

**FLY SMART AND STAY  
CONNECTED IN OVERSEAS  
WITH GOAIR**

**STAR AIR COMMENCES  
FLIGHT SERVICES BETWEEN  
BELAGAVI AND INDORE**

# AVIATION

**India's premier aviation monthly magazine**

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# UPDATE

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AirShow 2020  
All that you  
need to know**



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Gently close your eyes and relax. If needed, first do the Heartfulness Relaxation.

Turn your attention inwards and take a moment to observe yourself. Then, gently make a supposition that the source of divine light already present within your heart is attracting you from within.

Do this in a gentle and natural way. There is no need to concentrate. If you find your awareness drifting to other thoughts, gently come back to the idea of the light in your heart.

Meditation is often defined as thinking continuously about one thing. We often get stuck on this definition, however, and lose the real purpose of meditation.

Meditation must reveal the true nature of that object upon which we are meditating. Such revelation comes not as thought but as feeling. Therefore, meditation is a process in which we shift from thinking to feeling. It is a journey from the complexity of mind to the simplicity of heart.

Meditation is beautiful when done before sunrise, because of the stillness at dawn. Start by doing it for as long as you can, increase the duration to 30 minutes and eventually up to an hour when you are ready to do so.

Find a place where you can meditate without too many distractions, preferably at the same time and place every day. Turn off your phone and other devices, and prepare yourself by sitting comfortably in an upright relaxed posture.

There is no special posture prescribed, but you are not supposed to lie down and meditate because the relaxation produced will put you to sleep. If you have to change your position during meditation, please do so, so that your body does not disturb you.

Regarding the light in the heart, there is no need to try to see any light - it is a mere supposition that the light is there. Simply have the idea or thought. When you sit for meditation it is normal to have thoughts. Practice ignoring them rather than attending to them, because when you attend to those thoughts they take power and become stronger.

When you ignore them they drop off. As one thought leaves, another may come in its place, but when you treat them as uninvited guests they will go away. If you do this systematically and with alertness, you will find that in just a few months you can reach a state of thoughtlessness.

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# AVIATION UPDATE

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Hope you guys are doing well! It gives me great delight with our new issue on stands.

**T**he month of February is indeed a great one for Indian Aviation. There's so much happening all around; starting with Defexpo 2020 (Pg 27) kicking off at Lucknow and with all the big names in the world of aviation in one place. Reportedly, Airbus along with some other big names in the row will be showcasing their world-class technology at DefExpo. Get an insider view at Pg 13.

Further, we have got your covered with an exclusive preview of the Singapore Airshow 2020 at Pg 16. Moving on, I am super excited this month to have interviewed a gem of a person, immaculate talent and an absolute treasure trove of information, mastermind innovator Dr. Rao Tatavarti M.S (IIT Madras, India) [Pg25]. One of our regular sections, Captain Speaking welcomes Capt. Sathish Soundarraj, Airbus A320 who offers valuable insights on the Black Bird. [Pg31]. Not to miss out on our exclusive take on "Strategies for Higher Productivity in Civil Aviation" at Pg 22. This month our Appointments section features the latest movers and shakers from global aviation [Pg-19]

Lastly, our regular dose of information across the most popular sections like Quick Update, Defence and Military, Cargo, and much more. On that note, I shall take your leave now and look forward to our next issue which is going to be as exciting as ever, filled with the very best from the world of aviation at your fingertips. Till then, Ciao!

*Thanks*

**B. Kartikeya**  
Editor

## ■ STAR AIR COMMENCES FLIGHT SERVICES BETWEEN BELAGAVI AND INDORE



Star Air, on popular public demand, started its flight services connecting Indore & Belagavi from 20th January 2020. In one mega event held at Indore airport, many prominent dignitaries from the Airports Authority of India and Star Air were present to grace this historic event notably include: Mr. Mitra - CSO (AAI), Mr. Sunil Bansod - ATC Head, Mr. Sashikanth - APD, Mr. Chettiyar - Commercial Head, Mr. Shrivastav - Terminal In-charge, Bikar Singh - CASO, Mr. PB Chauhan - Fire Station In-charge (AAI), Mr. CA Bopanna - Head Airport Services, and Mr. Soham Shinde - Head Business Development (Sanjay Ghodawat Group)

Experts say, "Belagavi and Indore are two important regions in India from the commercial perspective. There has been a lot of business transactions carried out between these two cities. However, the absence of direct connectivity between these two cities impacts the business pace. After Star Air's launch, it is expected that business activities between these regions will find the pace and it will spur greater economic growth in the coming times."

The airline had started its sales for Indore - Belagavi route on 14th December 2019 by offering tickets at an impressive rate of just rupees 2599 only. It is getting very good response from customers for this route since the launch of its sales. This you can understand from the fact that in its inaugural flight itself the load factor was quite impressive, close to 84%.

"Since the announcement of this route, there has been an immense euphoria amongst the people of these regions who were desperately waiting to experience such services for quite long. We are proud of fulfilling their desires and are extremely delighted with the phenomenal response that we are receiving from customers,"

asserts Sanjay Ghodawat, Chairman, Sanjay Ghodawat Group.

## ■ NEW BOEING 777X COMPLETES SUCCESSFUL FIRST FLIGHT



The new Boeing 777X jetliner took to the skies, entering the next phase of its rigorous test program. Based on the popular 777 and with proven technologies from the 787 Dreamliner, the 777X took off in front of thousands at Paine Field in Everett, Washington, at 10:09 a.m. local time for a three hour, 51 minute flight over Washington State before landing at Seattle's Boeing Field.

"The 777X flew beautifully, and today's testing was very productive," said Capt. Van Chaney, 777/777X chief pilot for Boeing Test & Evaluation. "Thank you to all the teams who made today possible. I can't wait to go fly your airplane again."

Capt. Chaney and Boeing Chief Pilot Craig Bomben worked through a detailed test plan to exercise the airplane's systems and structures while the test team in Seattle monitored the data in real time.

"Our Boeing team has taken the most successful twin-aisle jet of all time and made it even more efficient, more capable and more comfortable for all," said Stan Deal, president and CEO of Boeing Commercial Airplanes. "Today's safe first flight of the 777X is a tribute to the years of hard work and dedication from our teammates, our suppliers and our community partners in Washington state and across the globe."

The first of four dedicated 777-9 flight test airplanes, WH001 will now undergo checks before resuming testing in the coming days. The test fleet, which began ground testing in Everett last year, will endure a comprehensive series of tests and conditions on the ground and in the air over the coming months to demonstrate the safety and reliability of the design.

The newest member of Boeing's market-leading widebody family, the 777X will deliver

10 percent lower fuel use and emissions and 10 percent lower operating costs than the competition through advanced aerodynamics, the latest generation carbon-fiber composite wing and the most advanced commercial engine ever built, GE Aviation's GE9X.

The new 777X also combines the best of the passenger-preferred 777 and 787 Dreamliner cabins with new innovations to deliver the flight experience of the future. Passengers will enjoy a wide, spacious cabin, large overhead bins that close easily for convenient access to their belongings, larger windows for a view from every seat, better cabin altitude and humidity, less noise and a smoother ride.

Boeing expects to deliver the first 777X in 2021. The program has won 340 orders and commitments from leading carriers around the world, including ANA, British Airways, Cathay Pacific Airways, Emirates, Etihad Airways, Lufthansa, Qatar Airways and Singapore Airlines. Since its launch in 2013, the 777X family has outsold the competition nearly 2 to 1.

## ■ INDIGO ENHANCES REGIONAL CONNECTIVITY WITHIN UTTAR PRADESH



IndiGo announced the launch of a daily direct flight connecting Gorakhpur and Prayagraj, in-line with its vision of increasing point-to-point connectivity across Tier II and III cities. The airline will be exclusively operating these flights under the government's Regional Connectivity Scheme (RCS) on its ATR fleet. IndiGo currently operates daily non-stop flights connecting Gorakhpur with Delhi, Hyderabad and Kolkata.

The inaugural ceremony at Gorakhpur was graced by Honourable MLA Shri Radha Mohan Das Aggarwal, Gorakhpur District Magistrate Shri K. VijanPandiyan, City Magistrate Shri R. K. Srivastav, Mayor Shri SitaramJaiswal and SSP Dr. Sunil Gupta,

along with other AAI officials. The maiden flight to Prayagraj departed at 11:40 am on January 10, 2020.

Mr. William Boulter, Chief Commercial Officer, IndiGo said, "We are delighted to inaugurate flights between Gorakhpur and Prayagraj in line with the government's RCS scheme. We are confident that these flights will enhance point-to-point connectivity between the two cities, increasing mobility and accessibility within the state. These flights will be able to cater to the travellers who look for affordable, on-time and hassle-free travel options, while promoting trade and commerce within the state of Uttar Pradesh. IndiGo will continue to expand its network to meet the requirements of both business and leisure travellers. It is our constant endeavour to provide flexibility of choice to our customers while offering on-time, affordable, courteous and hassle-free flying experience always".

**VISTARA COMPLETES FIVE GLORIOUS YEARS IN INDIAN AVIATION; CELEBRATES WITH CUSTOMERS AND COMMUNITY**



Vistara completes five years of redefining air travel in India and celebrates the milestone occasion. The airline today announced a celebratory, special 5th Anniversary Sale for 48 hours only, across its domestic and international network and for all three classes of travel – Economy,

Premium Economy and Business Class. Under the Sale, Economy Class fares start from INR 995, Premium Economy from INR 1995 and Business Class from INR 5555. To share the joy with the community, Vistara today also pledged to support the education and empowerment of ten underprivileged teenagers and young adults by partnering focused programs of Smile Foundation, a Delhi based NGO.

The 'Vistara 5th Anniversary Sale' opened at 0001 hrs on 09 January 2020 for 48 hours for travel between 25 January 2020 and 30 September 2020. An advance purchase of at least 15 days is required to avail sale fares across all cabin classes. RBL Bank and Bank of Baroda credit card holders can avail an additional cashback of up to INR 2000 on booking directly with Vistara using the airline's website or iOS and Android mobile apps. Cashback of INR 500 and INR 1000 can be availed on one-way and round-trip fares, respectively, on domestic flight bookings. For international bookings, customers can get cashback of INR 1000 and INR 2000 on one-way and round-trip fares, respectively.

Vistara has partnered Smile Foundation, an NGO that works towards the welfare of children and their families, to support two ongoing programs, 'Mission Education' and 'Swabhiman'. Vistara's association with the former sponsors the education of five youths aged between 18 and 20 for the next five years, while that with the latter supports skill-building of five meritorious underprivileged girl students aged between 13 and 19 for one year.

Vistara launched its operations on 9 January 2015 with only two aircraft and two destinations on the map. As of this day, the airline has a total of 39 aircraft in operations flying to 34 destinations across the length and breadth of India and cities abroad, and has flown over 20 million passengers. Vistara continues to grow rapidly across India and abroad, as it is poised to induct over 50 narrow-body and wide-body aircraft over the next four years, including Airbus A320neo and Airbus A321neo for domestic and international short and medium-haul operations and Boeing B787-9 for long-haul international operations.

**AIRBUS SIGNS CONTRACT WITH INDIAN STARTUP FOR TALENT ACQUISITION**



Continuing its outreach to develop the innovation ecosystem in India, Airbus has signed a contract with Bengaluru-based startup Traxof Technologies to automate the talent acquisition process for Airbus' Information Management (IM) organisations in India and Europe.

Traxof was part of Airbus BizLab's startup acceleration programme Season 4. The startup was chosen after a rigorous boot camp and jury election.

"Indian startups are extraordinarily competent, competitive and entrepreneurial in spirit. All they need is some supportive acceleration to achieve viability and scale. Airbus BizLab has been providing this support to Indian startups with great results," said Anand E Stanley, President and Managing Director, Airbus India & South Asia.

Traxof's cloud-based, automated desktop and mobile-based solution provides real-time visibility and monitoring of recruitment processes to support the planned ramp up of IM resources, especially in India for Airbus' digitalisation. The platform also allows the harmonisation of workflows of different stakeholders to optimise the process.

"Traxof solves a real world problem that is shared by a wide range of our internal stakeholders with a simple off the shelf solution," said Carlo Nizam, Chief Information Officer, Airbus India & South Asia. "Talent acquisition is the first of many possible areas that can benefit from Traxof's capabilities."

Founded in 2014, Traxof Technologies is a workflow automation startup that provides 100% customisability, natural language-based interaction, ease of usage, process optimisation, interfacing with external tools and better human - computer interaction.

**■ INDIGO STRENGTHENS INTERNATIONAL CONNECTIVITY FROM EAST INDIA, LAUNCHES DIRECT FLIGHTS CONNECTING KOLKATA WITH DOHA AND DUBAI**



India's leading carrier – IndiGo - announced daily direct flights connecting Kolkata with Dubai and Doha, effective February 16 and March 01, 2020 respectively. Also known as the 'City of Joy', Kolkata witnessed the highest growth of 13.3% in foreign tourist arrivals (FTA) between April-December 2019, among all the metro cities in the country. These flights will further strengthen connectivity from the city to the Middle-East and cater to the growing international traffic to and from Kolkata.

