2019
AERO INDIA
SHOW DAILY
22 February 2019
VAYU Day 3

Flying the Flag !

Indian Army Chief endorses HAL's LCH

The Army Chief, General Bipin Rawat, flew the Light Combat Helicopter (LCH) on second day of Aero India at Air Force Station, Yelahanka, the helicopter piloted by Wg Cdr S John, HAL's Test Pilot.

Terming the sortie in LCH as "an experience of life time", he said the LCH is suitable for the Army to take on adversaries in any terrain and different altitudes. Mr. R. Madhavan, CMD, HAL, Mr. G.V.S Bhaskar, CEO (Helicopter Complex), Wg Cdr, Unni Pillai, HAL's Chief Test Pilot (Rotary Wing) and other senior officials from the Army had a briefing session with the Chief before the sortie.

Dr.VK Saraswat of NITI Aayog meeting with Dr. Agung Nugroho, President of RAI , Indonesia at the International Seminar on Civil Aviation : Regional Air Connectivity which was held as part of Aero India 2019 , on 21 February

Dawn of India's new regional airliner programme

In an International Seminar on Civil Aviation, with the theme "Regional Air Connectivity" organised by the Indian National Academy of Engineering as part of Aero India 2019, various luminaries of the past and present spoke about air transportation trends and implications for regional air services in India.

Chaired by Prof. Roddam Narsimha , the session included a key note address by Dr. Kota Harinarayana, regarded by many as "Father of the LCA" and now advisor to CSIR-NAL. He spoke on the challenges and opportunities of the next generation turboprop airliner development, now identified as the RTA 70.

Various other sessions included a presentation by Dr. Agung Nugroho, President Director Regio Aviasi Industri of Indonesia on their R 80 turboprop regional airliner. There were key inputs from senior executives of SpiceJet and Indigo airlines who articulated on their vision for the next generation turboprop airliners.

Cont'd on page 3

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saab.com/region/india/gripen

SAAB

Boeing to accelerate growth in India's defence sector

Boeing presented its strategy and plans for 'Make in India' and also offered advanced capabilities to the Indian armed forces at Aero India yesterday. At the core of strategy is Boeing's public-private partnership with HAL and Mahindra, expected to produce next generation F/A-18 Super Hornet fighters in an entirely new 'factory-of-the-future' in India, delivering performance, affordability, and indigenisation for Indian customers. The partnership will create jobs, industrial capacity and a globally competitive Indian supply chain. " With multi-role capabilities, advanced technologies, growth potential and low acquisition and sustainment costs, the combat-proven F/A-18 is a clear choice for the Indian Navy and the Indian Air Force. Introduced in 2007, the Super Hornet is the world's leading fighter aircraft, highly capable across the full mission spectrum and continually evolving to outpace future threats", stated company officials.

In addition, Boeing laid out its future defence plans proposing the KC-46A aerial refueler, AH-64E Apache attack helicopter, additional P-8 long-range maritime reconnaissance/anti-submarine aircraft, and the twin-engined Airborne Early Warning and Control (AEW&C) aircraft.

Left to right: Sunil Velagapudi, president (acting), Boeing India; Thomas Breckenridge, VP, International Sales, Strike, Surveillance and Mobility, Boeing Defense, Space & Security (BDS); David Koopersmith, VP & GM, Vertical Lift, BDS and Michael Koch, vice president, Boeing Defense, Space & Security (BDS), India at the Boeing F/A-18 Super Hornet 'Make in India' press conference at Aero India

Cont'd from page 1

The concluding panel discussion on "Ecosystem of Manufacturing of Civil Aircraft in India" was chaired by Prof. K. Vijay Raghavan, Principal Scientific Advisor to the Government and had among its panel members Dr. Abhay Pashilkar of NAL, Mr. Appasaheb Malagaudanavar, GM-ARDC of HAL, Ms. Vandana Aggarwal of MOCA, Mr. Nigel Garner of Hawksland and others.

Development of the proposed Indian regional transport aircraft has been accorded priority by the government, with the Civil Aviation Minister having announced this programme in Parliament several months back.

Presentation on the new generation R.80 regional airliner to India's aviation community at Bangalore

Army Chief General Bipin Rawat with Loïc Piedevache, Country Head, India, MBDA Group at their Stand AB.2.23 during the airshow

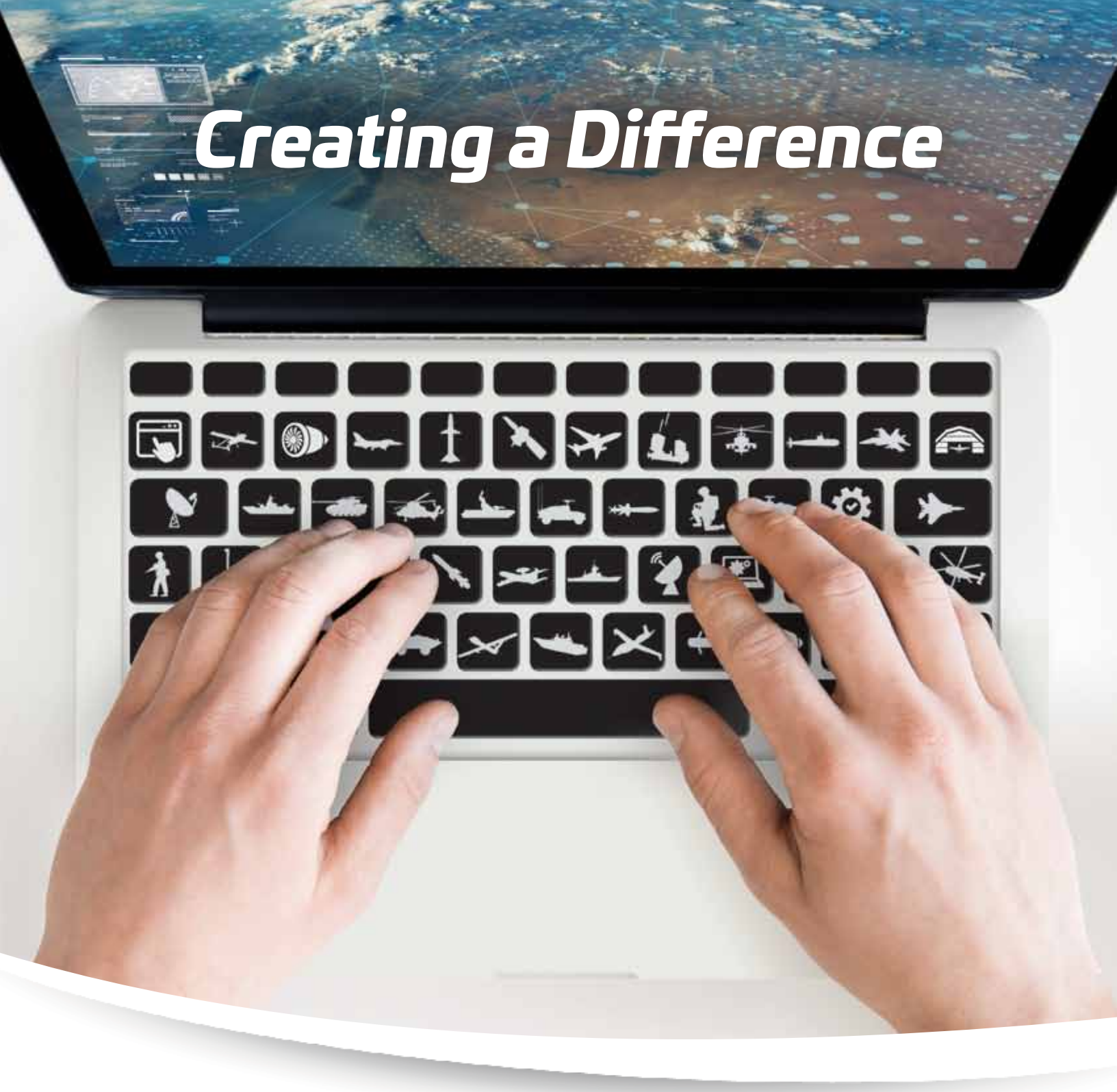
Alpha Design Technologies in big Elbit order

Bezhalel Machl, President & CEO, Elbit Systems Ltd., handed over the first export order worth a million dollars and which is expected to grow to millions of dollars in the next 4-5 Years to Col. H. S. Shankar, VSM (Retd) Chairman & Managing Director, Alpha Design Technologies, Bangalore at Alpha's Stall yesterday. Mr. Bezhalel Machl said that ELBIT had chosen Alpha Design as their technology and production partner for manufacturing of New Generation of Jammer Power Amplifiers needed by Elbit's company Elisra to meet worldwide requirements. This will later meet Indian needs also. Col. Shankar said it was a pleasure for Alpha to work with Elbit in this high Technology area and it would cement the close relationship between Alpha and Elbit as well as India and Israel.

Boeing discussions with Mahindra Defence Systems (MDS) and HAL

Boeing held discussions with its partners, Mahindra Defence Systems (MDS) and Hindustan Aeronautics Limited (HAL), on the proposed F/A-18 Super Hornet 'Make in India' plan at Aero India 2019 yesterday. The partners are developing comprehensive plans to set-up a new "**factory of the future**" to manufacture Super Hornet locally. The programme is expected to work with several Indian suppliers to grow a thriving defence aerospace base which could accelerate other programmes. The facility will create a world-class, highly trained aerospace workforce. "This **unique public-private partnership** is intended to bring Boeing, HAL and MDS' global scale and supply chain, its best-in-industry precision manufacturing processes, as well as the unrivalled experience in designing and optimising aerospace production facilities to expand India's aerospace ecosystem and help realise the 'Make in India' vision" stated officials.

From left to right: SP Shukla, Chairman & MD, Mahindra Defence, Jeff Shockey, Vice President, Global Sales & Marketing, Boeing Defense, Space & Security, and R Madhavan, Chairman and Managing Director, Hindustan Aeronautics Limited, at the Boeing booth



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Saab MoU's for Gripen Aerostructures

Saab has taken another important step forward to expand its footprint and aerospace ecosystem in India by signing new Memorandums of Understanding (MoUs) with three of the country's leading aerospace manufacturers; Dynamatic Technologies Limited, CIM Tools Private Limited and Sansera Engineering Private Limited.The MoUs with CIM Tools and Sansera expand the existing working relationships with Saab on commercial aerostructures to the Gripen fighter and other defence-related products in the Saab portfolio. The MoU with Dynamatic is a starting point to explore future joint opportunities in commercial and defence-related aerostructures work, including Gripen.

"Saab's Aerostructures business unit has had a successful relationship with CIM Tools and Sansera for several years. Based on that experience we see these two companies can add great value to our Gripen 'Make in India' offer," stated Mats Palmberg, VP Industrial Partnerships and Head of Gripen for India. "The MoU with Dynamatic adds the capabilities of complex airframe assembly to Saab's 'Make in India' offer for Gripen," continued Palmberg.

"I am pleased that the fruitful co-operation we have established over several years with CIM Tools and Sansera can be further developed for the Gripen fighter. The MoU with Dynamatic has the potential to further develop our ecosystem for commercial aerostructures as well as Gripen," noted Lars Jensen, Managing Director and Head of Saab Aerostructures.

IAI Unveils New Loitering Munition- Mini Harpy

Israel Aerospace Industries (IAI) has unveiled the 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 being displayed for the first time at the Aero India Exhibition. 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 loitering missiles are launched towards the target area. They loiter the sky until the threat is detected. Upon detection, the systems locks in on the threat and attacks it for a quick, lethal closure. 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 approx. 8 kg, operates in mission range of 100 km for duration of two house and 45 kg in weight.

