's* MODPRD is scheduled to be complete in July 2021, and the ship with rejoin the operational fleet thereafter.

AIRCRAFT ENGINES

POWERING INDIAN AIR SUPREMACY



M88 - Rafale Engine

M53- Mirage 2000 Engine

PEMA-2147 © Safran - Photos : Dassault Aviation - Cyril Cosmao - V. Almanza - P. Stroppa / Safran Aircraft Engines

Safran Aircraft Engines is a complete engine manufacturer, with proven expertise in the technologies underpinning the M88 and M53 engines that power the Rafale and Mirage fighters deployed by the Indian Air Force. A major player in Indian industry, Safran's comprehensive know-how powers the country's air supremacy and makes us an excellent fit with the open and collaborative attitude of the Make in India program.

safran-aircraft-engines.com
: @SafranEngines
: Safran

SAFRAN

Published By

Vayu Aerospace Pvt. Ltd.
E-52, Sujan Singh Park,
New Delhi 110 003 India
Tel: +91 11 24617234
Fax: +91 11 24628615
e-mail: vayuaerospace@lycos.com
e-mail: vayu@vayuaerospace.in

Amit Sharky, General Manager, IAI India Pvt. Ltd and Lital Ben Ari of IAI at their stand

Familiar sight at every DefExpo: the Vayu Dailies are distributed throughout the Show by the brightly-attired Vayu team, extensively and exhaustively!

Adding cheer to the Show are Ashmita, Amrita and Swetha!

The latest generation **engine** for latest generation **fighter aircraft**

The demands of military aviation in the 21st century leave no room for compromise – or outdated solutions. With cutting-edge technology and unrivalled build quality, the EJ200 has proven time and again to be the best engine in its class. The EJ200's inherent capacity for growth can deliver even more technological advances that can be realised in a joint partnership approach. To find out how our market-leading design and unique maintenance concept ensures that your air force will be able to fulfil its operational requirements and achieve the most value long-term, visit us at www.eurojet.de

The EJ200: Why would you want anything less?

EUROJET

Power. Precision. Performance.

ROCKETING PAST THE RANGE GAP

70-100 km range with no modifications to the gun

Nammo is the world's leading provider of range extension technologies for artillery. From base bleeds to ramjets, we give you the range you need to conquer any mission. At DefExpo this year, we are exhibiting our latest rocket-assisted projectiles (RAP), which are currently on offer to the Indian Army.

Visit us at DefExpo, hall 3, stall number S13 to learn more

www.nammo.com

Nammo

SECURING THE FUTURE