Mr. Ronojoy Dutta, Chief Executive Officer, IndiGo said, "We are pleased to announce new non-stop flights connecting Kolkata with Dubai and Doha to strengthen our connectivity between Middle-East and Asia. Dubai as a destination, witnessed the highest outbound traffic from India on 6E network in 2019, and these new connections will help us cater to and stimulate demand for outbound travel to and from Kolkata. Over the last few years, Kolkata has emerged as a well-known tourist destination, witnessing domestic as well as international tourist growth. These flights will not only promote economic growth and social cohesion but are also a step towards creating corridors of connectivity from the Middle-East to South-East Asia, with Kolkata as the gateway".

Mr. Dutta further added, "We will continue to rapidly expand our network as per the sectoral demand, while offering an affordable, on-time, courteous and hassle-free flying experience to all our customers".

**■ SPICEJET TO INTRODUCE EIGHT NEW INTERNATIONAL AND DOMESTIC FLIGHTS**



In a bid to strengthen its network across Western and Southern India, SpiceJet, the country's favourite carrier, announced the launch of eight new international and domestic flights. All the new flights are scheduled to commence operations in February 2020.

SpiceJet is the first Indian airline to offer direct connectivity between Ahmedabad and Jeddah – Saudi Arabia's commercial capital and a key transit point for thousands of Hajj pilgrims visiting Mecca and Medina. With the introduction of a non-stop flight on the Ahmedabad-Jeddah-Ahmedabad route, SpiceJet hopes that Ahmedabad's international air connectivity will get a major boost. The flight is effective from 20th February, 2020.

SpiceJet has also introduced daily flights on the Ahmedabad- Hyderabad route. The airline has also enhanced its operations with additional frequencies on sectors like Bengaluru – Chennai – Bengaluru (6th frequency), Bengaluru – Vijayawada – Bengaluru (4th frequency). These flights will operate daily except on Tuesdays.

SpiceJet will service the routes using a mix of 90-seater Bombardier Q400 aircraft and 189-seater Boeing 737-800 aircraft. SpiceJet is celebrating the launch by announcing introductory all-inclusive promotional fares starting at INR 12895/- on Ahmedabad – Jeddah and INR 9860/- on Jeddah – Ahmedabad routes.

**■ INDIGO ANNOUNCES AIZAWL AS ITS 62<sup>ND</sup> DOMESTIC DESTINATION**

IndiGo announced Aizawl as its 62nd domestic and 85th overall destination. Mizoram will be the sixth

amongst the eight north-eastern sister states to be connected by IndiGo to its large domestic and international network. The airline already operates flights to and from five North-Eastern states including – Assam (Guwahati), Nagaland (Dimapur), Manipur (Imphal), Tripura (Agartala), Meghalaya (Shillong).

The airline has launched 15 new flights including operations on 6 new RCS routes with 4 of them exclusive to IndiGo. The routes under the Regional Connectivity Scheme include Gorakhpur-Prayagraj (exclusive), Prayagraj-Gorakhpur (exclusive), Aizawl-Agartala (exclusive), Agartala-Aizawl (exclusive), Varanasi-Bhubaneswar and Bhubaneswar-Varanasi. The new routes will be serviced by ATR aircraft.

Mr. William Boulter, Chief Commercial Officer, IndiGo said, "In our mission to promote trade and tourism through increased mobility, we are delighted to add Aizawl as the 62nd domestic destination in our network. These flights reflect our relentless commitment to further strengthening the network within the north-eastern corridors of India, while enabling the Government's "Act East" vision. These flights are a step towards strengthening point-to-point connectivity from various states in the north-east, increasing mobility and accessibility in the region. We will continue to expand as per the sectoral demand, while offering an affordable, on-time, courteous and hassle-free flying experience across our unparalleled network"

**■ BOEING ROLLS OUT FIRST SPACE LAUNCH SYSTEM CORE STAGE FOR DELIVERY TO NASA**



Boeing delivered the core stage of NASA's first Space Launch System (SLS) deep space exploration rocket, moving it out of the NASA Michoud Assembly Facility in New Orleans to the agency's Pegasus barge.

The event marks the first time a completed rocket stage has shipped out of Michoud since the end of the Apollo program. SLS Core Stage 1 is the largest single rocket stage ever built by NASA and its industry partners.

The rollout follows several weeks of final testing and check-outs after NASA's declaration of "core stage complete" during a December 9 Artemis Day celebration at Michoud.

NASA will transport the SLS core stage to its Stennis Space Center in Bay St. Louis, Mississippi, in the next few days for "Green Run" hot-fire engine tests later this year. After inspection and refurbishing for launch, the stage moves to Kennedy Space Center in Florida. At Kennedy, the core stage will be integrated with the Interim Cryogenic Upper Stage (ICPS) and NASA's Orion spacecraft for the uncrewed Artemis I mission around the moon – the first launch of a human-rated spacecraft to the Moon since Apollo 17 in 1972.

"The Boeing SLS team has worked shoulder-to-shoulder with NASA and our supplier partners to face multiple challenges with ingenuity and perseverance, while keeping safety and quality at the forefront," said John Shannon, Boeing SLS vice president and program manager.

SLS is the world's most powerful rocket, evolvable and built to carry astronauts and cargo farther and faster than any rocket in history. Its unmatched capabilities will deliver human-rated spacecraft, habitats and science missions to the moon, Mars and beyond as part of NASA's Artemis program.

"We are applying what we've learned from development of the first core stage to accelerate work on core stages 2 and 3, already in production at Michoud, as well as the Exploration Upper Stage that will power NASA's most ambitious Artemis missions," said Shannon.

**■ SPICEJET TO INTRODUCE FOUR NEW DOMESTIC FLIGHTS**



**S**piceJet, the country's favourite carrier, has announced the launch of four new flights on its domestic network with a special focus on enhancing connectivity between metros and non-metros.

Aurangabad, which SpiceJet added as its 53rd domestic destination last year, will be connected with Ahmedabad with a daily flight. The historic city of Aurangabad is a popular tourism hub and is also one of the fastest growing cities in Asia. The new flight is set to enhance connectivity between two of the most important cities in Western India. The flight is effective from 15th February 2020.

In its constant endeavour to enhance connectivity between metros and smaller cities, SpiceJet will add an additional frequency on the Mumbai-Mangalore-Mumbai (2nd frequency) sector.

SpiceJet will service the routes using a mix of 90-seater Bombardier Q400 aircraft and 189-seater Boeing 737-800 aircraft. All the new flights introduced will be operational daily, except the flight on the Ahmedabad-Aurangabad sector which will operate on all days except Sunday.

SpiceJet is celebrating the launch by announcing introductory all-inclusive promotional fares starting at INR 2999/- on Ahmedabad – Aurangabad and Aurangabad - Ahmedabad routes.

**■ AIRBUS TO ADD A321 PRODUCTION CAPABILITIES IN TOULOUSE**



**F**ollowing its strategy to keep its overall production system at the leading edge of technology and to increase industrial capacity and flexibility, Airbus has decided to create new A321 production capabilities at its site in Toulouse.

By mid-2022 the current A380 Lagardère facility in Toulouse will accommodate a digitally-enabled A321 line as a step to modernise the A320 production system in Toulouse. The new facilities will provide more

flexibility for A321 production, while keeping the overall single-aisle industrial capacity in Toulouse flat.

"We are enjoying an unprecedented high demand for our winning A320neo Family and especially its A321 Long Range (LR) and Xtra Long Range (XLR) derivatives," said Michael Schoellhorn, Airbus Chief Operating Officer. "In order to optimise the industrial flow, we have decided to increase our global A321 production capacity and flexibility as well as to establish a next generation Final Assembly Line in Toulouse."

Currently, the only European Final Assembly Line to assemble A321s is at Airbus' Hamburg site. In addition, the A321 is also being assembled and delivered from Mobile, Alabama, USA.

Toulouse was selected for several reasons such as: overall competitiveness, time to market, investment cost, available floor space and resources. The decision has been communicated to Airbus' social partners.

The A320neo Family is the world's best-selling single aisle with over 7,100 aircraft sold to over 110 customers. Within this family, the A321XLR is the latest evolutionary step which responds to market needs for even more range and payload, creating more value for the airlines. From 2023, it will deliver an unprecedented Xtra Long Range of up to 4,700nm and a 30% lower fuel burn per seat compared with previous generation competitor aircraft. For passengers, the A321XLR's new Airspace cabin will provide the best travel experience, while offering seats in all classes with the same high-comfort as on a long-haul wide-body, with the low costs of a single-aisle aircraft.

**■ AIRBUS ANNOUNCES INCREASED INVESTMENT, EXPANSION OF AIRCRAFT MANUFACTURING IN THE U.S.**





**A**irbus announced that, as part of its plan to produce 63 A320 Family aircraft per month in 2021, the company will expand its industrial footprint in the U.S. by increasing the production rate of A320 family aircraft at its Airbus U.S. Manufacturing Facility in Mobile to seven per month by the beginning of next year. This increase, and continued recruiting for the A220 manufacturing team, will result in a further 275 jobs added at the Alabama-based facility over the next year. The company will also invest another \$40 million through construction of an additional support hangar on the site, bringing its total investment to more than \$1 billion in the Gulf Coast city.

Airbus' announcement comes on top of huge growth in 2019, when the company added 600 new jobs at the manufacturing site. With plans already in place for production of four A220 aircraft per month in Mobile by the middle of the decade, Airbus is on track to produce more than 130 aircraft in Mobile each year for its airline customers.

Reflecting on the growth and continued investment in the U.S., Airbus Americas Chairman and CEO C. Jeffrey Knittel said, "Airbus has been manufacturing in the U.S. for many years now through our helicopter, aircraft and satellite products. This increase in commercial aircraft production in Mobile is an exciting expansion of our significant industrial investment in the U.S., and it continues Airbus' positive contribution to American aerospace."

Knittel continued, "We have invested more than \$1 billion in Mobile because of the terrific team of employees there – and because of the support and welcome we continue to receive from the Gulf Coast community and State and Congressional leaders like Senator Richard Shelby, who has been with us from the beginning. We look forward to building on that strong relationship with our neighbors. This goes beyond jobs to include our support of education initiatives and future workforce development that will positively impact the community for decades to come along the Gulf Coast."

**■ FLY SMART AND STAY CONNECTED IN OVERSEAS WITH GOAIR**



**L**uggage, check. Passport, check. House, light, fan, gas shut, check. Reached airport and checked in. Now, you have to call family or loved ones after landing in an overseas location, but how? Be it for leisure or business travel, most of us get hassled about either forgetting to get an international connectivity or not knowing which network provider to choose.

GoAir has solved this dilemma for its flyers by associating with Matrix Cellular (International) Services Ltd. to provide a hassle-free, one-stop travel solution. Customers booking their international flights on GoAir website can now buy a Matrix International SIM card and collect it from the Matrix outlet at the airports. GoAir is the only Indian airline to provide its customers with such ease of purchasing SIM/Mi-Fi online.

Passengers flying via GoAir can now choose the best suited plan from an array of plans at <https://goair.matrix.in/>. They can now also avail the Mobile Wireless Communication (MiFi) through Matrix Cellular (International) Services Ltd. This device will act as a Wi-Fi router and can connect up to five devices at a time. Matrix offers GoAir passengers with the lowest price plan to Thailand starting at Rs. 599/- . The company also has special price plans for customers flying to Malaysia, Indonesia, China, Hong Kong and Dubai.

This new partnership is directed towards providing a smooth travel experience and help the travelers stay connected while abroad. GoAir has been constantly looking for opportunities to add value to the flying experiences of its passengers. This is evident from 1.4 million passengers voting for GoAir as the number one airline for 'Best Seat Comfort' and 'Best Cabin Service' at the recent APEX Passengers Choice Awards. Now, GoAir customers can not only enjoy the award-winning cabin services and seat comfort but also a seamless connectivity from Matrix.

**■ VISTARA ADDS KATHMANDU TO NETWORK WITH FLIGHTS STARTING 11TH FEBRUARY**



**V**istara, India's finest full-service carrier and a joint venture of Tata group and Singapore Airlines added Kathmandu, Nepal, as the fifth international destination to its fast-growing network. Vistara will operate daily flights between Delhi and Kathmandu starting 11 February 2020, the bookings for which open today, progressively on all channels including Vistara's website [www.airvistara.com](http://www.airvistara.com), Vistara's iOS & Android mobile apps and through travel agents.

Mr. Leslie Thng, Chief Executive Officer, Vistara, said, "We are happy to launch services to Kathmandu, the gateway to a country with significant trade and cultural ties with India. The timing could not have been any better, as Nepal recently kick-started its global tourism campaign, 'Visit Nepal Year 2020' and prepares to welcome 2 million tourists this year. These factors make Kathmandu a promising addition to Vistara's growing network. As India's only five-star carrier, we look forward to contributing to Nepal's tourism growth meaningfully and providing business and leisure travellers alike the finest way to fly between the two countries."