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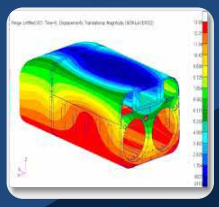


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Controp to Equip Asian Coast Guard with the iSea EO/IR systems

Lori Erlich and Rajat Lodha of Controp

Controp Precision Technologies Ltd., a company specialising in the field of electro-optics (EO) and infrared (IR) defence and homeland security solutions, announced Aero India 2019 that it will equip an Asian country's Coast Guard with its advanced iSea EO/IR maritime surveillance payloads. The systems will be deployed on several maritime vessels beginning in 2019 for territorial water protection missions. The easy-to-install, easy-to-operate systems include a long-range thermal camera, a high definition (HD) visible surveillance camera, and an eye-safe laser range finder (ELRF). In addition, the system features advanced image processing and video enhancement algorithms, automatic video tracker (AVT) and an automatic gain control (AGC).

The iSea system features a unique and stabilisation technology that enables a continuous and uninterrupted line-of-sight (LOS) to ensure clear pictures, even in the roughest of seas. This system can withstand the harshest environmental conditions including fog, salinity and moisture. The iSea system offers a full solution for naval maritime operations that easily interfaces with other on-board systems, including vessel radar systems, to provide slew-to-cue functionality.

Esterline displays its latest Korry and Mason products

Esterline Corporation, a global leader in defence and aerospace technologies is displaying its latest Korry and Mason products at Aero India this year. Products include the Korry 389 switches - Quick Switch programme, Mason's Harm's Way Controllers (HaWC), Korry Utility Control System (UCS) touchscreen display technology and Mason Flight Controls.

Stephen Burn, Esterline Control and Communication System's Senior Director, Marketing & Business Development, speaking on behalf of Esterline at Aero India for the first time, stated, "I'm delighted to be in Bangalore for Aero India 2019, the premier air show in the region. Esterline has a long-term commitment and footprint in India and we're looking forward to reinforcing our strong position in the Indian market."

Korry Utility Control System

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IAI: Drone Guard to protect Critical Sites

As Unmanned Aerial Systems (UAS) and drones become more common in our daily life, they also become potential threats. Whether used by innocent enthusiasts to snoop into a local airport, smuggle drugs or weapons into a prison, or laden with explosive on a terrorist attack, drones are regarded as potential danger for certain critical assets and secured locations. However, the means available to regulate and control drone access to protected areas are limited.

Small, slow and low flying vehicles multirotor drones are hardly spotted from the ground by radar, camera or the human eye. When spotted over sensitive areas such as airports, drones can cause significant disruptions – as the three-day closure of London Gatwick in December 2018 showed. Such incidents make it clear that authorities need new tools to regulate and enforce drone restrictions so on to ensure public safety, security and privacy.

Israel Aerospace Industries' (IAI) operationally proven Drone Guard counter-UAS system meets such needs. The latest version has been optimised for operation in high security environments such as airports, prisons and strategic infrastructures. As a system integrating multiple sensors to detect, classify, identify and track drone targets, the Drone Guard employs a multi-layered approach to manage drone activity and neutralise those suspected to be dangerous or hostile.

When protecting a secured site such as an airport or other highly secured facility, Drone Guard can be controlled from the operations centres. The system's sensors and effectors may be located in multiple outposts, in fixed or temporarily locations covering the entire premises. Deployment of multiple units enable operators to employ electronic means to effectively jam and 'takeover' or "spoof" suspected drones using low power effectors, thus minimizing the potential of electromagnetic interference. Such an array monitors the entire secured area, both inside and out, effectively detecting and locating drone activity immediately as it appears and even locates their operators beyond the protected perimeter. Such systems also track the activity of drones authorised to operate inside protected areas.

The system relies on radar and Communications Intelligence (COMINT) as the means to detect drone activity in and around the protected area. Some types of radars can even track hovering drones, or drones being prepared for takeoff, by the unique signature emitted by their rotors. The radar used for the Drone Guard is the ELTA ELM-2026B X-band radar, as first line of detection which is robust, based only on the drone movement and not on radio transmission. The radar detects targets in all weather conditions.

The passive COMINT is used to detect and classify drone activity by electromagnetic signals emitted from the drone and ground control units. Based on advanced techniques derived from military systems, Drone Guard intercepts and interprets both familiar signals from commercial systems as well as unfamiliar signals of hacked drones. Drone Guard's COMINT detects such signals from several kilometres, including in situations beyond the line of sight of EO and radar sensors.

Once the drone presence is verified, the radar directs the Electro-Optical (EO) system to identify it, this being the Drone Guard's third sensing channel, to visually verify a target and track it within the line of sight. As a passive sensor, EO can track targets that have minimal radar reflection and no electromagnetic signature.

Electronic countermeasures are basically used against drone's control and navigation channels, using different protocols to 'fend off' from the guarded premises or bring it down safely using cyber 'takeover' and spoofing methods. In a civilian environment the use of electronic countermeasures, such as GPS or communications jamming is restricted, as it may jeopardise air traffic safety, other counter-UAS measures are employed. In such events Drone Guard supports various 'Hard Kill' measures, such as net guns and firearms, having special sights to effectively engage drones when they are in sight.

Employing the latest software defined electronics to provide an agile and adaptable C-UAS platform sets Drone Guard apart from numerous C-UAS systems available in the market. Based on operational lessons learned ELTA has tailored Drone Guard to address a wide range of applications, from relatively simple deployments monitoring and alerting drone activity in a civilian area to conduct military C-UAS missions within a challenging electromagnetic environment, Drone Guard is best prepared to counter present and evolving threats and endure the most challenging situations.

Courtesy : IAI

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MMP

MBDA at Aero India 2019- Part 2

MBDA is exhibiting a full range of missiles and missile systems at **Stand AB.2.23** designed to provide next generation air combat capabilities, including air dominance, strike and maritime engagement, for the Indian Air Force.

Aero India 2019 is also the first Air Show where L&T MBDA Missile Systems Ltd, the joint venture with Larsen & Toubro, are exhibiting. L&T MBDA Missile Systems Ltd are at **Stand AB.2.24.**

Yesterday we covered their air launched weapons, so today we shall talk about the MMP and naval weapons!

MMP is the only fifth generation anti-tank missile available in the world, and it has been designed for dismounted infantry as well as for integration on combat vehicles. MMP is unique in featuring both fire-and-forget and operator-above-the-loop operation, and being network-enabled MMP can also receive third party target designation for indirect firing scenarios. The technologies pioneered in MMP will be further developed by **ATGM5** in India for the specific operational requirements of the Indian Armed Forces.

EXOCET probably ranks as the world's best known anti-ship missile. It is known in India where the submarine variant, SM39, has been delivered to the Indian Navy to arm its Scorpene submarines (Project 75). The AM39 version can be launched from Maritime Patrol Aircraft, strike fighters such as the Rafale as well as medium to heavyweight helicopters. Features such as low signature, sea-skimming flight at very low altitudes, late seeker activation, enhanced target discrimination and ECCM combine to make this a redoubtable weapon indeed.

Sea Ceptor is the next-generation, ship-based, all-weather, air defence weapon system. Through the use of new advanced technologies, Sea Ceptor provides complete protection against all known and projected air targets including saturation attacks across 360° simultaneously. Sea Ceptor 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.

MARTE is a family of fixed and rotary wing and ship-launched anti-ship missile weapon systems designed to meet operational requirements in complex littoral environments and blue water scenarios. At Aero India 2019, MBDA is displaying MARTE ER, the latest addition to the family. The high sub-sonic MARTE ER is equipped with a turbo-jet engine giving it a range of well over 120 km, thus enabling it to engage enemy vessels well over the horizon.

MBDA will also be displaying its **NCM** (Naval Cruise Missile). This very long-range surface attack stand-off cruise missile is designed to attack deep into enemy territory. Given its range, it will provide navies and surface and sub-surface vessels with the ability to maintain a prolonged dissuasive force in theatre unlike an aircraft launched missile.

Rafale in flight with the Exocet AM39

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

Boeing F/A-18: "Made For India; Made With India"

The combat proven F/A-18 Super Hornet will deliver on India's need for a carrier and land based multi-role fighter – outpacing threats, bolstering defense capabilities and make India stronger for decades to come.

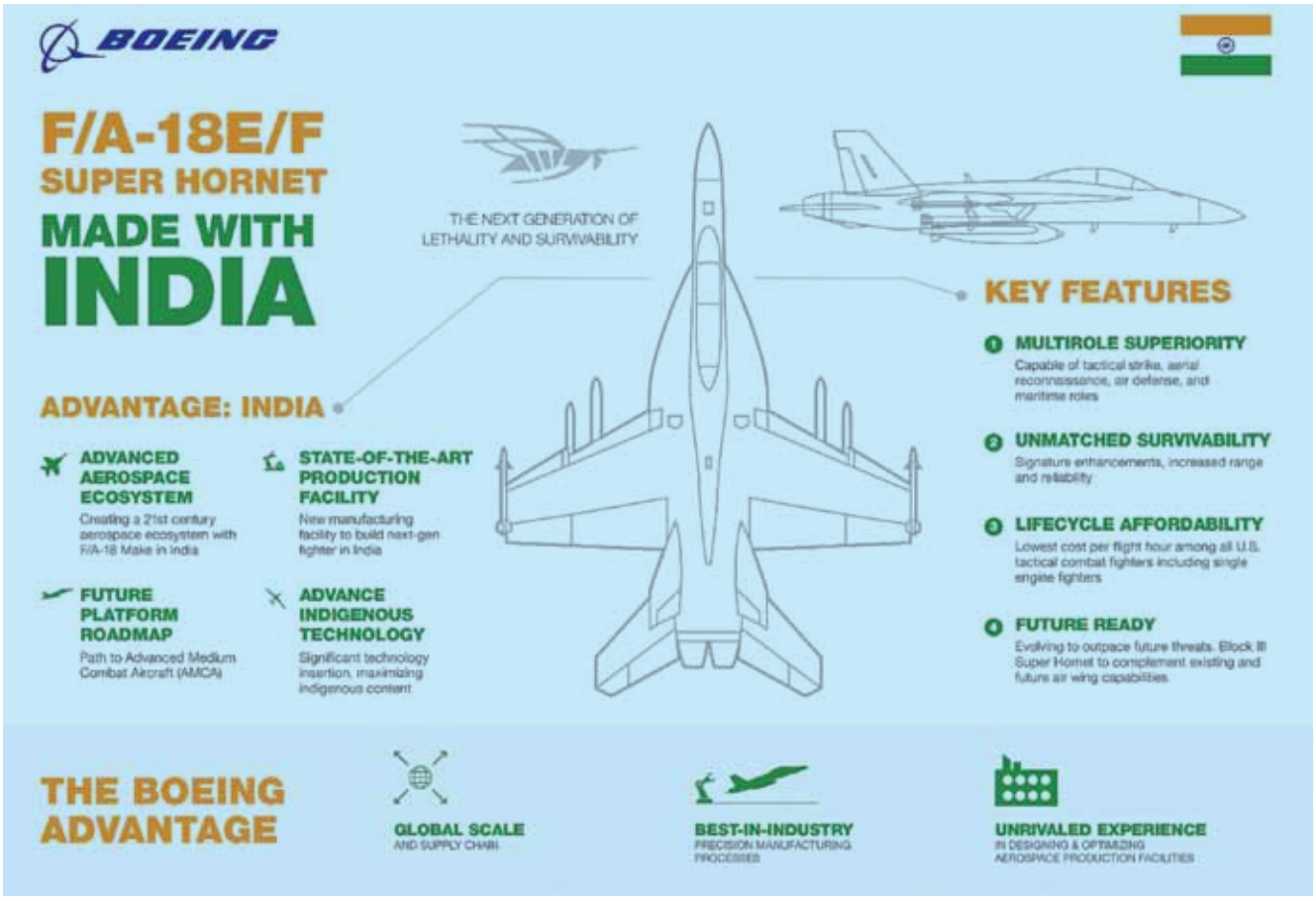
Best Capability for the Indian Navy and Indian Air Force

One look at the decks of United States Navy's aircraft carriers and the Royal Australian Air Force's fleet and you'll see advanced, combat-proven strike capability. The Super Hornet is the multi-role solution for the Navy and international air force customers. The Royal Australian Air Force operates 24 Super Hornets and 12 Growlers.