**■ EMBRAERX AND ELROY AIR SIGN AGREEMENT TO COLLABORATE ON UNMANNED AIR CARGO**



**E**mbraerX, Embraer's disruptive business subsidiary, announces its expansion

into the commercial air cargo market, via a collaboration agreement with Elroy Air, at CES 2020. This collaboration will allow the companies to accelerate the unmanned air cargo market worldwide, leveraging Embraer's 50 years of industry experience with Elroy Air's bold new developments in autonomous aircraft systems.

"In order to stay the course of creating solutions that benefit humanity at large, we believe the cargo market is prime for an autonomous aircraft," said Antonio Campello, President & CEO, EmbraerX. "Booming eCommerce is forcing the cargo market to grow and seek new solutions, creating a distinct need for more flexibility. Our holistic approach to accelerating this market will include working with Elroy Air and its Chaparral system, capable of delivering cargo (250-500 lbs) over distances up to 300 miles, as well as our work in associated services and air traffic management solutions."

"Elroy Air aims to open a new chapter for the logistics market with point-to-point autonomous aerial cargo systems" said Dave Merrill, CEO of Elroy Air. "Elroy Air's Vertical Takeoff and Landing (VTOL) cargo delivery aircraft, the Chaparral, will operate without airports or charging stations, and is optimized for freight with automated cargo loading and unloading. Our collaboration with EmbraerX will accelerate our path to deployment in commercial freight markets."

This collaboration is part of EmbraerX's multi-project approach to further develop the air mobility ecosystem and create the conditions for people and goods to move from A to B in a seamless and affordable way. Beyond cargo, EmbraerX is engaged in several projects, including the development of an Urban Air Mobility focused eVTOL, a tailored Urban Air Traffic Management (UATM) system and a fleet-agnostic business platform, designated Beacon, to streamline services.

**■ SPIRIT AIRLINES FINALISES ORDER FOR 100 AIRBUS A320NEO FAMILY AIRCRAFT**

U.S.-based Spirit Airlines has finalized a purchase agreement with Airbus for 100 A320neo Family aircraft. In October, the

two parties had signed and announced a memorandum of understanding (MoU) for the purchase of up to 100 of the aircraft – a mix of A319neo, A320neo, and A321neo – to meet the airline's future fleet requirements.

Spirit is based in South Florida and is the fastest-growing airline in the United States, with flights throughout the U.S., Latin America and the Caribbean. The airline will announce an engine selection at a later date.

Featuring the widest single-aisle cabin in the sky, the best-selling A320neo Family, comprising the A319neo, A320neo, and A321neo, will deliver a fuel-burn reduction of approximately 20% as well as 50 percent less noise compared to previous generation aircraft, thanks to incorporating the very latest technologies including new generation engines and Sharklets.

Firm orders worldwide for the A320neo Family now have surpassed 7,300 from more than 110 global customers.

**■ BOEING AND U.S. NAVY COMPLETE FIRST SUPER HORNET IRST BLOCK II FLIGHT**



For the first time, Boeing and the U.S. Navy flew an F/A-18 Super Hornet equipped with an Infrared Search & Track (IRST) Block II pod in late 2019. IRST Block II is a critical component of the Block III Super Hornet. The Block III conversion will include enhanced network capability, longer range with conformal fuel tanks, an advanced cockpit system, signature improvements and an enhanced communication system. The updates are expected to keep the F/A-18 in active service for decades to come.

IRST is a passive, long-range sensor incorporating infrared and other sensor technologies for highly accurate targeting.

"The IRST Block II gives the F/A-18 improved optics and processing power, significantly improving pilot situational awareness of the entire battle space," said

Jennifer Tebo, Boeing Director of F/A-18 Development.

Currently in the risk reduction phase of development, IRST Block II flights on the Super Hornet allow Boeing and the Navy to collect valuable data on the system before deployment to the fleet. The Block II variant will be delivered to the Navy in 2021, reaching Initial Operational Capability shortly thereafter.

"The IRST Block II sensor gives Navy fighters extended range and increasing survivability. This technology will help the Navy maintain its advantage over potential adversaries for many years," said Kenen Nelson, Lockheed Martin Director of Fixed Wing Programs, supplier of the IRST sensor.

**■ BOEING STATEMENT ON 737 MAX RETURN TO SERVICE**



As we have emphasized, the FAA and other global regulators will determine when the 737 MAX returns to service. However, in order to help our customers and suppliers plan their operations, we periodically provide them with our best estimate of when regulators will begin to authorize the ungrounding of the 737 MAX.

We are informing our customers and suppliers that we are currently estimating that the ungrounding of the 737 MAX will begin during mid-2020. This updated estimate is informed by our experience to date with the certification process. It is subject to our ongoing attempts to address known schedule risks and further developments that may arise in connection with the certification process. It also accounts for the rigorous scrutiny that regulatory authorities are rightly applying at every step of their review of the 737 MAX's flight control system and the Joint Operations Evaluation Board process which determines pilot training requirements.

Returning the MAX safely to service is our number one priority, and we are confident that will happen. We acknowledge and regret

the continued difficulties that the grounding of the 737 MAX has presented to our customers, our regulators, our suppliers, and the flying public. We will provide additional information about our efforts to safely return the 737 MAX to service in connection with our quarterly financial disclosures next week.

## ■ AIRBUS BELUGAXL ENTERS SERVICE, ADDING XL CAPACITY TO THE FLEET



The BelugaXL has entered into service, providing Airbus with 30% extra transport capacity in order to support the ongoing production ramp-up of commercial aircraft programmes.

The aircraft, which is an integral part of Airbus' industrial system, made its first operational flight on 9 January. This is the first of six BelugaXL to begin work alongside the BelugaST predecessors, with the additional aircraft being introduced between 2020 and 2023.

Launched just over five years ago, in November 2014, the entry into service milestone marks yet another successful achievement for the internal aircraft programme that was awarded Type Certification by the European Aviation Safety Agency (EASA) in November 2019, following an intensive flight test campaign that saw the BelugaXL complete more than 200 flight tests, clocking over 700 flight hours.

At 63 metres long and 8 metres wide, the BelugaXL has the largest cargo bay cross-section of all existing cargo aircraft worldwide. The BelugaXL can carry two A350 XWB wings compared to the BelugaST, which can only carry one. With a maximum payload of 51 tonnes, the BelugaXL has a range of 4,000 km. (2200nm).

The BelugaXL is based on an A330-200 Freighter, enabling the re-use of existing components and equipment, and is powered by Rolls-Royce Trent 700 engines. The lowered cockpit, the cargo bay structure and the rear-end and tail were newly developed

jointly with partners, giving the aircraft its distinctive look.

The BelugaXL is the latest addition to Airbus' transportation portfolio. While air transport remains the primary method for transporting large aircraft components, Airbus also uses road, rail and sea transport to move parts between its production sites. Like the BelugaST, the aircraft will operate from 11 destinations in Europe, continuing to strengthen industrial capabilities and enabling Airbus to deliver on its commitments.

## ■ AIRBUS DEMONSTRATES FIRST FULLY AUTOMATIC VISION-BASED TAKE-OFF

Airbus has successfully performed the first fully automatic vision-based take-off using an Airbus Family test aircraft at Toulouse-Blagnac airport. The test crew comprising of two pilots, two flight test engineers and a test flight engineer took off initially at around 10:15 am on 18 December and conducted a total of 8 take-offs over a period of four and a half hours.

"The aircraft performed as expected during these milestone tests. While completing alignment on the runway, waiting for clearance from air traffic control, we engaged the auto-pilot," said Airbus Test Pilot Captain YannBeaufils. "We moved the throttle levers to the take-off setting and we monitored the aircraft. It started to move and accelerate automatically maintaining the runway centre line, at the exact rotation speed as entered in the system. The nose of the aircraft began to lift up automatically to take the expected take-off pitch value and a few seconds later we were airborne."

Rather than relying on an Instrument Landing System (ILS), the existing ground equipment technology currently used by in-service passenger aircraft in airports around the world where the technology is present, this automatic take-off was enabled by image recognition technology installed directly on the aircraft.

Automatic take-off is an important milestone in Airbus' Autonomous Taxi, Take-Off & Landing (ATTOL) project. Launched in June 2018, ATTOL is one of the technological flight demonstrators being tested by

Airbus in order to understand the impact of autonomy on aircraft. The next steps in the project will see automatic vision-based taxi and landing sequences taking place by mid-2020.

Airbus' mission is not to move ahead with autonomy as a target in itself, but instead to explore autonomous technologies alongside other innovations in areas such as materials, electrification and connectivity. By doing so, Airbus is able to analyse the potential of these technologies in addressing the key industrial challenges of tomorrow, including improving air traffic management, addressing pilot shortages and enhancing future operations. At the same time Airbus is leveraging these opportunities to further improve aircraft safety while ensuring today's unprecedented levels are maintained.

For autonomous technologies to improve flight operations and overall aircraft performance, pilots will remain at the heart of operations. Autonomous technologies are paramount to supporting pilots, enabling them to focus less on aircraft operation and more on strategic decision-making and mission management.

## ■ NORDIC AVIATION CAPITAL FINALISED ORDER FOR 20 A220 FAMILY AIRCRAFT

Nordic Aviation Capital (NAC), the leading lessor of regional aircraft, signed at the end of 2019 a firm order for 20 A220 Family aircraft.

This latest order from NAC, counted in the 2019 order-book, is a huge endorsement and affirms the strong market demand for the state-of-the-art, fuel-efficient A220 Family.

"NAC's order for the A220 shows this aircraft is just as relevant in the regional world as it is in the mainline one," said Christian Scherer, Airbus Chief Commercial Officer. "We are delighted to work with NAC going forward, we thank them for their confidence and congratulate them on their new offices in Limerick."

NAC is today the largest lessor of regional aircraft in the world, managing and owning 500 aircraft on lease to 78 airline customers in over 50 countries.

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## Elbit Systems Successfully Demonstrates High-Altitude High-Precision Aerial Fire fighting Solution

**E**lbit Systems completed a successful field demonstration of its patented Hydrop system, an innovative solution enabling high-altitude high-precision aerial firefighting. The field demonstration took place recently as part of an exercise led by the Israel Fire and Rescue Authority. During the exercise two Air Tractor aircraft from the Israeli Fire Fighting Squadron were directed to extinguish a burning field, from as high as 500 ft., more than four times higher than the average altitude of a standard aerial firefighting sortie. Using the HyDrop system each aircraft launched 1.6-tons of 140-gram liquid pellets in a computed ballistic trajectory, achieving a precise hit with saturation of 1-2 liter per 1 square meter.

Since 1953, aerial firefighting has been carried out using liquid cascade drop methods that require sorties to be conducted at an altitude of a 100-120 ft. in order to reduce liquid loss caused by the aerosol effect. Such low-altitude flights are restricted to daytime due to safety concerns and Civil Aviation regulations. The experience from around the globe clearly shows that restricting aerial firefighting to daytime severely degrades its operational contribution. Addressing this needs gap, Elbit Systems developed the Hydrop system that enables a high-precision computed launch of bio-degradable liquid pellets from 500-2,000 ft., altitudes that are safe and certified for night-flight by Civil Aviation.

With Helicopter, Fixed-wing and Heavy Lifter configurations, Hydrop integrates fighter aircraft avionics including a ballistic computer, command and control (C2) system and advanced display systems, together with liquid pellets stored in a specially designed airborne dispenser. The C2 unit navigates the aircraft to the drop point while the ballistic computer produces an accurate launch trajectory, taking into account aircraft velocity, altitude, GPS location, wind conditions and the weight and shape of the liquid pellets. In addition to lifting the restriction on nighttime aerial firefighting, this high-altitude system improves pilots safety and increases the effectiveness of aerial firefighting, during day and night, by eliminating the liquid loss caused by the aerosol effect.

The Hydrop system includes a pellets manufacturing machine (static or mobile). Housed in a standard 20'-container, the manufacturing machine can produce up to 10 tons of pellets per hour. The biodegradable pellets which can be filled with either water, foam or fire retardant, have been proved to have no harmful residues and their dropping has also been tested and found to be safe to crews on the ground.

## Lockheed Martin Ships Mobile Communications Satellite To Launch Site

**L**ockheed Martin shipped its third satellite based on the modernized LM 2100™ bus to French Guiana for launch aboard an Ariane V rocket. JCSAT-17 will provide flexible mobile communications services to users in Japan and the surrounding region. Arianespace will launch JCSAT-17 from its spaceport in Kourou.

JCSAT-17 is the first Mobile Satellite Service (MSS) communications satellite built on the modernized LM 2100™, which includes 26 innovations that make the satellite more powerful, flexible and versatile in orbit. A reprogrammable mission processor adds flexibility as mission needs change. Lockheed Martin is currently manufacturing five modernized LM 2100™-based satellites for commercial and government customers.

"Following two successful launches of LM 2100™ commercial communications satellites, Lockheed Martin is proud to deliver JCSAT-17 to SKY Perfect JSAT Corporation (SJC), which will add a tremendous amount of new connectivity for users in Japan," said Guy Beutelschies, Lockheed Martin's Vice President for Communication Satellite Solutions. "This satellite will help grow Japan's advanced economy by adding new options for mobility, bandwidth where it's needed, and reliable connections."