As the most advanced multi role fighter, with advanced survivability, room to grow and least expensive aircraft per flight hour of its kind, the F/A-18 Super Hornet will deliver on India's need for a carrier and land based multi-role fighter. The Super Hornet does not only have a low acquisition cost, but it costs less per flight hour to operate than any other tactical aircraft in US forces inventory, including single engine fighters. With a plan for constant innovation, the F/A-18 Super Hornet will outpace threats, bolster defense capabilities and make India stronger for decades to come. Boeing's Super Hornet is combat proven and defined to meet the U.S. Navy's flight plan so that it continues to evolve to outpace future threats. The Super Hornet will be on the Navy's carrier decks for decades to come– being three-fourths of the Navy's strike fighter capacity into the 2030's and no less than half the carriers striking force into the 2040's.

Best Path to AMCA

The Super Hornet brings the latest generation of technologies to the warfighter. With designed-in stealth and robust capability growth plan, the Super Hornet is the best aircraft to get to India's Advanced Medium Combat Aircraft (AMCA) programme. The F/A-18 Super Hornet has a long life ahead, with the US Navy making significant investments in the latest evolution, the Block III. Key features of the US Navy Block III Super Hornet include



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enhanced network capability, longer range and low-drag with conformal fuel tanks, long-range detection with Infrared Search and Track, enhanced situational awareness with a new Advanced Cockpit System, improved signature reduction and a 9,000+ hour life.

Best for Make in India

The Super Hornet Make in India proposal is to build an entirely new and state-of-the-art production facility that can be utilised for other programmes like AMCA. Boeing is prepared to bring its global scale and supply chain, its best-in-industry precision manufacturing processes, as well as the company's unrivaled experience designing and optimizing aerospace production facilities to both expand India's aerospace ecosystem and help realise the Make in India vision. The approach addresses the infrastructure, personnel training, and operational tools and techniques required to produce a next gen fighter aircraft right here in India.

Boeing is deeply committed to expanding its industrial partnership for producing Super Hornets in India, further developing the country's aerospace ecosystem. Boeing will work closely with Indian industry to ensure they have the very latest technologies, applying lessons learned from the current Super Hornet production line.

Boeing believes India has demonstrated its potential in aerospace platform development and manufacturing and has a base to build upon. Boeing has been working with suppliers in India for over two decades in manufacturing, IT and engineering services and Indian companies are integrated in our global supply chain. Today, more than 160 suppliers provide parts and assemblies covering commodities such as aerostructures, wire harness, composites, forgings, avionics mission systems, and ground support equipment.

Boeing will work closely with India industry to ensure they have the very latest technologies, applying lessons learned from the current Super Hornet production line. The programme envisages transitioning airframe and subsystem manufacture to Indian industry in a deliberate way, representing extraordinary opportunity for technology insertion and growth within India's aerospace industry.

Boeing will partner with Indian industry to develop the right capabilities as efficiently and cost effectively as possible to integrate these suppliers into the global supply chain. Boeing and its current industry partners are having robust discussions with suppliers in India about building Super Hornets. We have talked to over 400 Indian companies as part of our partner evaluation process for various systems and subsystems of Super Hornet.

Courtesy: Boeing

Thales's commitment to 'Make in India' and defence modernisation

With a focus on "Make in India", Thales is reaffirming its commitment towards the development and modernisation of the Indian Armed Forces. Through a series of demonstrations, Thales is showcasing cutting-edge capabilities across civil and defence aerospace at its booth AB2.21.

"As a major player in the Indian defence and aerospace sector, Thales has been continuously supporting the Indian armed forces and the government's flagship 'Make in India' programme. Thales has a rich experience in liaising with numerous local players who are part of its global supply chain. It takes pride in onboarding Indian solutions in several worldwide product lines and creating employment opportunities for hundreds of people. The solutions being developed through several Indian companies – joint venture partners, global supply chain partners are under the spotlight at Thales' stand here at Aero India. Aero India is a prestigious event providing us with an opportunity to showcase how our word-class technology and solutions help our customers achieve their big ambitions. This year, we would also take a step further and present our efforts supporting the "Make in India" initiative of the Indian government. We would have solutions being manufactured in the country through our local partners – global supply chain partners and joint ventures, among others. In addition, we are also highlighting our hiring plans, and skilling and upskilling endeavours through our presence at the Aero Skills Pavillion this year", stated Emmanuel de Roquefeuil, VP and Country Director, Thales in India.

Thales' strong innovation capabilities prepare its customers to achieve their big ambitions and master every decisive moment. The company has been on the cutting edge of connectivity and a driving force in the digitalisation of the defence, aerospace and space markets. At Aero India, the Thales stand is highlighting all these efforts and providing an insight into its high-technology solutions across airborne solutions, air defence, radars, optronics, radio communications, among others through special digital experiences. Some of the main highlights at Aero India this year is the Thales' optronic pod - TALIOS; latest generation mini-UAS - Spy'Ranger; high-velocity missile - STARStreak; tracking and illumination radar - STIR; airborne rockets and a range of products from Radio Communications among others.

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The Gripen Smart Support Solution

The Gripen is a unique fighter system, bringing 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 was 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 small and very limited resources, but at the same time placed in 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.

Efficient support solution

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

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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 Gripen 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.

Gripen requires a minimum of resources

Gripen's support system allows for a very low logistic footprint. It comes with extremely efficient special to type multi-functional tools and other smart equipment to make sure that availability is maximized at all times. All its equipment is also deployable in remote areas. For aerial engagement, turnaround, including refueling and rearming, is done in less than ten minutes using only one technician and five conscript mechanics, with only ten weeks of training necessary.

As an example, two Gripens on a two week outstation detachment, require only that equipment which fits into a standard 20 feet container. Change of complex avionics (e.g. the radar) or an engine replacement can be carried out within one hour, with no fixed installations needed. The auxiliary power unit makes the Gripen self-sufficient for startups, and the aircraft can land or take-off using a road strip of 800x16 m rather than an average runway of 2,400x45 m.

Finally, the Gripen is fully NATO compatible.

Check list

- ✓ **Gripen's high availability leads to greater operational effect**
- ✓ **Gripen's reduced logistic footprint makes it extremely suitable for deployed operations**
- ✓ **Gripen's support solution is efficient, cost effective and Tailored to customer operational requirements**
- ✓ **Gripen's life cycle cost is the lowest of all comparable fighters**

IAF C-17s in Rapid Airlift effort

In an effort to evaluate its own 'Rapid Airlift Capability' and to enhance crew currency in the role, Western Air Command of the IAF, recently airlifted a record 463 tonnes of load from its airbase at Chandigarh to airfields and drop zones in the Ladakh region, in a single wave. The effort was accomplished with the aid of a fleet of 16 fixed wing transport aircraft comprising of C-17 Globemaster, the Ilyushin-76 Gajraj and the medium lift tactical aircraft, Antonov-32. All aircraft were loaded and took off from Chandigarh airbase early in the morning. The entire wave was accomplished in little less than 6 hours. Airlift of approx. 500 tonnes, in the achieved time frame, in a single wave, happens to be a record which enhances the assessment of the Commands' capability towards rapid and heavy airlift. The command is entrusted with the air maintenance of the entire northern region of the country and under normal operating circumstances airlifts close to 3000 tonnes of load per month. "Rapid air mobility is a key component of modern warfare. This assumes greater significance in short and intense wars. This is very true in India's context, especially when related to air mobility to airfields in the Ladakh region. With a wide spectrum of military transport aircraft in its inventory the IAF today has a credible airlift capability which has provided succour on numerous occasions when the nation was struck with natural calamities," stated Air Marshall NJS Dhillon AVSM, the SASO of Western Air Command, under whose direction the effort was achieved.

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Boeing : "Partnering the Indian Air Force's modernisation drive"


Boeing's C-17 Globemaster III in IAF service

For over 75 years of its 100-year legacy, Boeing has been a strong partner of the Indian armed forces. Boeing's relationship with India on the defence front goes back to the 1940s, when the Indian Air Force inducted two Boeing aircraft: the T-6 Texan, or Harvard made by North American Aviation, and the C-47 Skytrain military transport, a military variant of the DC-3, made by McDonnell Douglas.

Boeing has been providing robust services and support packages to the Indian Air Force's C-17 Globemaster III fleet and the Indian Navy's P-8I force. The GISP "virtual fleet" arrangement ensures mission readiness by providing all C-17 customers access to an extensive support network for worldwide parts availability and economies of scale. The C-17 GISP is a system-level partnership, where the customer pays for readiness, rather than specific parts or services.

Boeing also offers fully integrated training systems for C-17 aircrews in India at the C-17 Training Centre, which was inaugurated in July 2016, in collaboration with Mahindra Defence Systems (MDS). The C-17 training facility, is a full-service location offering instruction to aircrews that operate the 10 C-17 airlifters that Boeing delivered to India in 2014. The centre features a complete training solution for C-17 pilots and loadmasters with advanced simulation, courseware and computer-based training to practice the complete range of tasks required for military airlift operations and humanitarian missions, along with other scenarios such as aerial refueling and emergency procedures. The Centre has completed over 1700 hours of training and has maintained a serviceability state of 100 percent.

In June 2017, Boeing was also awarded a $131 million interim support agreement contract in support of the Indian Navy's fleet of P-8I aircraft. In January this year, the Defence Acquisitions Council cleared the procurement of a training solution from Boeing to support the Indian Navy's P-8I crews. The training solution is customised for the Indian Navy and will offer an integrated learning approach that will combine classroom education with simulation. Dedicated support will be provided to maintain the simulators and courseware, ensuring maximum availability.

The indigenous, ground-based training system for P-8I will allow Indian Navy crews to increase proficiency in a shorter time, without using finite fatigue life or putting the aircraft at risk during a training scenario.

The approximately 60,000 sq. ft. large Training Support & Data Handling (TSDH) Centre will be setup at INS *Rajali* to provide training to aircrew and maintenance technicians. The TSDH at INS *Rajali* will comprise of an Operational Flight Trainer, a Weapons Tactics Trainer, an Ordnance Load Trainer, a Virtual Maintenance Trainer, a Data Management & Training Console, five Electronic Aircrew Classroom and an Electronic Maintenance Classroom.

In addition to continued support to present aircraft, Boeing sees a significant opportunity in the future to support the Apache and Chinook helicopters in the coming years. We have been providing simulation based training solutions to the US Army and other international customers who operate the AH-64 Apache and CH-47 Chinook worldwide.

A future blueprint for partnership

Boeing has had a presence in India for more than seven decades and is committed to expanding that partnership. Our F/A-18 *Super Hornet India* proposal envisages the production of Super Hornets in India, in partnership with MDS and Hindustan Aeronautics Limited, further developing India's aerospace ecosystem.

With designed-in stealth and robust capability growth plan, the Super Hornet is the best aircraft to function as a roadmap to get to India's Advanced Medium Combat Aircraft (AMCA) programme. Boeing proposes to work closely with Indian aerospace industry to ensure they have the very latest technologies, applying lessons learned from the current Super Hornet production line and bringing in its global scale and expertise to Indian aerospace.

Courtesy: Boeing

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GA-ASI's SeaGuardian:
ASW, ATLC and All-Weather Performance

In October 2017, GA-ASI demonstrated remote detection and tracking of submerged contacts. The MQ-9A used sonobuoys to gather acoustic data and track underwater targets. The demonstration successfully paired sonobuoy receiver and data processing technology onboard the MQ-9A

GA-ASI's Certifiable Ground Control Station (CGCS) will be used to fly the MQ-9B. In October 2018, the CGCS completed its first flight.

SeaGuardian is the maritime version of the MQ-9B SkyGuardian from General Atomics Aeronautical Systems, Inc. (GA-ASI). MQ-9B is the world's most advanced Remotely Piloted Aircraft (RPA). MQ-9B has been selected as a sole source RPA for the UK Royal Air Force (RAF) as the Protector RG Mk1 and for the country of Belgium.

MQ-9B boasts a long list of features. SATCOM Auto Takeoff and Landing Capability (ATLC) is part of the package, designed to help minimise the aircraft's launch and recovery footprint and reduce manning and equipment requirements at a Forward Operating Base (FOB). This capability allows aircrew on a Main Operating Base (MOB) to land, taxi and launch the aircraft from a separate FOB, requiring only a small team equipped with a ruggedised laptop at the FOB.

The GA-ASI-developed Detect and Avoid (DAA) system is made up of an Air-to-Air Radar, TCAS II, ADS-B IN/OUT, and a Conflict Prediction and Display System. The DAA system provides pilots with real time situational awareness about proximate traffic and real time guidance to 'remain well clear'.

MQ-9B is a ground-up redesign of earlier variants. This was done in order to earn certification to fly in non-segregated airspace and integrate seamlessly with manned aircraft. GA-ASI expects MQ-9B to achieve certification in the early 2020s, when the aircraft initially will meet NATO STANAG-4671 airworthiness standards, and subsequently will meet commercial airworthiness certification standards in cooperation with the US Federal Aviation Administration (FAA).

The Detect and Avoid (DAA) system that GA-ASI has developed for the aircraft is made up of a radar, Traffic Collision Avoidance System (TCAS), Automatic Dependent Surveillance-Broadcast (ADS-B), and the ability to blend that surveillance onboard in support of alerting and maneuvering guidance to the pilot in the Ground Control Station (GCS). It enables the RPA to detect other platforms and safely remain well clear in coordination with air traffic control.

Both MQ-9B SeaGuardian and SkyGuardian are capable of all-weather day/night operations. The cold weather engine start capability allows ground operations down to -41°C. It also has an Electro-expulsive De-icing system (EEDS) for wing leading edges, anti-ice heated engine inlet, heated pitot tube and static ports, and lightning protection.

GA-ASI is also developing an Anti-Submarine Warfare (ASW) capability. In October 2017, GA-ASI demonstrated remote detection and tracking of submerged contacts using an MQ-9A RPA. The MQ-9A used sonobuoys to gather acoustic data and track underwater targets. The data was transmitted to the MQ-9A, processed onboard, and then relayed to the aircraft's GCS. The demonstration successfully paired sonobuoy receiver and data processing technology onboard the MQ-9A.

Future developments are planned that include MQ-9B SeaGuardian's ability to carry and dispense sonobuoys and to transmit the acoustic data via BLOS SATCOM.

Courtesy: GA-ASI

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SECURING THE FUTURE

(Air) Defence of the Realm (Rafale)

Air Chief Marshal BS Dhanoa during a break at the Seminar

Vayu Aerospace & Defence Review was invited to attend a special seminar on 'IAF Force Structure 2035' hosted by the Centre for Air Power Studies at New Delhi on 12 September 2018. The CAS Air Chief Marshal BS Dhanoa gave a special address on the rationale behind the Rafale acquisition programme as also on the IAF's modernisation roadmap.

Detailed briefings were thereafter given by Air Marshal SBP Sinha, AOC-in-C Central Air Command (and former Deputy Chief of the Air Staff during the MMRCA negotiations) and he was followed by the present DCAS, Air Marshal Raghu Nambiar, who gave an overview on the IAF's envisaged force structure.

As reported in various media, with controversy swirling around the procurement of 36 Rafale fighters from France, Air Chief Marshal BS Dhanoa referred to the "two front threat" from China and Pakistan to emphasise that the Rafale is urgently needed. "Pakistan has over 20 fighter squadrons, with upgraded F-16s and is inducting JF-17s from China in quantity. Meanwhile, China has 1,700 fighters, including 800 4th generation fighters…but we do not have the numbers, with fighter squadrons down to 31 from the sanctioned 42". The Indian Air Chief flagged the situation "across India's northern and western frontiers" stating that Pakistan and China "are not sitting idle".

The Air Chief dwelled on the cancellation of the original MMRCA requirement for 126 aircraft, stating that the plan to build 108 of them in India had "reached an impasse owing to irresolvable differences between Dassault Aviation and HAL." Senior IAF officers at the Seminar clarified that the price paid for the Rafale included "most modern sensors, best in class weapons, state-of-the-art EW (electronic warfare) and enhanced survivability, India-specific enhancements, better price terms, better overall delivery terms and timeline, better maintenance terms, longer industrial support commitment, additional warranty and longer PBL (performance based logistics) commitment."

References were repeatedly made to such historical "emergency purchases" of fighters for the IAF, including procurement of two MiG-23MF squadrons in 1983 to counter Pakistan's new F-16s, two squadrons of Mirage 2000s in 1985 and then two squadrons of MiG-29s.

The Air Marshals also stressed on the plan to procure large numbers of the Tejas light combat aircraft, 40 of the present Mk.Is on order to be followed by 83 Mk.IAs and thereafter by the considerably developed Mk.II which in fact will be a substantially different aircraft, "with twice the payload of the Mk.I, and powered by the GE F.414 engine." Air Marshal Nambiar indicated that the IAF envisages inducting about 200 LCA Mk.IIs from the 2030s to replace the present legacy Jaguars, Mirage 2000s and MiG-29s. The 5th generation AMCA will meanwhile be developed to supplement the force in the decades that follow.

Air Marshals SBP Sinha and R Nambiar

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Yak-130 combat trainer in flight

Irkut's aircraft and advanced pilot training

Irkut Corporation have expanded the deliveries of one of its bestsellers, the Yak-130 supersonic combat trainer aircraft, across the world. In December 2017, the first six aircraft of this type were inducted into the Myanmar Air Force. With this, the number of countries operating the Yak-130 now is five, which includes Russia, Myanmar, Algeria, Belarus and Bangladesh.

According to the Russian MoD, the Russian Air Force currently operates more than 80 Yak-130s which are slowly replacing their outdated L-39 jets. Irkut has continued to deliver a long-term contract of Yak-130s to the aviation training centres of the Russian Air Force. "In terms of its flight and performance characteristics at subsonic speeds, Yak-130 is closer to the latest ultra-manoeuverable fighters of the Russian Air Force such as the Su-30SM and Su-35."

The Yak-130 is equipped with a wide range of weapons weighing up to 3000 kg, that includes R-73E short-range missiles, precision air bombs with the KAB-500Kr guidance system and a wide variety of unguided aircraft weapons, enabling the aircraft to take on various targets at the same time.

The Yak-152, which is currently in flight testing mode, has higher capabilities than most of the existing competitors.

Yak-152 trainer in flight

With maximum takeoff weight of 1490 kg, the aircraft is fitted with a diesel engine of 500 hp which operates on aviation kerosene. The Yak-152 is designed for over 10,000 flight hours and is a rugged design.

A unique feature of the Yak-152 is the SKS-94M2-152 ultra-light catapult system, which is a newly installed technology for emergency escape. The escape system is triggered when the handle of the bailout is pulled, the pilot shoots the container with a parachute stacked in it, allowing for the breaking of the cockpit glass and opens the parachute within 0.2 seconds.

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Nammo's new artillery shell

"Flying higher than a passenger jet"

As a senior executive of this highly regarded Norwegian company stated "In Nammo, we believe that those doing an important job on behalf of society deserve the right equipment. Our role is to help provide that equipment, and to that end, we are always looking for innovative solutions that provide a reliable advantage to the end users. One area where we have done so recently is artillery ammunition.While artillery traditionally has been limited to a maximum range of 20-30 km, recent years have seen the introduction of new systems that support a maximum range of more than 40 km. This has significant tactical advantages, as it increases the area one artillery gun can cover by more than 75%. It also allows artillery crews to remain further away from the combat zone, reducing the danger for both to them and any support forces carrying supplies and ammunition."

The new shell design is known as the 155 mm IM HE-ER *(Insensitive Munitions, High Explosive–Extended Range.)* It provides artillery forces with the ability to effectively target both personnel and vehicles at ranges over 40 km with very good accuracy, and it does so without adding any guidance systems or submunitions. Instead, Nammo has drawn on its experience from two other areas of expertise - rocket motors and sniper ammunition – to design one of the most capable conventional shells on the market."

"Our experience from rocket motors has allowed us to fit the shell with a small rocket motor known as a base bleed. A base bleed is essentially a small rocket installed at the base of a shell that is ignited when it is fired. As it burns, the base stabilises the airflow over the projectile, reducing drag, and thereby adding range. Nammo is today one of the world's leading providers of rocket motors for anti-air missiles, including the AMRAAM, the AIM-9X Sidewinder, and the ESSM, and we have used this experience to also become the largest manufacturer of base bleeds for ammunition."

Nammo's experience from sniper ammunition has also benefited the design of the new shell, as high-performance sniper ammunition faces many of the challenges as long range artillery ammunition. When firing at extended distances, both suffer from the fact that even extremely small variations in materials and shape can change the airflow and weight distribution of the projectile, affecting what is known as its 'ballistic properties'. These small variations may lead to two shots fired at the exact same target under the exact same conditions hitting in different places, and the longer the range, the greater the potential impact of these variations.

For sniper ammunition the solution has been to develop manufacturing processes that reduce the variations in the bullets as much as possible, and Nammo is today one the leading providers of such high accuracy ammunition.

Nammo provides a wide range of extremely accurate ammunition products for snipers and marksmen

Enhancing Indian Army firepower with The K9 Vajra, BAE Systems M777 and artillery tractors

Indian Army inducted the first batch of its 'state-of-the-art' artillery systems at Devlali Field Firing Ranges in Nasik on 9 November 2018. The artillery gun systems included the M777 Ultra-Light Howitzers, K9 Vajra tracked self-propelled howitzer and a 'Composite Gun Tractor' for towing some existing guns in service: each tractor is fitted with a crane that can handle ammunition weighing up to two tons.

Defence Minister Nirmala Sitharaman with Army Chief Bipin Rawat and K9 Vajra during the induction ceremony

The induction ceremony was attended by Defence Minister Nirmala Sitharaman and Army Chief General Bipin Rawat. As Sitharaman stated, "state-of-the-art gun systems have been inducted at Devlali Field Firing Ranges in Nasik. The recently inducted M777s can be heli-lifted in mountainous areas. While negotiations to buy the M777 Ultra-Light Howitzers started in 2006 with the US Government, the contract was signed with the USA for the supply of 145 ultralight howitzer M-777, of which 25 will be brought to India in combat-ready condition. The remaining 125 guns will be made in India with Mahindra Defence. The third piece of equipment, inducted along with the guns, is the Common Gun Tower, a 6x6 vehicle with cross country capability. These Common Gun Towers are made by Ashok Leyland."

The Army's artillery modernisation plan has been moving very slowly since a couple of decades but picked up pace when the Indian Army issued a Request for Proposal (RFP) for 100 155mm / 52-calibre SP guns in 2011. In fact, more than three decades have passed since a modern artillery system was inducted by the army, the last being the Bofors FH77B02 in 1987.

The first regiment of K9 Vajra tracked artillery guns manufactured by the Indian private sector (but procured from South Korea), is expected to be formed by July 2019. "The gun has a maximum range of 28-38 km and is capable of burst firing three rounds in 30 seconds, intense firing of 15 rounds in three minutes and sustained firing of 60 rounds in 60 minutes", stated Colonel Aman Anand, of the MoD. The Army is to raise seven regiments with a total of 145 M777s. Five guns each will be delivered to the Army beginning August 2019 and the entire process will be completed in 24 months. The first regiment will form by October next year.

Nammo completes purchase of majority share in MAC

Nammo has announced that it has completed the acquisition of a majority share in US ammunition firm MAC. The Norwegian company completed the acquisition of the majority stake of MAC on 3 January 2019 after having begun pursuing the Missouri-based firm a year earlier in January 2018. MAC leads in the development of lightweight polymer cartridge cases for small and medium calibre ammunition, which Nammo said is one technology that will "strengthen its ability to provide a reliable advantage to its customers". "We are extremely satisfied to have Nammo become a majority owner. The experience from our first year working together has been very positive, and we look forward to strengthening our co-operation going forward," stated Nick Malkovich, President of MAC.