The satellite's payload incorporates S-band and C-band transponders with a flexible processor along with 18m mesh reflector, enabling assured communications continuity during high-volume events. The satellite also features robust Ku-band connectivity. JCSAT-17 is the eighth satellite built by Lockheed Martin for SJC, beginning with NSAT-110, JCSAT-9 through JCSAT-13 and JCSAT-110R.





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

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

The several defence projects that Airbus India is participating in will lead to the creation of thousands of jobs, skilling of people, technology absorption and will catalyse the local supplier base. Airbus currently works with more than 45 suppliers in India, and the annual procurement from them is worth more than \$650 million. Airbus' network of dedicated Indian suppliers provides engineering and IT services, aerostructures and materials for several of Airbus' leading aircraft. Over 7,000 people, including 1,500 engineers, are currently employed across Airbus projects in the country.

## Airbus to showcase world-class technology at DefExpo

Airbus will showcase its best-in-class military products and cutting-edge defence technologies at the DefExpo airshow between February 5 and 8, 2020, in Lucknow, Uttar Pradesh, India. Airbus' exhibits at the show will demonstrate its capabilities

and commitment to kick-start a defence industrial base in the country.

Airbus will exhibit at Stand S46, Hall 07. Visitors to the stand will find scale models of the highly versatile C295 aircraft which is proven around the world as a tough, reliable and high-performance workhorse with outstanding lifecycle costs and excellent performance on short or unpaved runways. Airbus has bid to manufacture the C295 in India together with Tata Advanced Systems. The visitors will also learn about the combat-proven A330 MRTT, the only new generation aerial refueller in full service today.



## Tania Sher Gill Is The First Woman Officer To Lead Men In Army Day Parade

It is a day to remember and a day of one of the most memorable firsts in the Indian Army. Traditionally a bastion which has but reluctantly opened its gates to women, Indian Army gave an honour which would have been unthinkable even in the recent past to the women of the nation by making a woman lead the Army day Parade 2020. The decade started definitely with a two great firsts, the CDS and now Captain Tania Sher Gill who led the parade.

Tania Sher Gill is a fourth-generation army officer, who joined the Corps of Signals of Army in 2017 after graduating from the Officers Training Academy in Chennai. She has completed B Tech Electronics & Communication. Her father was in 101 Med Regiment (Artillery), grandfather was from the 14th Armoured Regiment (Scinde Horse) and her great-grandfather was in the SIKH Regiment. A military lineage any girl would be proud of.

She led an all-men contingent as the Parade Adjutant making January 15 2020 a red letter day in military history of India. Last Year, Capt Bhavna Kasturi from ASC was the first woman officer to lead an all-men contingent on Republic Day.

## Boeing to showcase advanced defense and services capabilities at DefExpo 2020

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

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

Boeing's exhibit at Hall 3, Booth S16 with the theme

'Building The Future Together' will focus on its partnerships with India's armed forces, and highlight the strategic investments the company has made in developing India's indigenous aerospace and defense ecosystem. These include the engineering and technology centre in Bengaluru and Chennai, the joint venture with Tata Advanced Systems, and work with over 200 suppliers and partners in support of "Make in India" and "Skill India."

"We're honoured to support India's armed forces with advanced platforms such as the P-8I, C-17, AH-64 Apache and the CH-47 Chinook that are delivering superior capabilities. Additionally, our support

and services have played a significant role in ensuring enhanced operational readiness," said SalilGupte, president, Boeing India. "We continue to remain committed to strengthening the Indian aerospace ecosystem and look forward to engaging with our customers, partners and industry at DefExpo 2020."

Boeing will also provide visitors a virtual flying experience with the F/A-18 Super Hornet Block III simulator to understand a wide range of missions, carrier-based aviation and capabilities the aircraft can offer the Indian Navy. The F/A-18 Super Hornet serves as the frontline multi-role fighter of the U.S. Navy and air forces of several countries, and is currently on

offer to the Indian Navy and Indian Air Force. The combat proven F/A-18 Block III Super Hornet will bring the most contemporary next generation warfighter technologies to the Indian Navy through battlespace situational awareness, counter stealth targeting, greater range and improved survivability, reduced radar signature and room for growth.

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

## Lockheed Martin to Deliver 50 C-130Js to U.S. Government Via Multiyear III Award

Lockheed Martin will deliver 50 C-130J Super Hercules to the U.S. government through a C-130J Multiyear III award, which was finalized by the U.S. government on Dec. 27, 2019. The award comes as a delivery order under an existing Indefinite Delivery Indefinite Quantity contract awarded in August 2016.

The Department of Defense awarded more than \$1.5 billion in funding for the first 21 C-130J aircraft on the multiyear award. The overall award, worth more than \$3 billion, provides Super Hercules aircraft to the U.S. Air Force (24 HC/MC-130Js), Marine Corps (20 KC-130Js) and Coast Guard (options for six HC-130Js). Aircraft purchased through the C-130J Multiyear III award will deliver between 2021-2025, and will be built at Lockheed Martin's Marietta, Georgia, facility.

"The C-130J Multiyear III award represents a joint commitment between Lockheed Martin and the U.S. government in delivering proven capability that meets our operators' mission and affordability requirements," said Rod McLean, vice president and general manager, Air Mobility & Maritime Missions at Lockheed Martin. "Our

partnership with the U.S. government provides significant savings through multiyear procurement as compared to annual buys, and provides the best tactical airlifter to crews who fly and support the world's largest Super Hercules fleet."

The C-130J Super Hercules is the global standard in tactical airlift, providing a unique mix of versatility and performance to complete any mission — anytime, anywhere. The Super Hercules worldwide fleet has more than 2 million flight hours and is the airlifter of choice for 20 nations.





## Maiden landing of DRDO-developed LCA Navy onboard INS Vikramaditya

After completing extensive trials on the Shore Based Test Facility (SBTF), Naval version of Light Combat Aircraft (LCA) did a successful arrested landing onboard INS Vikramaditya at 1002 hrs on January 11. Commodore Jaideep Maolankar conducted the maiden landing. Captain Dahiya was the Landing Safety Officer (LSO) and Cdr Vivek Pandey Test Director on ship whereas Gr. Capt. Kabadwal and Cdr Ankur Jain were monitoring the aircraft through telemetry from SBTF. LCA Navy has been developed by Defence Research and Development Organisation (DRDO).

Secretary, Department of Defence R&D & Chairman DRDO Dr G Satheesh Reddy has congratulated DRDO, Aeronautical Development Agency (ADA), Indian Navy, Hindustan Aeronautics Limited (HAL), Council of Scientific and Industrial Research (CSIR) and Directorate General of Aeronautical Quality Assurance (DGAQA) teams.

## BAE Systems Announces Proposed acquisition of Collins Aerospace's Military Global Positioning System Business and Raytheon's Airborne Tactical Radios Business

BAE Systems, Inc. announced January 20th that it has reached definitive agreements for the proposed acquisitions of Collins Aerospace's military Global Positioning System (GPS) business and Raytheon's Airborne Tactical Radios (ATR) business.

These two high-performing businesses are being sold in connection with obtaining the required antitrust clearances for the previously announced pending merger between Raytheon and United Technologies Corporation (UTC).

The proposed acquisitions are structured as asset transactions with associated tax benefits, and they remain subject to

customary closing adjustments. The asset purchase agreement for the Collins military GPS business calls for cash of \$1.925 billion, with an expected tax benefit of approximately \$365 million. For Raytheon's ATR business, the purchase agreement calls for cash of \$275 million, with an expected tax benefit of approximately \$50 million.

"As militaries around the world increasingly operate in contested environments, the industry-leading, battle-tested products of these two businesses will complement and extend our existing portfolio of solutions we offer our customers," said Jerry DeMuro, CEO of BAE Systems, Inc.

"This unique opportunity to acquire critical radio and GPS capabilities strengthens our position as a leading provider of defense electronics and communications systems, and further supports our alignment with the modernization priorities of the U.S. military and its partners."

These proposed acquisitions are subject to the successful closure of the Raytheon-UTC transaction, as well as the satisfaction of other customary closing conditions, including receipt of the required U.S. regulatory approvals. Upon closure, both business lines would be integrated into the company's Electronic Systems sector.

"These are strong businesses with talented employees who share our focus on quality and technology innovation," said Tom Arseneault, President and COO of BAE Systems, Inc. "We are confident of a smooth transition that will accelerate our future together and look forward to welcoming these new employees to the BAE Systems team once the transactions are approved."

# Singapore AirShow 2020

All that you  
need to know

The Changi Exhibition Centre is all set to host the seventh edition of the biennial Air Show to be held from Feb 11-16. Experia Events which happens to be the organiser of the Singapore Air Show 2020, is expecting more than 65 of the top 100 aerospace and defence companies to participate in the aerospace show, which is reportedly the largest in Asia. In total, over 1,000 companies from 50 countries, and about 55,000 trade attendees from 150 countries are expected to be in the Republic. Presumably, there will be a 5 percent increase in the participation coming from private companies in China especially, with an urge to push their products further wide into the international market. It includes the wide-body CRJ929 aircraft, developed by Russia and China together to challenge the duopoly held by US-made Boeing and Europe's Airbus. Although, there exists a long line of

geo-political tension between US and China, in all probability it won't affect the participation numbers at the event, in any aspect. Several new business-aviation aircraft will make their Asia-Pacific airshow debuts with static displays, including the Dassault Falcon 6X and the Embraer Praetor 500. In essence, the Singapore Airshow shall also provide a platform for more than 60 start-ups to showcase their products to industry leaders. Leck Chet Lam, Managing director for Experia Events made a point saying that the Asia-Pacific region is expected to account for no less than 44 per cent of global growth in terms of air passengers over next two decades in question. "The Singapore Airshow is where global leaders meet and forge strategic partnerships, and also where game-changing innovation can be showcased," said Mr Leck. Similar to all previous editions, the show will be opening its doors to one and all trade visitors starting from Feb 11-14, 2020.

## A solar powered event

For the very first time in its 12 year history, the Singapore Air show is going to be fully solar powered as 15,000 solar panels (capable of generating 7,840 megawatt hours of power annually) have already been installed across the building roof. The idea to make the event solar powered is in line to realize the goals of environmental sustainability as told by Managing Director Lam in a recent press briefing. Further, the exhibitors in the event will take charge to incorporate environmentally-friendly technologies for a wide range of products and services, either through electric or hybrid engines, or via streamlining the entire manufacturing processes to help reduce





the required resource input. Through their endeavours, the Airshow organizers are proud to do their bid in contributing towards reducing carbon footprint and look forward to foster support and partnership combating climate change issues in future editions as well.

### The Singapore Airshow Aviation Leadership Summit

An integral part of the Airshow, the Aviation Leadership Summit shall comprise of three key topics namely; Capacity, Technology and Sustainability. Together, it aims to reflect on some of the most pressing concerns of the Aviation Industry in recent times, with individual viewpoint discussion from leaders. Han Kok Juan is the acting chairman of the organising committee for the summit and also the deputy secretary of Hub Strategy at the Ministry of Transport.

Mr. Han in his addressing to the media said that the industry is headed towards a period of "headwinds and turbulence" harping on the element of globalisation currently under immense pressure which in turn is doing no



good to aviation as a business. Reportedly, the summit also presents before the industry leaders an unique opportunity to assume stock and discuss their variable views to propel forward.

### Other key initiatives

Among other key initiatives which form a part of the Airshow include "Talent Development" programmes like Aero Campus and Education Days. All these programs have been specially designed to





cater to the youth and are meant to pique the interest of youngsters who have a penchant for aerospace technology. Besides, it also functions to connect all graduating students with prospective companies who are looking to hire candidates.

The Innovation Forum is yet another offering at the Singapore Airshow where

industry leaders like Boeing HorizonX and EmbraerX will take the centre stage to discuss the theme of Urban Mobility. In the words of Mr. Leck, "We all want to take an autonomous air taxi, we want to go into those futuristic vehicles that we see, so the speakers from all these leading companies will be here to talk about their innovation, their timeline, how

their products are evolving and how they'll fit into our day-to-day lives."

Lastly, the A\*STAR Aerospace Technology Leadership Forum, the Singapore Aerospace Technology & Engineering Conference and the inaugural Aerospace Media Awards Asia will also be co-located at the Airshow.

### Wrap up

The Airshow shall remain open for the general public from Feb 15-16; from 9.30am to 5pm. Although, there isn't much detail available on the aerial displays, but it is speculated that the public can get a glimpse of the Republic of Singapore Air Force's newly acquired F-35B fighter jets in action. Reportedly, the F-35B is Singapore's very first short take-off and vertical landing (STOVL) aircraft priced at S\$155 million each, and also happens to be the most expensive fighter jet of Singapore. Indian aviation start-ups will also be a prominent part of the show and are expected to pitch support towards industry heavyweights such as Boeing, Airbus and others in the row.