Rolls-Royce collaborate with Indian start-ups for data innovation

R² Data Labs, the data innovation catalyst inside Rolls-Royce, will develop a collaborative ecosystem of digital partners in India, the company has announced. This will enable Rolls-Royce to use data to spark innovation in all of its businesses and collaborate more effectively with partners and customers. Rolls-Royce will provide mentoring and technical support to start-ups specialising in the areas of Advanced Analytics, Artificial Intelligence (AI), Internet of Things (IoT), Blockchain, Quantum Computing, Autonomous and Sensing.

The drive is in line with Rolls-Royce's commitment to collaborative innovation and building an ecosystem of partners that harnesses the latest thinking and technologies from a wide community of innovators. Rolls-Royce has specifically chosen Bengaluru to launch this programme in India due to the growing number of technology companies there. According to recent reports, Bengaluru is now ranked as the city with highest growth index for start-up hubs, followed by London and Tel Aviv. The city is one among the nine 'International Start-up Hubs' outside of the United States and the start-up capital of India.

Caroline Gorski, Group Director of R² Data Labs, said: "Sitting at the heart of our vision for the digital age is a collaborative approach to innovation, where we actively look to develop new, radical ways of working to maintain our competitive edge. To this end, Rolls-Royce has been sponsoring, and collaborating with, niche technology startups in the areas of Artificial Intelligence, Big Data Analytics, Internet of Things (IoT), Application Development and Future Technologies across the world to help validate, build and grow their business. Unlocking hidden value in data requires new technology but also new ways of thinking. Working with IoT start-ups helps us to accelerate digital transformation, deliver further value to customers, improve existing services and create new areas of growth. At the same time, we also get to help those innovators to succeed, and share in their pace, inventiveness and energy."

Rolls-Royce has more than 20 years of experience combining engineering expertise with data analytics, offering operational efficiencies to airline customers. Building on these foundations, Rolls-Royce is expanding its digital capabilities to deliver increased value from existing services and introduce new services to customers across the group.

Kishore Jayaraman, President, Rolls-Royce – India & South Asia, stated, "Digital skills help accelerate India's drive to develop its economy. The country's vibrant digital ecosystem, supported by an innovative start-up environment, will facilitate the development of capabilities in these areas in the hope of creating immense opportunities across the lives of individuals and affect diverse industries including financial services, retail, media, travel, hospitality and healthcare. We recognise that some of the best digital capabilities exist outside of our business. For Rolls-Royce to continue to pioneer the power that matters as a leading industrial technology company and be a strong industrial partner, we must champion collaboration. As a leader in applied industrial AI and analytics applications, R² Data Labs is tasked to help Rolls-Royce become the 'go-to' industrial company."

Rolls-Royce already partners with Tata Consultancy Services and Microsoft, two globally-recognised digital service providers. As part of the partnership, TCS – a leading provider of IT services, consulting and business solutions – provides digital platform capability, allowing data to be captured, shared and analysed more easily across Rolls-Royce so that new products and services can be developed at pace.

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Successful test firing of BrahMos to validate service life extension

BrahMos, the supersonic cruise missile has been successfully test-fired recently, from the Integrated Test Range (ITR) at Balasore, Odisha. The test-firing conducted from a Mobile Autonomous Launcher was part of service life extension programme for Indian Army under extreme weather conditions. The precision strike missile followed the designated trajectory and the key components functioned perfectly. DRDO's range capability to operate in the most severe weather condition was also validated at ITR Balasore. Senior Army officials and scientists from DRDO and BrahMos witnessed the trial.

BrahMos is a joint venture between DRDO of India and NPOM of Russia. BrahMos missile has established itself as a major force multiplier in modern-day complex battlefields with its land-attack, anti-ship capabilities with multi-role and multi-platform abilities.

BrahMos Extended Range missile successfully tested

As part of capability enhancement endeavour, a major milestone was achieved when an enhanced version of the BrahMos supersonic cruise missile with an Extended Range (ER) was successfully test-fired from the Integrated Test Range (ITR) Chandipur at sea in Balasore, off coast of Odisha. During the launch, the land-attack version of the supersonic missile system met its all mission parameters. The launched achieved 100% results, executed with high precision from the Mobile Autonomous Launcher (MAL) deployed in full configuration. "With the successful test firing of BrahMos Extended Range missile, the Indian Armed Forces will be able to attack enemy targets far beyond 400 kms. BrahMos has thus proved its prowess once again as the best supersonic cruise missile system in the world," stated Dr Sudhir Mishra, CEO & MD, BrahMos Aerospace.

IAI's ELTA to supply multi-mode radars and EW systems

ELTA Systems, a subsidiary of Israel Aerospace Industries (IAI), has been awarded initial contracts to supply advanced multi-mode radars and an Electronic Warfare (EW) protection system, both based on latest Active Electronically Scanned Array (AESA) technology. The combined contracts are worth over 60 million USD. The products to be delivered are based on the latest technologies providing the customer's Air Force fighter jets with high performing radar sensing and maximum protection against potential ground and airborne threats.

The new AESA radar provides extended capabilities over legacy technologies such as longer range detection, better target accuracy, and multi-target tracking capabilities which allows for simultaneous modes of operation such as Air-to-Air/Ground/Sea. For Air-to-Ground missions, the radar provides very high resolution Synthetic Aperture Radar (SAR) mapping with Ground Moving Target Indicator (GMTI) capabilities.

The EW protection suite provides fighter jets ultimate safeguard against Surface-to-Air and Air-to-Air weapon systems. Upon detection and identification of a threat, a warning is displayed and a type defensive countermeasure is automatically activated. The fighter jet's protection is maintained regardless of the weather and environmental conditions. The EW suite operates autonomously, without any pilot intervention with extremely fast reaction time.

Yoav Turgeman, IAI VP and CEO of ELTA stated, "After overcoming very competitive tenders, ELTA was selected based on our capabilities to provide the latest state-of-the-art technologies in AESA radars and EW systems. ELTA has a long history of supplying modern and innovative products allowing our customers leading edge in the modern battlefield".

IAI Heron TP Deal with Germany Approved

Israel Aerospace Industries (IAI) has signed an agreement with Airbus to lease Heron TP Medium Altitude Long Endurance (MALE) RPASs (Remotely Piloted Aircraft System) to Germany's Federal Ministry of Defence.


The Heron TP

The Heron TP MALE is a high altitude, long endurance, strategic, versatile and multiple-payload RPAS, which features IAI's most advanced technologies. The system which is a world leader of its kind is in service with the Israel Air Force since 2010. The Heron TP is the strategic variant of the Heron family, which includes the Heron 1, used reliably by the German Air Force since 2010 in Afghanistan and since 2016 in Mali. The German's choice of the Heron TP builds on this long-term successful experience.

Moshe Levi, IAI EVP and General Manager of the Military Aircraft Group, said, "We are thrilled and proud of this agreement with the Federal Ministry of Defence, a major strategic customer. The Heron TP is a first rate strategic RPAS. Its strong performance will provide Germany with unprecedented air superiority. We regard it as a powerful symbol that the technology of Israel's largest defence company will be used in the heart of Germany's defence organisation. IAI and Airbus would like to thank the German government for this vote of confidence built over many years. We are committed to preserving the quality of our service and systems and look forward to continued collaboration."

Rosoboronexport's Sprut-SDM1 light amphibious tank

Rosoboronexport has launched the Sprut-SDM1 light amphibious tank built by the Tractor Plants Concern. "This is a unique armament unrivaled throughout the world. The Sprut-SDM1 is the only light amphibious fighting vehicle in its class that possesses the firepower of the main battle tank, capable of disembarking from a ship and operating day or night in difficult terrain. Rosoboronexport expects interest in this vehicle from countries which have difficult terrain, such as water obstacles, marshes and mountains. A number of South-East Asian countries have already shown great interest in the Sprut-SDM1," stated Rosoboronexport's Director General Alexander Mikheev.

The Sprut-SDMI light amphibious tank

The Sprut-SDM1 will provide fire support to infantry, engage armoured targets, destroy enemy strong points and fortifications, and conduct battlefield reconnaissance and security. It is intended for marine troops as also armoured forces. The Sprut-SDM1 has a 'powerful' armament suite, similar to a main battle tank, and includes a 125-mm gun, a 7.62-mm remote-controlled machine gun and a 7.62-mm coaxial machine gun.

Eurofighter and the Future Concept 'Tempest'

Eurofighter Typhoons from various European air forces were parked alongside the UK's future combat air strategy concept model 'Tempest' during the *2018 Belgian Air Force Days* at Kleine-Brogel. A Eurofighter 'show of force' formed a static display line-up on, in addition to a spectacular air display from the Royal Air Force's Eurofighter Display Pilot, Flt Lt Jim Peterson, demonstrating the power, speed and impressive agility of this multi-role combat aircraft. Displayed too was a full scale model of the 'Tempest' the future combat aircraft system concept developed by the UK Ministry of Defence with industrial partners.

First revealed at the 2018 Farnborough International Air Show, Tempest illustrates some of the concepts and capabilities the UK expects to see on a future system, concepts which will continue to evolve.

Artists' impression of the Eurofighter and Tempest in close formation

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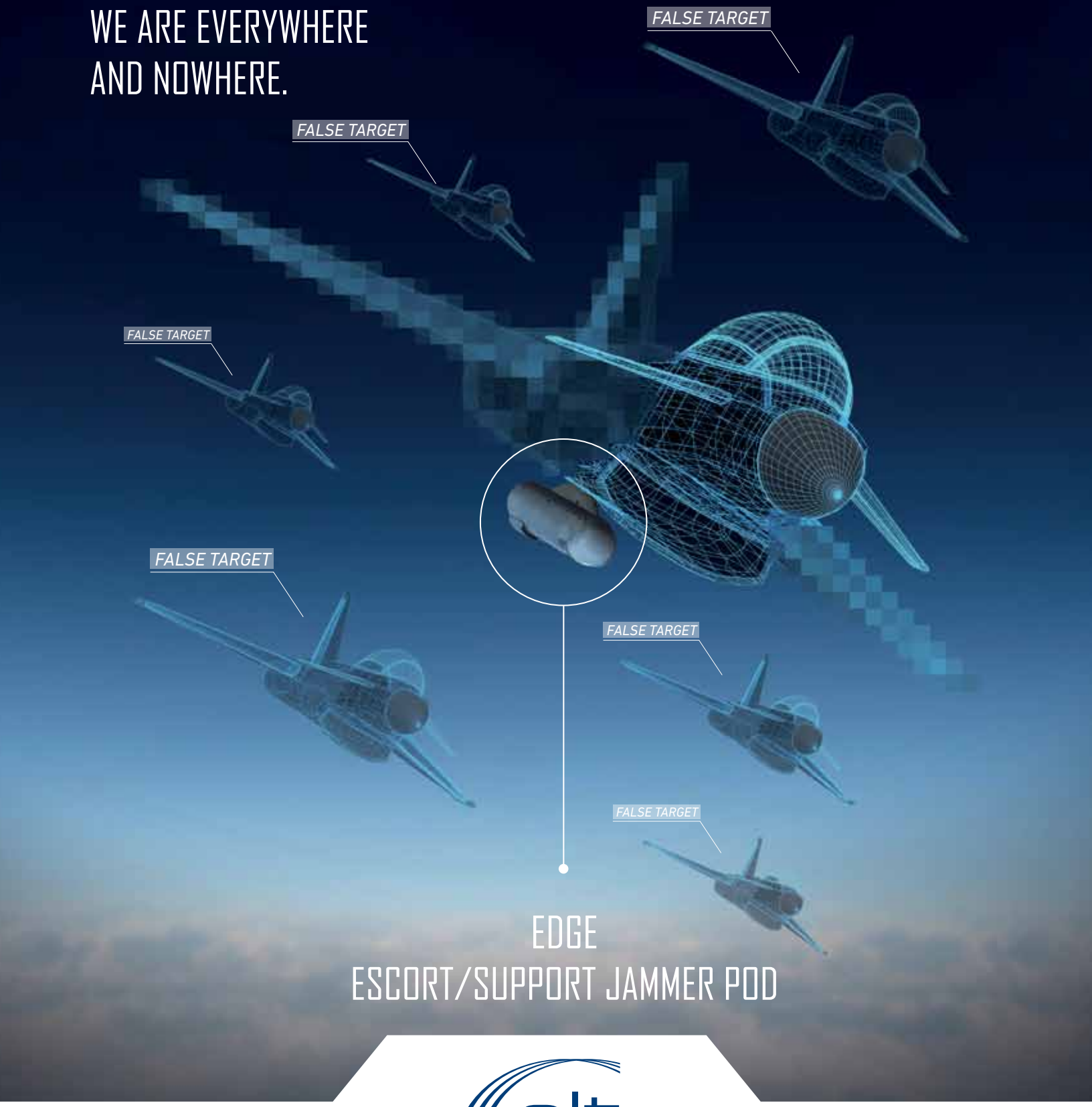

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MBDA demonstrates anti-surface capabilities of the Mistral

In end-2018, MBDA successfully demonstrated the use of the Mistral missile against fast boats such as FIACs (Fast Inshore Attack Craft). A number of foreign delegations attended the demonstration firing that was performed from a SIMBAD-RC automated naval turret firing from the land against a fast moving remotely-controlled semi-rigid boat more than 3 kilometres off the coast. The scenario was representative of the self-protection of a vessel against an asymmetric threat (commando or terrorist attack). In its latest version currently in service with the French armed forces, the Mistral is an air defence missile equipped with an imaging infrared seeker with advanced image processing capabilities that allow it to engage low thermal signature targets from a long distance (such targets include UAVs, missiles and fast boats), whilst at the same time offering resistance to countermeasures.