## Calhoun Begins Role as Boeing President and CEO

David L. Calhoun assumed the role of president and chief executive officer of The Boeing Company

"With deep industry experience and a proven track record of performance, Dave is the right leader to navigate Boeing through this challenging time in our 104-year legacy," said Lawrence W. Kellner, chairman of the Boeing Board of Directors. "We're confident Dave will take Boeing forward with intense focus on our values, including safety, quality and integrity."

"We also want to thank Greg Smith for his leadership as interim CEO and are pleased Boeing will continue to benefit from his contributions as he returns to the role of Boeing chief financial officer and executive vice president of Enterprise Performance & Strategy," concluded Kellner.

Calhoun, 62, has served in various senior leadership roles within several large-scale enterprises including at the Blackstone Group, Nielsen Holdings and GE. During his 26-year tenure at GE, he led multiple business units including GE Transportation and GE Aircraft Engines where safety was paramount. He has served on the Boeing Board of Directors since 2009 and served as chairman from October 11 to December 22, 2019.

"I'm honored to lead the talented people of Boeing as we face our challenges. Working together, we will strengthen our safety culture, improve transparency and rebuild trust with our customers, regulators, suppliers and the flying public," said Calhoun. "With the strength of our team, I'm confident in the future of Boeing, including the 737 MAX."



## Airbus Helicopters appoints Laurence Petiard as Head of External Communications

Laurence Petiard has been appointed Head of External Communications for Airbus Helicopters, effective January 2020. In this new role, she will be in charge of coordinating Airbus Helicopters' media relations, web, and social media activities. Laurence has worked for the last five years in the Airbus Helicopters media relations department, where she was in charge of external communications for a variety of civil and military helicopter programmes, while also acting as the main contact for French media, amongst others.



She has been with the company since 2005 in various project management roles, including four and half years with the H160 programme team. A Franco-British citizen, Laurence holds an MA (Hons) in English Literature from the University of Glasgow in Scotland with additional media relations certification from the Parisbased school of Journalism (ESJ-Pro). As Airbus Helicopters' new Head of External Communications, Laurence succeeds Guillaume Steuer, who was appointed Head of External Communications for Airbus at the end of 2019.

## Gulfstream names Matt Baer as Regional Vice President

Gulfstream Aerospace announced the promotion of Matt Baer to regional vice president of Sales for the northeastern U.S. and eastern Canada.

Baer joined Gulfstream in the spring of 2019 as a regional sales manager for the northeastern region. Prior to that, he was a vice president of global corporate aircraft finance with Bank of America Merrill Lynch. He has worked in the aviation industry for a decade and is a licensed pilot. Baer earned a bachelor's degree in business marketing management from the University of St. Thomas in St. Paul and Minneapolis, Minnesota. Baer is based in Gulfstream's Manhattan Sales and Design Center and reports to Peter Vasconcelos, regional senior vice president of Sales for the northeastern U.S. and eastern Canada.



## Carroll Lane Named President of Commercial Engines, Pratt & Whitney

Pratt & Whitney announced that Carroll Lane has assumed the role of President of the company's Commercial Engines business, reporting to Pratt & Whitney President Christopher Calio. Pratt & Whitney is a division of United Technologies Corp. (NYSE: UTX). The appointment was previously announced during the UTC Earnings call in October.

"Carroll is uniquely positioned to help Commercial Engines continue its transformation," said Mr. Calio. "Carroll brings a wealth of experience to the organization with an understanding of the aerospace industry and key experiences in strategic leadership. I look forward to working with him to implement Pratt & Whitney's long-term strategy and ensuring we meet our



commitments to customers, employees and shareowners."

Carroll Lane succeeds Mr. Calio in this role; Mr. Calio was named President of Pratt & Whitney last year, with an effective date of January 1, 2020, succeeding Bob Leduc, who

retired from the company after more than four decades of service.

Mr. Lane returns to Pratt & Whitney after leading Investor Relations for United Technologies Corporation, where he was responsible for developing and implementing strategies that position UTC as a preferred investment to domestic and international investor communities.

Mr. Lane first joined the UTC Corporate Office in 2012 as director, Corporate Strategy & Development. In 2014, he transferred to Pratt & Whitney as the senior director, Customer Solutions, and served in positions of increasing responsibility including vice president, Commercial Aftermarket. Prior to joining UTC, he was a director with CSP Associates, an Aerospace & Defense advisory firm in Cambridge, MA. Mr. Lane served in the United States Marine Corps as a Naval Aviator.

## RAFAEL has appointed EVP Dr. Ran Gozali as head of the Land and Naval Systems Division



RAFAEL Advanced Defense Systems Ltd. announces it has appointed EVP Dr. Ran Gozali as head of the company's Land and Naval Systems Division. Dr. Gozali is replacing Mr. Moshe Elazar who has been appointed as CEO of Aeronautics, recently purchased by RAFAEL and Mr. Avichai Stolero.

Dr. Gozali (50 years old) holds a BSc. from the University of Be'erSheva, an MSc. in electrical engineering from Haifa's Technion and a PhD. from Virginia Tech.

Dr. Gozali joined RAFAEL in 2004, and has since then served in various senior managerial-technological capacities. Between the years 2011-2014, Dr. Gozali served as CEO of Goji, and upon returning to RAFAEL, he was appointed as head of the company's R&D and Engineering Division, presiding over more than 2500 engineers and scientists.

RAFAEL'S Land and Naval Systems Division is responsible for the development, manufacturing and marketing of comprehensive and integrated solutions in the areas of precise missiles (SPIKE Family), maneuvering and NCW, survivability and armor protection (TROPHY), naval warfare systems and many more.

RAFAEL's CEO and President, Maj. Gen. (Ret.) Yoav Har-Even stated that Dr. Gozali brings with him vast managerial experience, as well as deep knowledge and through understanding of technological and operational requirements, a combination that will allow him to propel the division forward towards its goals and challenges in Israel and around the world.

Har-Even thanked Moshe Elazar for his numerous achievements as head of the division, and stated his confidence in Elazar's ability to utilize his knowledge, experience and talent to achieve his goals in his new role at Aeronautics under its new ownership.

## CAE Appoints Todd Probert As Group President, Defence & Security



CAE has appointed Todd Probert as Group President, Defence & Security, effective January 27, 2020. He will be based in Washington, DC and is succeeding Gene Colabatistto, who retired from CAE in December 2019.

"I am very pleased to welcome Todd Probert to CAE's executive management team, as our new Group President, Defence & Security. He is a proven strategic business leader with the right balance of technical, business and international experience in defence and technology," said Marc Parent, CAE's President and Chief Executive Officer. "Todd's competencies and background are very well aligned with CAE's emphasis on digital innovation and our long-term vision to be the training partner of choice. His ability to drive business growth and create strategic partnerships will bring significant value to our company and our defence customers."

Probert worked for Raytheon, the world's fourth largest defence company, over the past 10 years. Most recently, he was leading the Command, Control, Space & Intelligence business unit as part of Raytheon's Intelligence, Information

and Services segment. In this role, he spearheaded Raytheon's use of commercial software development practices and artificial intelligence for military and intelligence community customers in addition to establishing strategic relationships with Silicon Valley companies. He previously served as the Vice President of Raytheon's Mission Support & Modernization product line where he steadily grew the business during his tenure. He has formed innovative partnerships with leading tech companies to transform the development timelines and delivery of capabilities to the U.S. Department of Defense in areas such as fully open architectures, artificial intelligence and cyber security. He also held the position of Vice President, Engineering and Technology, where he managed the engineering workforce for Raytheon's Intelligence, Information and Services portfolio.

Probert holds a master's degree in aeronautical and astronautical engineering from Purdue University, where he was named Outstanding Aerospace Engineer of the Year in 2017. He has a bachelor's degree in aerospace engineering from the University of Michigan.

## Alok Verma Takes-over as Director (HR) at HAL

Mr. Alok Verma took over as Director (Human Resources) of HAL here on January 1. Prior to this, he was General Manager (HR) at the Corporate Office.

"In these challenging times my focus would be on developing the HR function as a strategic contributor to business outcomes with new initiatives", he says. His endeavor has been to develop systems that seek to create a learning organization and a performance driven culture.

Mr Verma joined HAL in 2006 after serving National Fertilizers Limited for 19 years. A post-graduate in Labor and Social Work (LSW), he also holds Law degree and PG diploma in computer applications. He has vast and diverse experience of over three decades in the HR function. Mr.Verma was instrumental in transforming the Employee-Management relations at Hyderabad Division and played a key-role in settlement of the workmen wage revision and signing of the MoU, recently.



# STRATEGIES FOR HIGHER PRODUCTIVITY IN CIVIL AVIATION

*PREPARED BY: SURENDER PANDITA*

## ABSTRACT

To remain profitable amid the fierce competition post deregulation and for their own survival and sustainability, the airlines have to manage their operations very well and more efficiently. Airlines use a number of different resources to provide transportation services for their passengers. It is the planning and efficient management of these resources that determines the survival or demise of an airline. The sustainability of airline industry is an apt example of the 'survival of the fittest.' The airline industry operates in a very dynamic and uncertain

environment. A low flexibility to respond to changes, highly inter-dependent resources and State regulations make the airline industry a complex environment. Two critical elements affecting competitiveness are quality and productivity. This paper identifies some of the variables that affect the productivity in airlines and recommend the strategies that airlines can follow to improve their productivity and competitiveness.

## INTRODUCTION

Historically the Aviation Sector has been operating in the most competitive business

environment. The passing of the Airline Deregulation Act of 1978 by The United States resulted in major structural changes in the US airline industry. Airlines were now free to select their Networks and Fares. This encouraged new airline players to enter the market. Therefore the existing airlines had to compete not only among themselves but with the newly formed airlines as well.

In India, East-West Airlines was the first national-level private airline to operate after the government de-regularized the civil aviation sector in 1991. Many private airlines such as Jet Airways, AirSahara, Modiluft, Damania Airways and NEPC Airlines and others started their domestic operation. Air transportation and Air Travel in India and therefore the civil aviation sector attracted a lot of attention due to increased demand from growing middle class population, favourable demographics, high economic growth, and higher disposable incomes. The industry is traversing on a progressive trajectory and has paved way for a new wave of growth and expansion with the focus on Low Cost Carriers (LCC), modern airports, Foreign Direct Investments (FDI) in domestic airlines, Technological developments and regional connectivity(RCS).

But Indian aviation industry struggled due to economic slowdown, rising fuel and operation costs. This led to interruptions, M&A and consolidation in the Indian airline



industry. In 2007, Air Sahara was acquired by Jet Airways and Air Deccan was acquired by Kingfisher Airlines. Paramount Airways stopped operations in 2010 and Kingfisher did completely shut down in 2012. Etihad Airways agreed to acquire 24% stake in Jet in 2013. Air Asia India, a low-cost carrier operating as a joint venture between AirAsia and Tata Sons launched in 2014. Vistara, another carrier was established as a joint venture between Tata Sons and Singapore Airlines.

**PRODUCTIVITY**

To be successful in the commercial aviation industry, Efficiency and Productivity are the key elements. Often the terms productivity and efficiency are used interchangeably but it is important to understand that both are separate but related concepts. Productivity is essentially a measure of efficiency that shows how effectively and optimally an airline utilizes its resources. Productivity can be measured and expressed in many different ways. For example, in a production unit productivity might be measured in terms of the number of man-hours it takes to produce one product, while in the service sector productivity might be measured in terms of the revenue generated by an employee divided by the number of hours worked. Hence, productivity is concerned with the ratio of outputs over inputs. Therefore, Productivity measurement would need clearly defined inputs and outputs that can be quantified.

Airlines use various inputs such as airplanes, which consume fuel and require maintenance, repair and overhaul, use technology, ground handling and also require other materials and services to support their operations. They employ Pilots, Cabin Crew, Aircraft Maintenance Engineers, Technicians, Ground Crew and other personnel to support the flying and other operations. Airlines also engage in non-airline businesses which are often referred to as incidental or ancillary services, and are considered as part of an airline’s outputs. In a sense airlines really don’t have any clearly defined and quantifiable outputs and inputs.

**Parameters which affect Productivity & Efficiency in Airlines**

Based on the analysis of various variables or Factors that formed the inputs and outputs in majority of the cases in the airline productivity and efficiency studies and also on the basis of our own understanding of and experience in the field, we have selected the following variables as inputs and outputs:

**Input variables:**

- 1. Aircraft Utility; 2. Average number of employees; 3. Service Quality

**Output variables:**

- 1. Available Seat miles (ASM); 2. Cost per available Seat Mile (CASM); 3. Load Factor.

**Aircraft Utilization and Available Seat Miles (ASM)**

The two major assets of an airline are its routes and its aircraft. The decision to procure new aircraft is generally based upon an expected growth in traffic, a new route permit, the desire to increase capacity, frequency, or market share, or the desire or need to replace some of the existing aircraft either for reasons of efficiency or of age. Finally, since the proposed aircraft must fit properly into the airline’s overall

corporate plan, it becomes necessary to evaluate the new aircraft in light of the entire route structure and fleet composition. The process by which this analysis is performed is generally known as fleetplanning.

Among all the factors that influence the aircraft utilization, we are focusing on the Fleet Planning and Airplane Turn Time as these are easier to manage and are much within the control of an airline. Two factors that significantly impact the efficient aircraft utilization are:

- (i) The age of the aircraft
- (ii) Airplane Turn Time

Therefore, both these factors, that is, having a structured airplane acquisition and phase out plan together with best airplane turn times in the industry have helped Indigo to achieve the best aircraft utility rates. Airplane Turn Time is the critical component in the efficient aircraft utilization which has a direct impact on scheduled planning and operations planning. Optimizing airplane utilization can help an airline maximize the large capital investment it has made in its airplanes. Improved airplane utilization helps spread fixed costs over an increased number of trips, thereby reducing costs per seat-mile.

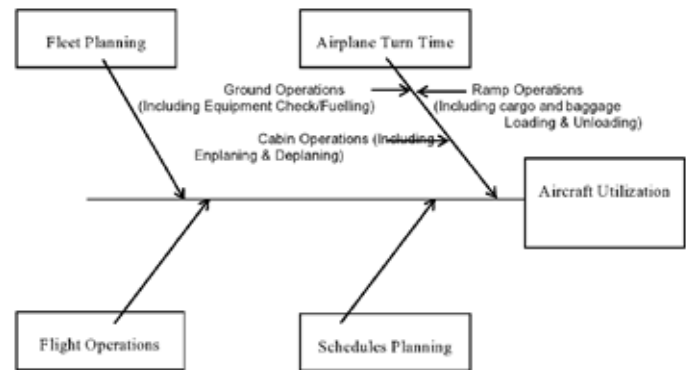


Fig.1 Aircraft Utilization

**Average Number of Employees per Aircraft and Cost per Available Seat Mile**

If the competitors are able to achieve more with fewer resources, employees in this case, then the employee productivity may be the issue. Low output workers is a serious challenge for any organisation. Employee cost is one of the significant components of the operating expenses for any airline which substantially contribute to Cost per Available Seat Mile (CASM).

The authors consider four major factors which significantly influence the employee productivity

**Service Quality and Load Factor**

Though ticket price is the most important criteria that influenced the decision making in choosing a particular flight, but it did not constitute part of service quality. On Time Performance (OTP) and the Load Factor appear to be highly correlated. Indigo with the highest On Time Performance of 82.4% also enjoys a highest load factor of 81.4% in LCC category. On the other hand, Air India with the lowest On Time Performance of 72.1% has the lowest load factor of 74.4% in FSC category (Air Vistara being a new entrant in the market)

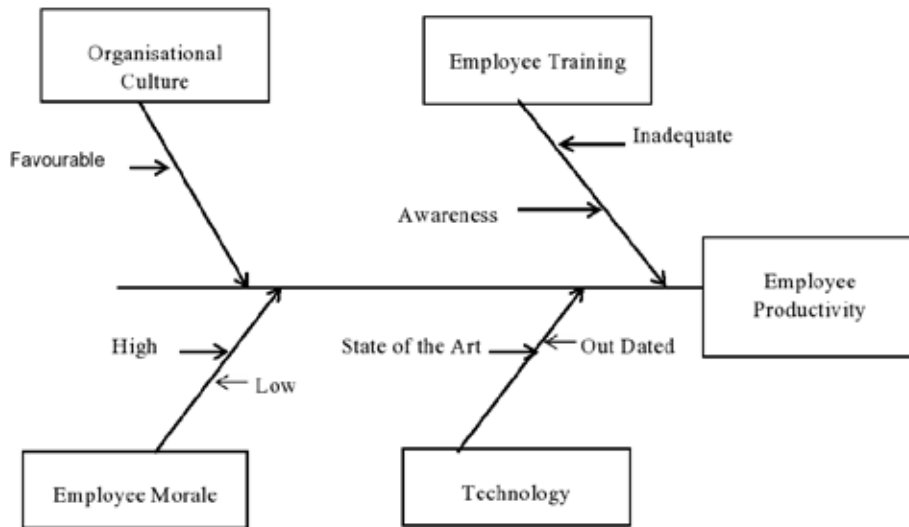


Fig.2 Employee Productivity

## CONCLUSION

1. If an Airline is not able to replace its old fleet with new aircraft acquisitions at regular intervals, its fleet will grow older and older year on year. This would put tremendous upward pressure on the maintenance costs. The increased maintenance costs coupled with increased fuel expenses, due to old and less fuel efficient aircraft, would significantly increase the operating expenses of the airline which would substantially pull down the operating margins. Further, as planes get older it increases the need for greater and detailed scrutiny and assessment of the airplane material state and the inspection standards and frequency grow increasingly strict, which not only increase the maintenance costs substantially but significantly increase the down time of the aircrafts thereby directly impacting the availability and therefore the Utility of the aircraft. With reduced aircraft utility, the capacity and the Available Seat Miles (ASM) reduce significantly which will ultimately lower the marketshare.

Airplane Turn Times are critical determinants of Efficient Aircraft Utilization and any reduction in airplane turn times will significantly affect the profitability of the airlines. For example, a saving of 10 minutes on 3,000 trips per year means an additional 30,000 minutes

or 500 hours available for additional flights. More flights mean more paying passengers and, ultimately, more revenue. According to Boeing reducing the average turn-time by just 10 minutes — from 40 to 30 minutes — improves the utilization level to 2,491 trips per year, an increase of 8.1 percent. This efficiency can enable a carrier to reduce the number of airplanes it needs to have in its fleet to make an equal number of trips. Fleet Planning is also critical to efficient aircraft utilization, therefore airlines must ensure that they maintain a good mix of old and new aircraft fleet and adopt a structured policy on acquisition of new planes and phasing out of old planes.

2. Airlines can also do away with inflight catering & serving food on trunk routes and other routes which are of flight duration of less than 2 hours. This would significantly reduce the aircraft turn times and do away with supply chain

related delays, if any. Further, in-flight catering is not a significant influencer on the decision making of choosing a particular flight for an air traveler as brought out by the primary survey.

3. While some airlines have been able to achieve more with fewer resources (Employee Productivity) than others, we believe that airlines can significantly improve the employee productivity through adopting new technologies and improving the work culture. Training is viewed a major contributor that can significantly improve employee productivity.
4. Airlines should continuously keep a lookout and have a finger on the pulse of satisfaction through regular audits that are designed to measure and track customer satisfaction. Inevitably, drivers of customer satisfaction will continue to change over time as new technologies are introduced and other changes occur in the market place, making it obligatory for airlines to design and set up processes that allow them to quickly respond to changes in the environment. Marketing managers should ensure their airlines deliver the promised service. Social media and online chat forums have made it easier for customers to share experiences and it is to an airline's advantage if the shared experiences are coming from satisfied customers. Airline cabin crew and all employees working at customer touch points should be provided with exceptional training regularly and be equipped to ensure that they are able to offer outstanding service Quality. An airline can only promise excellent service to passengers when they are confident that their customer facing staff is able to provide it.





## Aviation Update Editor Kartikeya in conversation with hidden gem and mastermind innovator Dr. Rao Tatavarti M.S (IIT Madras, India), PhD (Dalhousie, Canada), DRDS, FOSI, FAPAS and Founder and Managing Partner, CATS - CASTLE Advanced Technologies & Systems (CASTLE - Centre for Advancement of Science, Technology, Law and Engineering)

### AU : What motivated you to start your company?

Dr. Rao : The Stockholm based SIPRA, an institute which deals with global security has come out recently with disturbing statistics indicating that India - a peace loving country - is a major, if not the biggest importer in the world of defence technologies for so many years. Huge amounts of our nation's reserves were spent on import of technologies, making us dependent on the whims and fancies of other countries, who obviously would not be sharing the latest technologies, nor do they transfer the technology per se. I felt that this should be stopped forthwith, and one way to do that, is to develop indigenous technologies of world standards which can be commercialized so that we can eventually reverse the nation's import process into an export process in the coming decade. Hence CASTLE Advanced Systems and Technologies (CATS) was started in 2017 under the Start-up India initiative.

### AU : Where do you place yourself in terms of making a difference in terms of other similar organisations in the row?

Dr. Rao : CATS primarily deals with photonic technologies and products for a variety of applications in aerospace, ocean and land. The applications encompass both civilian and defence domains and were demonstrated to be have many advantages compared to any of the other existing technologies for similar applications. The core technologies for all our developed systems are based on photonics, and as such are not only novel in India, but also across the world and are therefore being patented. All our products employ state of art AI (artificial intelligence) and ML (machine learning) and deep learning techniques with superior capabilities. This therefore, enabled us to occupy an upper echelon of the strata in comparison to other similar companies.

Moreover, CATS is a lean organization with no encumbrances so far, but only passionate persons at all stages trying to make a mark in the world. This philosophy shall hopefully pave way for a good and successful future.

### AU : What are the different solutions & products so far created by CATS? Tell us one product which is close to you and proud of?

Dr. Rao : Systems and Technologies Developed for Commercialization – 11nos.



1.	<b>AUM-3</b> (Air Unique – quality Monitoring)	System for Environmental Monitoring
2.	<b>PRANEEDHAR</b> (Photonic Reconnoitering of Acoustic Noise for Effective Eaves Dropping and Highlighting Intelligence)	System for Eavesdropping
3.	<b>SAMIRA</b> समिरी (Seeing Air in Motion: Instrumentation for Remote sensing Applications)	System for Wind Profiling
4.	<b>SARATH</b> सारथी (Search And Rescue Apparatus for Targeting Holistic Information)	System for Search and Rescue in Disaster Management
5.	<b>SAVDHAN</b> सवधान (Scan, Analyze, Validate, Discriminate, Highlight, Assess and Neutralize)	System for Maritime Surveillance
6.	<b>Dr. T</b>	System for Exhaled Breath Analysis
7.	<b>tara</b> तारा (Technology for Air data Reckoning for Aerial Navigational Information)	System for Air-data Monitoring Onboard Aircrafts.
8.	<b>VAYU</b> वायु (Variable Air Yielding Unit)	Fully Instrumented Wind Tunnel Facility
9.	<b>VEDA</b> वेदा (Vibrational Effects – Detection Analysis)	System for Vehicle and Intrusion Monitoring
10.	<b>VIDUR</b> वद्विदुर (Vibration Intelligence Data Unravelling Remotely)	System for Vibration and Condition Monitoring
11.	<b>DRONACHARYA</b>	System for image Processing Analytics

We are proud of each and every technology / system that we have developed after painstaking R&D, as each of them are a novelty in their respective fields and involved a lot of innovations in design and development and additionally have many advantages in comparison to imported systems, and are also economical.

### AU : What is the biggest risk that you haven't been able to overcome as of yet?

Dr.Rao :Notwithstanding the general rhetoric of politicians, industry and the bureaucrats of the governments, the acceptance of new and indigenous technologies and systems by the Government and Industry is still abysmally low.Thisputs an immense burden and risk on commercialization.

**AU : One change that you want to see in the industry, tech and innovation put together?**

Dr. Rao : Perhaps a change in the mind set of people to realize that Indians living in India and working under challenging constraints, are completely capable of developing world class technologies and systems, which can transform the nation's economy.

**AU : What are the key risk factors and mega-trends your business faces over the next three to seven years, and how have this influenced the corporate strategy?**

Dr. Rao : Technology is rapidly changing. Keeping in pace with new technologies and developments is the biggest challenge. Upgrading photonic sensing solutions and addressing new problems with more accurate and sensitive data, at the same time keeping it cost effective is challenging. With constant endeavor in R&D and to capitalize market in all sensor segments and stay at a one up position, CATS plans to introduce new products and services by relentlessly enhancing IT Infrastructure and upgrading the sensing products with latest technologies like augmented reality, edge computing, AI and cognitive based medical diagnostics.

**AU : Can you please explain your research in photonics sensing solutions?**

Dr. Rao : Laser Monitoring is a Breakthrough Invention in Remote Monitoring and networking of spatially separated sensors for comprehensive geo-spatial monitoring of various parameters enabled by innovative photonic systems. Accurate qualitative and quantitative data is collected in real time using a single laser source as a function of time and space.

**Principles**

Novel Photonic Systems were designed and developed. The systems are novel and innovatively uses principles of laser back



scattering in the environment of operation. CATS is only company providing single laser Sensor that can monitor and records various Movement, Force, Environment, Weather, Acceleration, Displacements, Flow, Position, Light, Sound etc...

**Attributes**

The sensitivity and accuracy of the monitored parameters are very high compared to conventional sensor measurements. The multifarious advantages of the systems include smaller time responses, higher accuracies, one system to measure a host of parameters in the time, frequency and spatial domains and the freedom from many known constraints associated with conventional sensors. Laser sensors are at the fractional cost to their conventional equivalent. The photonic system collects 10000 data points per second. All the data is seamlessly integrated, distinguished and stored on Big Data. This will assist in making geospatial, predictive, prescriptive and descriptive analytics on continual and long-term basis.