MBDA Brimstone to be integrated onto RAF's Protector

MBDA has received a contract for the integration of its Brimstone high-precision strike missile onto the Royal Air Force's Protector RG Mk1 remotely piloted aircraft developed and manufactured by General Atomics Aeronautical Systems, Inc. Brimstone and Protector RG Mk1 will provide key new capabilities to the Royal Air Force's ISTAR force, enabling them to engage high-speed moving and manoeuvring targets (including maritime fast attack craft for the first time). The Protector RG Mk1 can carry three lightweight Brimstones per weapon station, and offers a much higher loadout than the Reaper platform it will replace.

Integration of Brimstone onto Protector RG Mk1 (which is the weaponised version of MQ-9B SkyGuardian) follows a series of successful firing trials of Brimstone from the Reaper/Predator B aircraft in the United States that demonstrated the advancement in performance that Brimstone offers. Brimstone integration will be completed in time for the entry to service of the aircraft with the RAF.

The Arrows in Apache's Quiver

The 22 AH-64D Block III Apache helicopters for the Indian Air Force, is worth approximately $1.4 billion. The attack helicopters, referred to as AH-64E Guardian are set to enter Indian Air Force service 2019 onwards.

To decimate hostile armoured formations and enemy bunker and fortifications, the package includes 812 Lockheed Martin AGM-114L-3 Longbow Hellfire Anti-Tank Guided Weapon (ATGW) plus 542 AGM-114R-3 Hellfire II ATGWs. The Hellfire name comes from its original role as a helicopter-launched fire and forget weapon. The AGM-114L-3, or Longbow Hellfire, is a fire and forget weapon equipped with a Millimetre Wave (MMW) radar seeker coupled with inertial guidance, enabling Lock on after Launch (LOAL) capability; very effective against hostile multiple rolling armour.

Complementing the AGM-114L-3 Longbow Hellfire will be the multi-purpose 8-km range AGM-114R or 'Romeo' that uses a Semi-Active Laser Homing (SALH) guidance system and an integrated blast fragmentation sleeve (IBFS) warhead likely built around tandem shaped charge HEAT to engage targets that previously needed multiple Hellfire variants. Hellfire II locks on before or after launch and can engage multiple targets simultaneously.

Lockheed Martin has developed the 'Arrowhead' targeting and night vision system for the Apache, using second-generation long-wave Infra Red (IR) sensors with improved range and resolution, and has a targeting Forward Looking Infra Red (FLIR) with three fields of view, a dual field-of-view FLIR, a Charged Coupled Device (CCD) TV camera, electronic zoom, target tracker and auto-boresight.

Sayan Majumdar

US Army's AH-64D Longbow Apache, the type soon in 'Indian' colours

Boeing's Low-Cost Smart Bomb

The game-changing JDAM

It was in 1998 when Boeing delivered the first production model of the satellite-guided Joint Direct Attack Munition to the US Air Force. JDAM ('j-dam') destined to transform the way in which the US Air Force, Navy and Marine Corps conducted air strikes against ground targets, because it delivered pinpoint accuracy regardless of weather conditions.

The first generation of precision-guided munitions, popularly known as smart bombs, were highly accurate – if atmospheric conditions permitted them to be. However, as the US Air Force and Navy discovered in *Operation Desert Storm* in 1991, when there was rain or dust or smoke around a target, seekers had trouble finding it. A smart bomb that could work regardless of weather conditions or local obscurants like smoke was needed.

That was the genesis of JDAM. Designers at Boeing devised an inexpensive way of providing free-fall gravity bombs with guidance from Global Positioning System satellites. Employing simple control surfaces and "strakes" along the side of the bombs that permitted them to glide, the Boeing technology converted 'dumb' weapons into smart munitions. As long as the location of a target was known, JDAM could hit within a few yards of it even in a sandstorm.

A US Navy F/A-18 Super Hornet equipped with multiple JDAMs. Each of the weapons shown can be used to destroy a different target with high accuracy and at low cost

Today, all of the heavy bombers and strike fighters in America's joint force are equipped to deliver JDAMs, including the tri-service F-35. It's a safe bet the next-generation B-21 bomber will be too. Expectations for what strike warfare can accomplish have been genuinely transformed. Rather than sending half a dozen fighters to destroy one target, the military services can dispatch one fighter to destroy half a dozen targets – in a single sortie, and at low cost.

Loren Thompson

Russia exhibits naval Pantsir for the first time

JSC Rosoboronexport (part of the Rostec State Corporation) and JSC NPO High Precision Systems demonstrated the Pantsir-ME shipborne air-defence missile and artillery system developed and produced by the Instrument Design Bureau JSC KBP named after Academician A. Shipunov recently.

The Pantsir-ME air-defence missile and artillery system can be installed on ships with water displacement of more than 300 tons. The system provides a reliable protection of vessels from all the existing and prospective air assault weapons in the whole spectrum of their combat capabilities with an unconditional probability of kill, which is "practically equivalent to one", including low-flying anti-ship missiles and unmanned aerial vehicles.

The high effectiveness of intercepting anti-ship missiles is due to high performance tactical and technical characteristics of the Pantsir-ME air-defence missile and artillery system. The system is capable of simultaneous firing at four targets attacking the ship while the kill zone for guided anti-aircraft missiles is a 20 kilometer range and up to 15 kilometers in height. Besides, Pantsir-ME can first utilise its missiles, and then, in case of a miss, the target can be hit by the artillery fire with 'a 100 percent guarantee'.

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Rosoboronexport is the sole state company in Russia authorized to export the full range of defense and dual-use products, technologies and services. Rosoboronexport accounts for over 85% of Russia's annual arms sales and maintains military-technical cooperation with over 100 countries worldwide.

Developments at Saab

Saab RBS 70 NG for Brazil

Saab has signed a contract with the Brazilian Army for deliveries of RBS 70 NG – the latest generation of the RBS 70 man-portable air defence system. In addition to the RBS 70 NG system, the order also includes training systems, camouflage systems and other associated equipment. This is the Brazilian Army's first order of the latest RBS 70 NG version and marks a significant upgrade to their air defence capability. Their existing RBS 70 inventory has been in service with the Brazilian Army since 2014, the system having a big role in 2016 as part of the protection of the 2016 Olympics in Rio de Janeiro, Brazil.

Second GlobalEye flies

Saab has completed a successful first flight with the second GlobalEye Airborne Early Warning & Control (AEW&C) aircraft. The second GlobalEye aircraft took off for the first time on 3 January 2019 from Saab's airfield in Linköping. GlobalEye, which is based on a modified Bombardier Global 6000 aircraft with a suite of advanced sensors including the Erieye ER airborne radar, undertook a test flight collecting flight-test data. GlobalEye brings extended detection range, endurance and the ability to perform multiple roles, including tasks such as search and rescue, border surveillance and military operations. The launch customer for GlobalEye is United Arab Emirates, where the solution is known as the Swing Role Surveillance System (SRSS).

Saab Offers Gripen E to Switzerland

Supported by the Swedish Government, Saab has submitted its proposal for the Swiss New Fighter Aircraft procurement to armasuisse, the Swiss defence procurement agency. Saab offers Gripen E and a comprehensive industrial participation programme for Swiss industry corresponding to 100 percent of the contract value. The proposal includes of options for 30, and 40, new build Gripen E fighter aircraft in response to the Request for Proposal (RFP), which armasuisse issued on 6 July 2018. Switzerland has a need to replace its fighter fleet of F/A-18 Hornet and F-5 E/F Tiger aircraft.

Test flights of Gripen E with Meteor BVRAAM

Saab has completed test flights by a Gripen E aircraft with the Meteor Beyond Visual Range Air-to-Air Missile (BVRAAM). Carrying two Meteor missiles, the Gripen E aircraft (39-8) operated from Saab's airfield at Linköping, Sweden, this being part of the weapon integration progress and marking an important milestone in the programme with the Swedish Air Force. The Gripen E continues to fly with different configurations to gradually expand the flight envelope.

Deployable Aircraft Maintenance Facility

Saab will provide enhanced aircraft maintenance capability to the Hungarian Air Force, using the mobile solution Deployable Aircraft Maintenance Facility, (DAM) which is a mobile hangar solution that enables 'enhanced aircraft maintenance capacity combined with superior protection'. DAM provides capability equivalent to stationary maintenance infrastructure, but at a fraction of the cost.

The Hungarian Air Force is currently operating 14 Gripens on a lease-purchase agreement with the Swedish government. DAM will provide the Hungarian Air Force with an increased level of flexibility and reduce their dependency on stationary infrastructure for maintenance and protection of their Gripen fleet. The DAM solution can be rapidly deployed (in less than 48 hours) to enable sustainment of self-sufficient operations for extended periods of time, in any location, regardless of whether they are domestic or overseas.

FMV orders Giraffe 4A and Arthur radars

Saab has received an order from the Swedish Defence Materiel Administration (FMV) "to develop and maintain the Armed Forces' artillery and weapon locating capability." The order includes Saab's Giraffe 4A multi-function radar and life extension of the Arthur artillery locating system. The modern ground-based multi-function system Giraffe 4A and the life extension of Arthur will give the Armed Forces' long-range surveillance capability and give new possibilities to handle existing and future threats.

Contracts for Carl-Gustaf M4

Saab has received contracts for the Carl-Gustaf M4 multi-role weapon system for "an undisclosed customer," the total order value being for approximately 492 MSEK with deliveries to take place in 2019-2024. For seven decades, the Carl-Gustaf man-portable multi-role weapon system has been supporting infantry around the world in dealing with a full range of battlefield challenges. The new Carl-Gustaf M4, has all the effectiveness and versatility of the Carl-Gustaf system but its improved and lightweight design, weighing less than 7 kg, offers significant mobility for the infantry soldier.

Boeing Delivers First Two KC-46A Pegasus Tankers to USAF

The first two Boeing KC-46 Pegasus aircraft departed Everett's Paine Field on 29 January for McConnell Air Force Base, where the 22nd Air Refueling Wing is the first unit to have the world's newest air refueling tankers. After Oklahoma's Altus Air Force Base receives four aircraft to support aircrew training, the USAF will soon begin evaluating the KC-46's systems in operationally realistic scenarios, which is required before the aircraft can be used in combat. It will also continue validating the KC-46's refueling capabilities, with aircraft including the B-2 bomber, C-5 cargo plane, and F-35 fighter. Prior testing involved the B-52 bomber, C-17 cargo plane, and F-15E and F/A-18 fighters, among others.