**AU : What are the different technologies that you have developed that can be used by Aviation industry?**

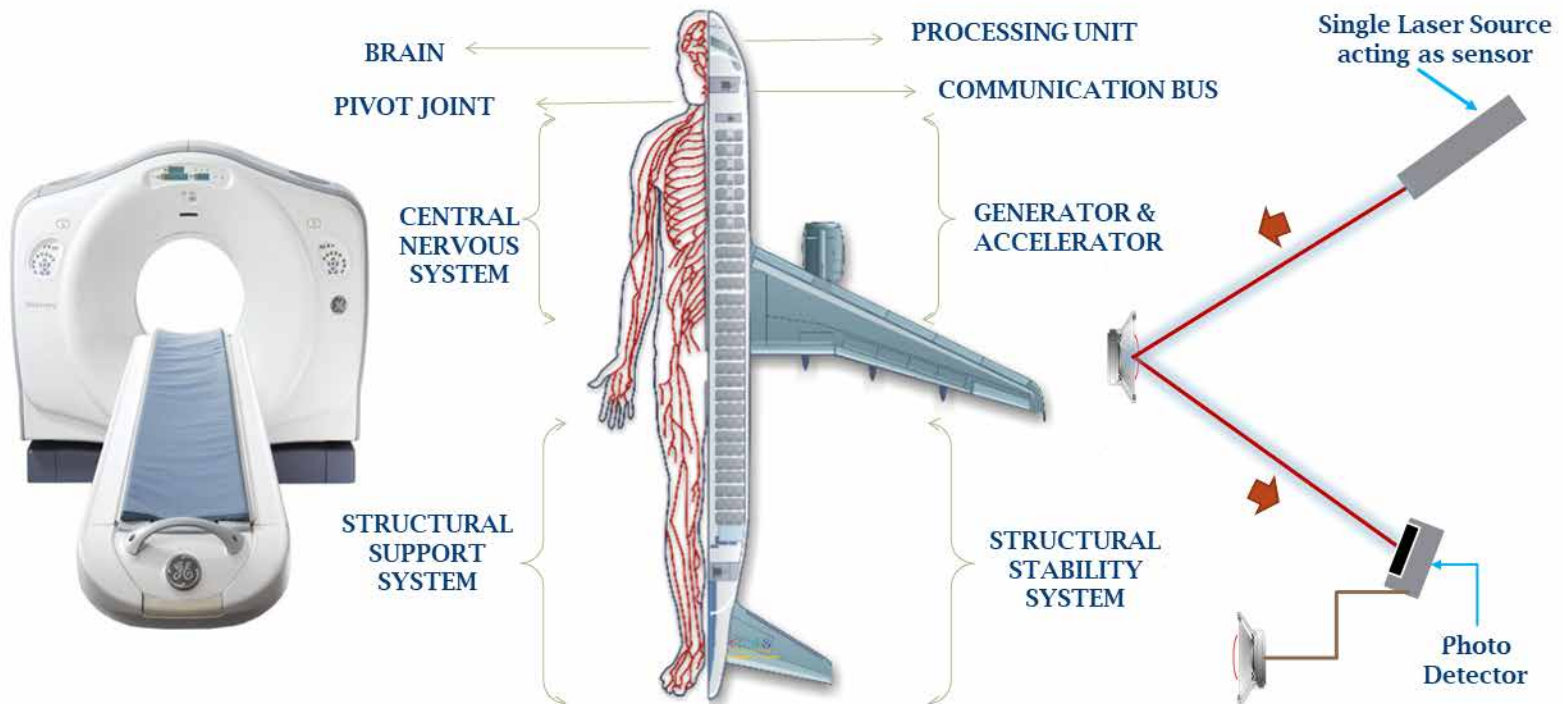
Dr. Rao : I would like to mention 2 cutting edge technologies that we have developed

- Tarani :- Technology for Air data Reckoning for Aerial Navigational

Information. taraNi (a photonic system) was envisaged as a compact, lightweight, cheap, direct detection optical system that can directly measure wind speed and direction, density, pressure and temperature of a body of air, ahead of a moving aircraft - whose operative conditions may vary from speeds ranging from zero to hypersonic, from flight altitudes varying from sea level to 18 kilometers, from flight paths across sea and land. The outcomes of the measurements are to be comprehensive air data products (including AoA, AoSS). taraNi is a molecular optical air data system designed and developed indigenously involving novel and innovative techniques, as an alternative to the systems which are under development in the western world.

- VIDUR :- Vibration Intelligence Data Unravelling Remotely Condition monitoring is critical to forestalling breakdown, as it works on the philosophy of predictive (prognosis-driven) maintenance. Vidur is worlds one of its kind non contacting probe technology (photonic (laser) sensor) in monitoring any type of Condition and Vibration. Accurately measures maximum displacement from the mean position Amplitude, Velocity and Acceleration in time and frequency domain.

# Light for AIR WORTHINESS



Objectives of CATS Structural Health Monitoring

- To provide an automated and real-time assessment of a structure's ability to serve its intended purpose
- To identify damage at the earliest possible opportunity so that corrective action can be taken to
  - minimize downtime,
  - operational costs,
  - maintenance costs,
  - and to reduce the risk of catastrophic failure, injury and loss of life

The innovative technologies and the algorithms employed in the development of the system ensure the real time extraction of the following information:

- Level 1 : Detection- VIDUR simply answers the question: is there a damage?
- Level 2 : Localization- VIDUR is capable of specifying the location of the damage within the structure
- Level 3 : Assessment- VIDUR is capable of specifying the type and extent of

damage

- Level 4 : Prediction- VIDUR is capable of estimating the remaining useful life (RUL) and safety

## AU : What all are in your wish list for 2020?

Dr. Rao : We are launching Photonic Sensing Solutions and Services in 2020. We are also launching our big data, cloud platform integrated with IOT and AOT. We are looking forward to incorporate CATS EU, CATS Canada and CATS UAE as our international marketing platforms.

## AU : What are your suggestions to students who wish to take their career in Research and Development?

Dr. Rao : Since the last few years I have continuously engaged students (both under graduate and graduate students) to work alongside me on challenging and important scientific and technological problems faced by the nation. This resulted in a win-win situation

for both students (who pick up state of art knowledge to solve real world problems) and to the researchers (who get highly focussed and passionate manpower which is so crucial for completing work in time).

The students interned in my laboratory have moved to higher education all over the world to expand their horizons, and those who opted for jobs ended up getting higher packages because of their hands on training and learning of many skill sets essential to the Industry.

Therefore, my advice to students who wish to take their career in R&D is that exciting and interesting vistas shall open up, leading to a peaceful, contented, and rewarding career for the next 20 to 30 years. If the youth of today can exploit the demographic dividend which we now as a nation enjoy and transform the society at large into a knowledge society by taking up R&D careers, then India as a nation can transform itself from a developing nation to a developed and leading nation of the world.

# Defexpo 2020 and why you can't afford to miss the event

– An exclusive preview

Fighter jets, foreign stalls, PM Modi and much more to embark on the promise of a scintillating air show. Here's why Defexpo 2020 is slotted to be a big one.

Lucknow, the City of Nawabs is due to witness the biggest aviation event of the year till date and there's no shortage of reasons for all aviation fanatics to be excited. Reportedly, Lucknow will be hosting the Defence Expo 2020 (Defexpo); a mammoth scale aviation comprising of more than 1000 exhibitors (including 150 foreign defence equipment) showcasing their top their top-of-the-line defence and military equipment along with top-notch modern and cutting edge military equipment to substantially enhance India's military and defensive prowess. The event that kicks off on the 5th of Feb and will be in full swing till 9th is undoubtedly a humongous affair for the capital city of Uttar Pradesh. The theme for this year's show is 'India: The Emerging Defence Manufacturing Hub', which is reflects on India's aims to rope in international defence companies to manufacture and set up base in the country. The event will be inaugurated by Prime Minister Narendra Modi and various dignitaries from around the world (including the US, Russia, France, Germany and the United Kingdom) will participate here as well. Also, Defence Minister Rajnath Singh will hold a curtain raiser meeting on the eve of the exhibition in the presence of eminent defence officials. Taking place at Lucknow's Vrindavan Yojana, the expo will be open to only invitees on its initial 3 days, 5-7th February, while for last two days, the gates shall remain open to the general public as well.



## Key attractions

One of the biggest attractions at the Defence Expo is the F-21 Fighter Jet brought in by American aerospace giant, Lockheed Martin. European aircraft manufacturer, Airbus, will also showcase its latest military equipment and technologies at the venue. Airbus' exhibit will include the models of C295 aircraft- one of the toughest and reliable modern day aircraft, AS565 MBe Panther, the H145M and the H225M helicopters. Alongside, Indian Defence Research and Development Organisation (DRDO), is also expected to showcase 500 products from various fields of technology.

## Why the buzz

Defexpo 2020 is being looked out as a major effort by the Government contributing to build a strong military infrastructure in Uttar Pradesh which has one of the two designated defence industrial corridors. Since 2016, the DefExpo has been shifting venues after former Defence Minister Manohar Parrikar decided to shift it to Goa from Delhi. Since then, the event was held in Chennai when Nirmala Sitharaman was the Defence Minister and now it has been shifted to Lucknow. Also, Uttar Pradesh Chief Minister Yogi Adityanath has made considerable efforts to make the event successful. Furthermore, it's the very first time when more than 1000 national and international defence companies have registered for the event. Incidentally, the space booked by the exhibitors has gone up by 60 per cent to over 42,800 square metres, compared to around 26,774 during the last edition.



So far, defence ministers and service chiefs of 35 countries have confirmed their participation for the DefExpo and a number of Memoranda of Undertaking (MoUs) are expected to be inked which will help in forging of new business collaborations. Also, there is expected participation from over 70 countries. The sub-theme of the exhibition is 'Digital Transformation of Defence' aligns with the concept of the future battlefield. The aim of DefExpo is to bring forth leading technologies in the defence sector under one roof and provide opportunities for the government, private manufactures and start-ups. Also, according to the Ministry of Defence (MoD) the focus will be on manufacturing for the aerospace and defence sector through the application of newer technologies.

### Other activities

Besides the products and technologies being exhibited, there will be live demonstrations by the Services, Defence Public Sector Undertakings (DPSUs) and industry showcasing the land, naval, air and internal security systems. There will be 'India Pavilion' exclusively showcasing the coming together of the public and private sector, including small and Medium Enterprises (SMEs)/Micro,



Small and Medium Enterprises (MSMEs) and innovation eco-system. The UP Pavilion will be displaying its industrial strength, in an effort to attract investors and has planned several cultural programmes which will showcase the cultural heritage of the state. Business seminars have been organised by various bodies including international

and Indian Industry chambers, National Skill Development Corporation (NSDC), SYNERGIA, Directorate of Standardisation (DOS)/Department of Defence Production (DDP), US-India Business Council (USIBC), US-India Strategic Partnership Forum (USISPF).



# This is your Captain Speaking....!!!

## All About BlackBird

The world's highest & fastest aircraft which couldn't be spotted, not only for our eyes but to latest technology too. Nicknamed as BlackBird & SR-71 it is, most advanced aircraft by its design that too in 1960's and still the SR-71 got the adrenaline pumping to get unleashed even at sleep in museums around the world.

Before the BlackBird were even thought about, there was the U-2 reconnaissance aircraft which USA used to spy foreign countries & gather information. But it was not adequate due to its vulnerability to get detected. The U-2 in late 1950's when on a mission spying Soviet Nation from 70000ft and above, acquired all the intel information USA wanted and landed safely back in American soil. But when the intel information was downloaded, surprise hit Americans that Soviet Nation radar spotted all the movement of the spy plane when it was over their territory. But Soviet couldn't takedown the U-2 due to non-adequate technology to strike the plane which was 70000ft and above, So Americans knew it is not very far, that Soviet will find a solution to take down U-2 in near future.



**Capt. Sathish Soundarraj**

**Captain**

**Airbus A320**

## Survival Fact,

Test pilot-Bill Weaver was first & last who survived the SR-71 crash which disintegrated at 78,000ft & fell all the way to the ground, he walked away unhurt.

## Project Oxcart,

Since then CIA (a separate wing for intelligence gathering) wanted fast & high enough aircraft to spy and stay undetected. Around 1960's the search for a new undetectable was born - Project Oxcart. Being a product of CIA, no wonder the Project is for spy plane. The team was assembled and the first mission Black Shield was started. The Mission is to produce a product which can stay undetected & gather intel over foreign

soil. CIA wanted a plane which can fly three times greater than speed of sound -Mach 3+ and above 80000ft, so no radar or any other aircraft can spot or takedown. The A-12 was born,

## Mystery Fact,

4 June 1968 A12 piloted by Capt. Jack Weeks vanished from our planet which last spotted at 836km east of Manila, Philippines. No cause for the accident was ever ascertained and the disappearance remains a mystery to this day.