19 more Boeing P-8A Poseidon ordered

The US Navy has awarded Boeing a $2.4 billion production contract for the next 19 P-8A Poseidon aircraft. The contract includes 10 aircraft to add to the current inventory of P-8As in the US Navy fleet, all five jets currently under contract for Norway and the four aircraft remaining for the existing United Kingdom contract, bringing the total United Kingdom acquisition to nine aircraft.

The United Kingdom and Norway are acquiring the Boeing aircraft through the Foreign Military Sales process and will receive a variant designed and produced for the US Navy as the P-8A Poseidon. The United Kingdom will receive their first aircraft in 2019 and Norway will begin receiving aircraft in 2021.

Beware of the DRDO Nag ! The lethal ATGW

Developed by the Defence Research and Development Organisation (DRDO) to support both mechanised infantry and airborne forces of the Indian Army, the Nag is a third-generation, fire-and-forget, Anti-Tank Guided Weapon (ATGW) designed to destroy modern Main Battle Tanks (MBT) and other heavily armoured targets. The ATGW is presently armed with an advanced Bharat Dynamics (BDL)–produced passive Imaging Infra-Red (IIR) Homing Mercury Cadmium Telluride (HgCdTe) Focal Plane Array (FPA) seeker to achieve high single-shot kill probability even in dense electronic countermeasures environment. The missile is optionally offered with a Millimetre Wave (MMW) fire-and-forget Active Radar Homing (ARH) seeker to be fired in swarms against advancing high density MBT columns. The missile also features top-attack capability.

The Nag ATGW airframe is built with lightweight and high-strength composite materials featuring four foldable wings and has a length of 1.85m, diameter of 0.20m, wing span of 0.4m and weight of 43kg. A blunt nose cone houses the guidance system, while the middle portion accommodates a compact sensor package and main charge of the warhead. A booster rocket motor is located towards the rear. Four tail fins are fitted at the rear to stabilise the missile while in flight. A real-time image processor with fast and efficient algorithms is installed next to the guidance section to provide automatic target detection and tracking capabilities. Control of the missile in roll, pitch and yaw is achieved by moving the rear fins with all electric actuating system using power from the thermal batteries. The digital autopilot offers guidance, stability and control for the missile during the flight.

The Nag ATGW is fitted with a high-energy propulsion system consisting of booster and smokeless nitramine Extruded Double Base (EDB) sustainer, propelling the weapon to a speed of 230 m/s. The range of the terrestrial version mounted on the Nag missile carrier (NAMICA) with Lock-On-Before Launch (LOBL) capability is 4 kilometres, while Helicopter Launched Nag (HELINA)integrated with HAL Rudra (ALH WSI) with Lock-On After Launch (LOAL)

can reach up to 7 kilometres. An 8 kg tandem-shaped charge High-Explosive Anti-Tank (HEAT) warhead, with a precursor and a main charge, provides the weapon with a high kill probability. After the precursor charge penetrates the Explosive Reactive Armour (ERA) of hostile tanks, the main charge is intended to destroy the main armour.

Sayan Majumdar

First Korean Airbus A330 MRTT

The Republic of Korea Air Force (ROKAF) has taken delivery of its first Airbus A330 Multi Role Tanker Transport (MRTT) aircraft. The new-generation A330 MRTT extends the endurance and range of the ROKAF's fighter aircraft, and provides the service with strategic transport capability for passengers and freight. In South Korean service the A330 MRTT will be powered by Rolls-Royce Trent 700 engines, be equipped with the Airbus Refuelling Boom System, and can be configured in a variety of layouts to carry passengers and freight or for medevac purposes. South Korea becomes the seventh member of the worldwide family of A330 MRTT operators and is one of 12 nations to have ordered the aircraft.

Elettronica promotes ADRIAN

Elettronica, the European leader in electronic and cyber warfare, has launched the ADRIAN (Anti Drone Interception Acquisition Neutralisation) to counter mini and micro drone threats as also the growing security risks posed by lightweight civilian "quadri-copter" drones at public events and in civil airspace. ADRIAN is the state-of-the-art counter-UAV solution designed to intercept and neutralise LSS (Low-Small-Slow) UAV in multiple scenarios and environments, including urban and dense-urban environment.

Traditional sensors and countermeasures may be not effective or not applicable in urban warfare. Therefore ADRIAN is based on multispectral sensors (Radar, EO/IR, acoustic and radio link interceptor) performing data fusion for detection and identification. ADRIAN architecture is modular and can be tailored depending on operational, environmental and cost/effectiveness requirements.

ADRIAN reactive and smart jammer is capable to deny the remote control link of the platform and the navigation aids signals used to follow the programmed route through proper waypoints. Innovative jamming techniques enhancing the effectiveness of soft kill disruption of hostile platforms maintaining full operational services of active friendly platforms.

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Raytheon/LM Javelin JV Awarded Contract for 2,100 F-Model Missiles

The Javelin Joint Venture was awarded a production contract for 2,100 F-Model (FGM-148F) missiles, following a successful and rigorous system qualification test programme that included 21 successful flight tests. The contract launches the initial full-rate production agreement for the Javelin F-Model missile, replacing the Javelin FGM-148E (Block I).

The Javelin FGM-148F missile features an advanced multipurpose warhead (MPWH) as part of the man portable, fire-and-forget Javelin missile system.

Javelin, which is produced by a joint venture between Raytheon and Lockheed Martin, has been used extensively and to great advantage in combat operations in both Afghanistan and Iraq. Over 5,000 engagements have been successfully conducted by US and coalition forces.

Safran and MTU for the next-gen European fighter engine

In the presence of the French and German Ministers of Defence, respectively Florence Parly and Ursula von der Leyen, Safran and MTU Aero Engines have officially announced their partnership to jointly lead the development, the production and the after-sales support activities of the new engine that will power the next generation combat aircraft, as part of the Franco-German Future Combat Air System (FCAS). The aircraft will enter into service by 2040 to complement the current generation of Eurofighter and Rafale fighter aircraft. Both partners are 'willing to ensure a strong and effective management of the programme, and to supply the Forces with their longstanding experience in military engines, the best technologies and innovative engine architecture'.

In the frame of this partnership, Safran Aircraft Engines will take the lead in engine design and integration, and MTU Aero Engines will take the lead in engine services. MTU Aero Engines will be in charge of the low and high-pressure compressors and the low-pressure turbine, while Safran will be responsible for combustor, high-pressure turbine and the afterburner.

The existing joint venture Aerospace Embedded Solutions (AES) will be in charge of the engine control hardware and software under the responsibility and the lead of Engine integrator (Safran Aircraft Engines). The intention is to achieve a balanced French–German industry programme share, assuming balanced funding by France and Germany.

Irkut's MC-21-300 aircraft in flight test programmes

On 12 May 2018, maiden flight of the second MC-21-300 test aircraft took place at the airfield of Irkutsk Aviation Plant. The test results of the first test aircraft were considered in planning for production of the new aircraft. The duration of flight was 1 hour 7 minutes at an altitude of 3000 metres and at a speed of up to 400 km/hr. The flight programme included testing the aircraft for stability and controllability for various wing configurations with retracting and extension landing gear, as well as testing the on-board equipment.

Acting Minister of Industry and Trade of the Russian Federation, Denis Manturov, stated, "The flight of the second aircraft is a significant event that will ensure the timely conduct of flight certification tests." The Minister said that three MC-21-300 aircraft were taking part in the test programme: two of them flying and one for static tests in TsAGI.

The President of JSC UAC and Irkut Corporation, Yuri Slyusar, said that Aviastar-SP plant had started manufacturing panels for the first aircraft to be delivered to customers. "In recent years, the Russian aviation industry has undergone a profound modernisation. The most modern scalable assembly line for the newest civil airliners was commissioned at the Irkutsk Aviation Plant. Within the UAC, fundamentally new competencies have been developed in the field of production of structures from polymer composite materials. Their widespread use is one of the main advantages of the aircraft. The new high-tech production will ensure the development of the MC-21 programme and other perspective aviation projects", Yuri Slyusar emphasised.

Rostec is the integrator of number of MC-21 aircraft systems and Rostec Enterprises produce more than 50% of the airliner avionics, providing titanium for the MC-21 programme and also supplies composite panels of the tail unit. United Engine Corporation, a part of the Rostec State Corporation, will supply the PD-14 engines, which, along with the Pratt & Whitney PW1400G engines, will be installed on the MC-21 serial aircraft. In February 2018, Aeroflot airlines signed a firm contract with the Avia Capital Services leasing company (subsidiary of Rostec State Corporation) for the delivery of 50 MC-21-300 aircraft.

New Systems from Rosoboronexport

Tor-E2 SAM system launched

JSC Rosoboronexport, part of the Rostec State Corporation, has started promoting the latest Tor-E2 SAM system developed and produced by the Almaz-Antey Air and Space Defence Concern. The Tor-E2 fits into short-range air defence segment, retaining the best qualities inherent in the Tor family "to become an even more formidable weapon against any current air threats." With its unique capabilities and performance, the system is "superior to most of its counterparts in the world market and second to none in mobility and survivability. Rosoboronexport is considering its sale from its partners for the supply of these systems," stated Alexander Mikheev, Director General of Rosoboronexport.

The system provides air defence for army units in combat and on the move, as well as to protect military and other critical facilities from attacks by manned and unmanned aerial vehicles. The Tor-E2 can engage aircraft and helicopters, cruise, anti-radar and various guided missiles. It effectively destroys precision guided munitions, such as glide and guided air bombs, as well as UAVs within its engagement envelope. The system is capable of operating in intense jamming and counter-fire environments, in any weather, by day or night.

The Tor-E2 combat vehicle is an independent, mobile, all-terrain fighting unit that provides detection and identification of air targets on the move or at halt, target lock-on and engagement at the halt, and on the move. A high level of automation and unique algorithms of the SAM system minimise crew involvement in the engagement process. A battery of the four-channel Tor-E2 SAM systems, consisting of four combat vehicles, can simultaneously engage up to 16 targets flying from any direction at a range of 15 km and an altitude of up to 12 km. Each vehicle carries 16 missiles, which are twice as many as the previous version of the Tor system.

The Tor-E2 is a unique weapon, one combat vehicle incorporating all which is necessary for anti-air warfare, from target detection to its destruction. The system far exceeds its counterparts in combat survivability: "to knock out a Tor battery, you need to destroy all of its combat vehicles. For most of its counterparts, disabling a command post or a battery radar would be sufficient." In addition, two Tor-E2 combat vehicles can operate in the 'link' mode, which enables them to exchange information about the air situation at different altitude ranges and coordinate joint engagement operations. In this mode, one of the combat vehicles, receives information from the other and does not reveal itself until the launch of the missile.

The possibility of integrating the Tor-E2 SAM system into any existing air defence system is available including compatibility with NATO standards, considerably expands its export potential. A command post can be attached to a battery of four Tor-E2 combat vehicles to control and coordinate them and interact with the air defence control system.

Russia's A-100 AWACS makes first flight undergoing new stage of trials

A new Russian A-100 Airborne Warning and Control System (AWACS) aircraft has made its first flight undergoing a new stage of prior test flights. The A-100 a modified variant of the IL-76MD-90A (Ilyushin) strategic airlifter. According to the Russian Defence Ministry, the aircraft is equipped with a digital navigation system and digital control systems in the glass cockpit, along with a new two-band locator with phased antenna array manufactured by the Vega Radio Engineering Corporation. The A-100 first took off on 18 November 2017 to test aerodynamic characteristics, avionics and aerial target equipment. "There are about 20 tons of unique electronic equipment onboard this aircraft. The new generation of flying radars combines the most advanced developments in the field of aviation, radar ranging and information technologies. Only a few countries in the world produce such aviation systems, while the level of the newest Russian complex can be considered unsurpassed", stated Director of Rostec's Aviation Cluster Anatoly Serdyukov.

HAL Shows Growth in Nine Month Period (F.Y. 2018-19)

The financial results of Hindustan Aeronautics Ltd. approved at its Board Meeting held on 11 February in Delhi for the nine month period ended 31 December 2018 has shown growth as compared to corresponding period ending 31 December 2017. The HAL revenue and profits before tax up to third quarter ended December 2018 (April–December 2018) have registered an increase of 3% and 13% respectively, compared to corresponding period ended December 2017. The Company is working towards streamlining the production uniformly so as to even out seasonality of business leading to bunching of revenue and profits during the 3rd and 4th quarter of the financial year. This has resulted in uniform flow of revenue and profits in the first three quarters of the current financial year 2018-19, as compared to the previous period of 2017-18. The revenue and profits for the current financial year 2018-19 is in the similar growth range as in previous years.

Ivory Coast orders Airbus C295

The Ministry of Defence of Ivory Coast has ordered one C295 medium transport aircraft. The aircraft, in transport configuration, will enhance the capabilities of the Ivory Coast Air Force with its "proven record of excellent performance in hot and harsh conditions, and affordable maintenance and operational costs." Bernhard Brenner, Airbus Defence and Space Head of Marketing & Sales, said: "The C295 has proven its outstanding capabilities in the exceptionally harsh sub-Saharan Africa operating environment. The aircraft will be a game changer for Ivory Coast and we feel very proud to welcome a new operator into our C295 family." With this new order Ivory Coast becomes the 28th nation worldwide to operate the C295. Airbus Defence and Space has to date sold 91 aircraft to 17 countries in Africa. There is a growing fleet of C295s in the North and West Africa region with up to 35 C295s contracted by Egypt, Algeria, Ghana and Mali.

Aequs and Agility

Buzzword for sustainability and growth in the fourth industrial age

Aravind Melligeri, Chairman & CEO, Aequs Group

The latest wave of industrial revolution, popularly termed as Industry 4.0, has completely changed the way we look at production and operation in a manufacturing plant. While the third industrial revolution in the 1970s and '80s made the word disruptive take a whole new meaning with the introduction of computers and automation, Industry 4.0 has successfully managed to create a digital world that blurs the lines between the physical, digital, and biological spheres and connect them together in hitherto unimaginable ways.

Needless to say, in such an interconnected world, business leaders and budding entrepreneurs are swept by the wave of disruption and the only way to sustain is by moving with the times and staying agile.

Leveraging technology to achieve the right balance of capacity and capability

The manufacturing industry works on the principles of scale and diversity, and the aerospace sector is no different. The winning strategy is the one that use the right mix of resources – manpower, infrastructure and material – and channelize this for manufacturing diverse products in large volumes. Today, owing to the huge appetite for military, commercial and business aircraft worldwide, and mounting backlogs in clearing these deliveries, aerospace OEMs are under tremendous pressure to keep costs low and seek out suppliers who have the capacity to absorb large orders and capability to deliver them flawlessly.

Suppliers who can quickly adopt to the latest technology and deliver on time are eagerly incorporated into the larger OEM supply chains. One such innovative technology that is being embraced by the aerospace industry is Flexible Manufacturing System (FMS). Simply put, FMS is two or more automated machining centres linked by a common controller, common load station, and a pallet pool system.

With FMS technology, manufacturers are able to achieve industry-leading agility by leveraging a system that is readily adaptable to changes in the product being manufactured, both in type and quantity. FMS can create precise customer value through goods of higher quality, in a scale dictated by demand, and with exact precision, with little or no operator intervention.

In its endeavor to stay agile and move with changing market dynamics, Aequs has set up an FMS cell to cater to the high demand of parts by major industry players like Airbus and PAG. It is the first of its kind in India in the aerospace sector that enables Aequs to be the top choice of global OEMs in delivering the relatively high mix, low volume product variety that are in great demand today. With the introduction of FMS technology, Aequs has achieved a level of flexibility that we have been seeing in the automotive industry.

With the changing face of manufacturing and supply chain, flexibility and adaptability will be game changers for today's manufacturers. With smart and adaptive manufacturing plants, the world is poised to witness unparalleled efficiency in the industry.

Indian Army Chief briefed on Boeing AH-64E Demonstrator

The AH-64 Apache attack Demonstrator is a centerpiece of Boeing's Apache training. The high-fidelity flight simulator is used by pilots and crews to practice aircraft procedures and rehearse missions. The Indian Army Chief of Staff, General Bipin Rawat experienced the demonstrator at Aero India yesterday, in the presence of senior Boeing defence executives David Koopersmith, vice president, Vertical Lift; Jeff Shockey, vice president, Global Sales and Marketing; Dennis Swanson, vice president, International Sales; Michael Koch, vice president, Boeing Defence, Space & Security in India; and Brad Rounding, Vertical Lift, Global Sales & Marketing.

HAL orders Thales 2.75-inch rocket launchers

In seeking to boost the tactical capabilities of the Indian armed forces, HAL has awarded Thales a contract to supply 135 2.75-inch (70-mm) rocket launchers. Thales's 2.75-inch (70-mm) rocket launchers use composite material, making them some 50% lighter than metal launchers, and eliminating corrosion issues. "This new collaboration between Thales and HAL in the field of air-launched weaponry opens up new opportunities for the supply of equipment to the Indian armed forces, and consolidates Thales's position in the Indian market. With this, helicopter crews will see a significant improvement in their tactical capabilities during missions," stated Emmanuel de Roquefeuil, VP and Country Director, Thales in India.

Rolls-Royce welcomes Star Air

Rolls-Royce welcomed Star Air as the first commercial Indian operator of the Embraer ERJ 145 aircraft, powered by the company's AE 3007 engine. Star Air is the newest airline in India and is backed by the Sanjay Ghodawat Group – a conglomerate in India with more than 20 businesses. To support its ambitious growth strategy, Star Air has chosen Rolls-Royce's flagship TotalCare long-term service support for the Rolls-Royce engines on its current two aircraft, and for the expansion of the fleet in the coming year.

Captain Simran Singh Tiwana, Star Air's Chief Executive Officer, stated, "As a rapidly growing airline, it is key that we meet customers' demands for the best travel experience through providing the best product and service offerings at the right price. By partnering with Rolls-Royce and signing onto the TotalCare engine service package, we will maximise engine reliability to ensure excellence in delivery."

Justin Mills Vice President (Customers) Civil Aerospace for Rolls-Royce with Captain Simran Singh Tiwana, Star Air's Chief Executive Officer

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VAYU Interview with

BEL CMD, Mr Gowtama MV

VAYU: Can you please tell us about the products and systems that BEL is showcasing at Aero India 2019?

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, Life Support Systems (Atmospheric Water Generator), Cyber Security and professional electronic components. BEL is also showcasing its R&D capabilities by launching/demonstrating some of its new products / technologies. The highlight of BEL's outdoor display is the Comprehensive Integrated Border Management System, X Band Active Phase Array Radar, Advance Landing Ground Communication Terminal, Gun Shot Detection System, enclosures made from Composite, Atmospheric Water Generator (AWG), Compact Multipurpose Advance Stabilised System for day and night surveillance, reconnaissance and target tracking application.

VAYU: Can you tell us about the new technologies BEL is working on?

Various Divisions of BEL are involved in development of Strategic Components, Technology Modules, Subsystems, Products, Systems and System of Systems. Apart from in-house efforts, BEL R&D Engineers are working with DRDO, ISRO, CSIR, other national research laboratories and academic institutes for Joint Development of state-of-the-art products and systems. The major developments initiated are Next Generation Weapon Systems, Smart elements of Homeland Security, IIR Seekers, Command Control Software, On-the-move Satcom with low profile Antenna, Satcom Manpack Terminal, Electronic Sub-Systems for Twin Barrel 30 mm AD Gun, advanced system for Identification of Friend & Foe for Weapon Systems, Upgraded Voice Control and Communication systems, Coastal Situation Awareness Radar, Ultra Light-Weight Shelter and modular High Altitude Shelters. BEL is also working on new technology areas like Artificial Intelligence, Internet of Things, Robotics, Big Data Analytics and Cyber Security.

VAYU: Can you tell us about BEL's Make-in-India Initiatives?

Be it the efforts that the Company has been putting in to engage in collaborative R&D — in addition to augmenting its own R&D set up — its recent attempts to outsource work from Indian private industries and MSMES, or the path breaking decision to go in for Public-Private partnerships to execute huge missile programmes, BEL is leaving no stone unturned to ensure that it is in sync with the Government's larger goal of indigenisation and self-reliance. A case in point is the Akash Missile System, which is testimony to BEL's commitment to the Make in India initiative. Barring a few electronic components, every bit of Akash, a medium-range surface-to-air missile system, has been indigenously developed with BEL as the nodal agency, in partnership with companies from both the public sector and private sector.

89% of BEL's sales revenue accrues from indigenous technology. BEL is focusing more on core areas and R&D and all non-core areas are being outsourced to Indian industries including MSMEs. BEL has released an Outsourcing and Vendor Development Policy. Make in India Display Cells have been established at all the Units of BEL and Nodal officers have been nominated for Outsourcing & Vendor development. BEL has complied with the Public Procurement Policy. BEL's Test facilities are being provided to private vendors at a cost.

VAYU: What is the status of your order book? What kind of revenue you are expecting in next three years?

The Order Book as on end of January 2019 is about Rs.50,000 Crores. Defence segment continues to be BEL's main business and provides close to 80% of revenues. We are anticipating a revenue growth in the range of 12 to 15%.

VAYU: Tell us about your expansion plans. What is the status of your seeker plant in Anantpur and electronic plant in Machilipatnam?

BEL invests substantial amount in expansion and modernisation of its facilities. BEL plans to spend around Rs 2,500 Crores in the next 3-4 years. The Defence Systems Integration Complex at Palasamudram in Ananthapur district of Andhra Pradesh will be the largest facility in the country once it is commissioned, covering an area of over 900 acres. The facility will enable BEL to expand its Missile Systems business and carry out manufacturing and integration of systems and sub-systems for upcoming projects. The facility will be built in 3 to 4 phases, as various projects mature with an estimated investment of about Rs.500 Crores over next 2-3 years with the first phase in progress.

The Nimmaluru plant (near Machilipatnam) will make IR seekers, Night Vision devices and Thermal Imaging cameras with an investment of about Rs.250 Crores. The plant is expected to be operational in next 2 years.

Avdel at Aero India 2019

Mr. Sameer Bulchandani, Director and CEO, Avdel (extreme right) and the Team at their stand at Aero India

Avdel (India) Private Ltd. is proud to announce their participation in the Aero India 2019 exhibition at Yelahanka Air Force Station in Bengaluru. Avdel India is exhibiting their full capabilities at Hall AB, Booth no: AB 2.25.

As a trusted partner to leading manufacturers and service providers, the company operates under two divisions Aerospace, Transportation & Defence (ATD) Division and Aviation Division.

Avdel ATD Division is set-up to offer the broadest range of industry specific hardware, consumables, advanced materials and inventory management services for the Aerospace, Defence, Rail and Marine industries. These include fasteners, installation tools, mechanical control cables, wire rope, advanced materials made from honey comb in various materials.

Avdel Aviation caters to the needs of the growing Aviation and MRO segment with a special focus on Business (General) & Commercial Aviation in India. It provides Trip Management Services, Business Jet Acquisition & Sales, Aircraft interior refurbishment services and supports MRO in thier Aircraft maintenance repairs and overhaul activities.

The airshow is expected to provide a significant platform for bolstering business opportunities in the International aviation sector. And with a wide range of products and service offerings, Avdel India is positive about a strong and successful presence at Aero India 2019. Especially with the boost offered to the private sector in the form of joint ventures as a result of various offset opportunities in India.

Avdel (India) Private Ltd. has manufactured, collaborated, forged partnerships and expanded for almost 60 years to emerge as one of the prominent names in the Aerospace, Aviation and Transport and allied industries in India. With their years of experience and with a focus on India, they can easily boast of having one of the strong relationships with almost every indigenous aerospace company in the country.

Elettronica at Aero India 2019

The Elettronica Group is showcasing its top-of-the-range systems at Aero India. This year's catchphrase, "The Runaway to a Billion Opportunities", aims at promoting India's commitment to take full advantage of the endless opportunities the aerospace and defence sectors have to offer. “Elettronica is ready to take up the challenge, displaying its capabilities in the Homeland, Cyber and Security domains”, stated company officials.

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