## Preparation disguise,

Around the world almost or most of the aircraft parts are made of metals, which is vulnerable to radar signals as these metals will reflect radar frequencies. So to evade the ground & airborne Radar, A-12 aircraft structure was made of titanium and little plastic to stay undetected and the aircraft surface temperature might reach anywhere from 170\*c to 300\*c during Mach 3+, so to withstand the temperature too the material was useful. There was a time, the titanium material which was supplied by Titanium Metal Corporation of America couldn't supply for entire project due to lack of availability of titanium within USA, so titanium was sourced from all around the world and ironically the titanium was sourced from Soviet Nation too, who unwittingly helped USA to create the plane which will spy their own territory. The body





also made of composite materials which after flying for a while at 80,000ft where the outside temperature is  $-70^{\circ}\text{C}$ , and the heating & cooling cycles the body goes through, will actually make the airframe stronger over time by the process of annealing the same process blacksmith use on horseshoe to make them stronger. Along with the titanium body, Quartz Glass was used for windshield and windows construction as cruising at 80,000ft the sun rays are very powerful where it can make instruments unreadable and can severely affect the pilots. Overall the A12 was a man made marvel.

### **Record Fact,**

Lockheed's A12 highest record is 16500km in 6 hrs duration.

### **Black Project,**

Around 1962 even though the US Air Force helped CIA for all the support to research and build a spy plane, but was totally frustrated that the reconnaissance mission was given to another government agency (CIA) to operate. This differences & misunderstanding gave birth to Black Project - US Airforce SR-71. Since then A12 mission came to an end and on October 1964 Lockheed SR-71 BlackBird came into existence, that means now US Airforce will build, maintain, train, and fly the Black Bird.

### **Training Fact,**

To be qualified as a pilot on SR-71, one has to undergo Astronaut training.

### **Extensive Training & Cost,**

To pilot the SR-71, the airforce pilots need to undergo serious selection process and training program which includes extensive medical checkup equivalent to an astronaut's medical certification. Not just certification but the project itself is more of an advance aviation including gadget's& training necessary for safe operation. Flying at 80,000ft and higher is very unusual for aircrafts as all the commercial flying is below 45,000ft and even some military operation is below 60,000ft so flying above 80,000ft is an exception. Due the flying is at unusual altitude, the requirement is different or almost equal to space flying. Outer space begins at 100km above earth surface approximately but as a physiological environment it begins at around 63,000ft where the atmosphere pressure becomes too low that fluids boil at the body temperature. So as SR-71 pilots fly at 85,000ft they need a special pressure suit called "Physiological Support Division". All these requirements, training & maintenance which are expensive and were financed under a special funding called "Black World". Along with the requirements the aspiring pilots were trained in the Northrop T-38 Talon which is a trainer aircraft in US airforce which can almost give the feeling of SR-71 with speed greater than Mach 1.3+. All the flying lessons- contact, instruments, formation, cross country, stealth



chase, spying etc will be trained in T-38. Once the training is done & released to fly the SR-71, there is no looking back.

### **Cost Fact,**

The cost of SR-71 pilots Pressure Suit & Helmet is just above 1 00,00,000 INR.

### **Pure SR-71 It is,**

On March 1968 SR-71 began arriving to take over black shield mission. Lockheed Martin's Black Bird first mission started on 17 May 1967. First they spied China & North Vietnam ( which USA claims they didn't spy and its all myth) successfully without even the other countries knew nothing about the spy plane. When the SR-71 flies three times the speed of sound (3540km/hr), we cannot leave the questions of Sonic boom. Yes, when SR-71 crossing sound barrier at 80,000ft the sonic boom could be heard on the ground as a double thunder clap. So the SR-71 has lots of restrictions to fly over particular areas, like sonic boom might affect the farmers most likely that cows wont give milk, chicken wouldn't lay eggs, mink wouldn't mate etc.

### **Engine Fact,**

SR71's two J58 continues afterburner engines will consume 30,000 litres per hour.

### **Ariel Refuelling,**

SR-71 is incomplete without the KC-135Q tanker aircraft as the KC itself a air fuel tanker which can take enough JP7 fuel for SR-71 to continue it's mission. The SR-71 without the support of arielrefueling cannot fly further to 3700km and to extend its range KC-135Q tanker aircraft is used to refuel the SR-71 on the air itself at around 25000ft & with the air fuelling SR-71 can extend its range to 22000kms. SR-71 mission success was directly related to inflight refueling by KC-135Q, & KC-135Q always with full load of JP7 fuel awaiting thirsty SR-71. The arielrefueling between KC-135Q and SR-71 were also done secretly, by using high level of communication system using UHF (ultra high frequency) radio system which was unique with these aircrafts so their communications in the air is not overheard by anyone on air as well as on the ground.

### **Fuelling Fact,**

The refueling is capable of providing 2700kg of fuel per minute and the entire ariel refuelling will take place in approximately

15mins to fullfill SR-71 in air. Ariel refueling is done between the tanker and SR-71 with the help of refueling boom where the boom has a vertical, horizontal, & fore & aft limits. Once the tanker boom is connected and locked into SR-71, the fuel is transfered. In case of any abnormal movement or any rough air makes the aircraft to move violently which might affects the fuelling then the boom automatically disconnects itself. And the entire process need a good formation flying skills from both the tanker crew as well as SR-71 crew which is of no question.

### **Turning Fact,**

At supersonic speed SR-71 turning radius is 150kms due to its high speed & high altitude.

### **Navigation,**

The SR-71 navigation system is not like any other aircraft as it has to navigate with the help of the Stars due to its super fast& very high flying characteristics that it just can't use the ground equipments. SR-71 is equipped with ANS (Astro Navigation System). ANS-by comparing the position of the stars to their known location and with the exact time of day could then compute the aircraft precise position & track. And to use the ANS precisely, SR-71 consist of two crew member-Pilot to fly & RSO (Reconnaissance System Officer) to operate navigation systems. The RSO who sits behind the pilot seat, will control all these stealth systems on-board, Radar/Frequency jamming, Heat Dissipator to avoid Missiles, etc. Also SR-71 was never found by enemy radar as the aircraft itself was extremely difficult to spot. Featuring the original stealth technology SR-71 body was coated with paint containing "iron ferrites" to absorb radar energy rather than returning it to the sender.

### **Fired Fact,**

Over 100 SA2 missiles (which is surface to air missile) have been fired at SR-71 but no SR-71 were ever shot down until today.

### **Mission Hot,**

Around 1970's one of the hottest mission of SR-71 was "Rocket Ride". This was a spying and intel gathering mission for SR-71 crew. Mentally pilots had to stay well ahead of the mission as this operation was around the most restricted area around North Korea, South Korea & Soviet. As North Korea for

very long time has been hiding and be deceptive about their plans those times & at present, USA wanted to gather intel on these Nations. So SR-71 was pressed into the border area between North & South Korea known as demilitarized zone which is 260kms long and 4kms wide. The SR-71 crew had a zero tolerance as this area is heavily guarded and armed from both sides with SAM (Surface to Air Missiles), Radar etc. The total time over the critical area was 7 minutes to gather intel and take photos. The mission itself very critical because of its location towards China/USSR/North & South Korea. Any mistake, SR-71 might be targeted and taken down or even if these countries know about it, can create trouble for USA. But as we know the state of the art SR-71 can never go wrong and the mission was a success. Also SR-71 was widely used for Vietnam War intelligence & Post Libya War in 1986, all for reconnaissance etc.

### **Nickname Fact,**

Habu pronounced "HAW BOO" is a poisonous snake found in Southeast Asia a pit viper sake. when SR-71 arrived at Japan Okinawa in 1967, people saw SR-71 in the sky and thought evil looking plane similar to black Habu snake is coming. From then Habu became nickname of the SR-71.

### **Retirement,**

During 1990's High level Committee at Pentagon ( USAdefense office) realised that operating airborne reconnaissance SR-71 is a huge expense and attack vulnerability , the spying and intel program slowly changed to new technology like - Satellite reconnaissance. Satellite reconnaissance became the easiest way of getting pictures of a territory or to assess the landmass with thermal imaging etc. Now with the help of the satellites which USA has it permanently above the earth, not one or two but solid 24 satellites orbiting our planet earth and giving live feeds to scientist & agencies who wants information. So SR-71 stands history today and a human marvel which as a pilot everyone would regret its retirement.

### **Record Fact,**

SR-71 set the London to Los angeles( distance - 8791kms) world record in 3hrs 47mins 39seconds i.e SR-71 can make 5 trips between Chennai & Delhi in the above Timmins.

# “Opportunities in Manufacturing and MRO services: Civil Aviation

An International Seminar under the theme “Opportunities in Manufacturing and MRO services: Civil Aviation” was organized on 24th Jan 2020 by Aeronautical Society of India (AeSI), Nasik Branch in association with Hindustan Aeronautics Limited (HAL), Nasik. The seminar was organized to deliberate on issues to create India as a global maintenance repair and overhaul (MRO) hub. This will enable India not only to cater its own MRO needs but also serve the regional MRO demand.

Shri R Madhavan, CMD HAL was the chief guest for the International Seminar. It was also graced by Shri Bh V Seshagiri Rao, CEO (MiG Complex) HAL, Rear Admiral V M Doss VSM, ACNS (AM), IHQ, Indian Navy, Air Cmde P S Sarin VSM, AOC, 11 BRD, IAF, Mr. Pierre Dickeli, CEO Safran India Pvt. Ltd, France, Mr. Bogdanov Ilya, Director UEC, Moscow, Shri Prashant Sanglikar, Asst. Director IATA, Delhi and Shri R V Huliraj, CD (AURDC)

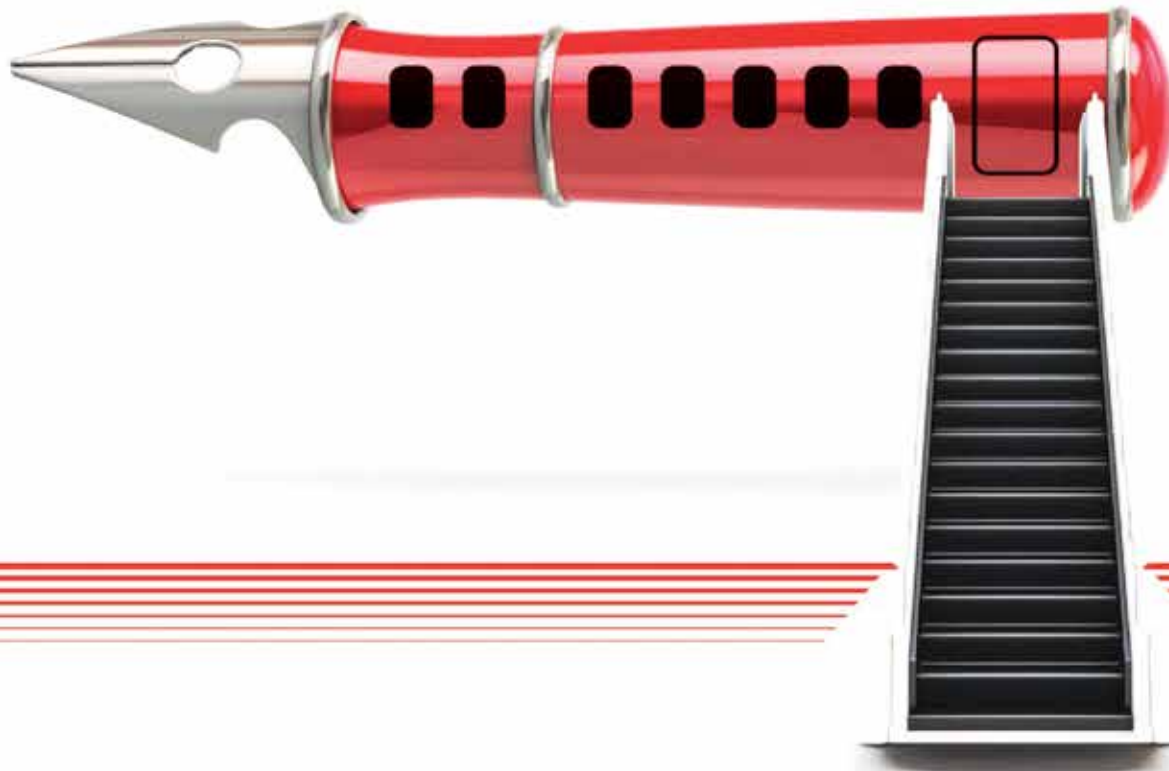
and Chairman, AeSI, Nasik branch. To commemorate the International Seminar, a souvenir was released by CMD, HAL followed by his opening address in which he stressed upon the need to build a collaborative MRO ecosystem in India which can cater the burgeoning needs of Indian Aviation industry and later transform it into a global power as a force to reckon with.

The International Seminar received a huge response and was attended by more than 550 participants, which also included International delegates like OEMs from Dassault Aviation Pvt. Ltd, France, Safran India Pvt. Ltd, France, United Engine Corporation, Moscow, SpetsTechnoExport, Ukraine and range of Airline Operators like Go Air, SpiceJet, Alliance Air & General Aviation etc. In addition to this various Indian MRO Industries, Aviation training institutes, engineering colleges, media partners and local Nasik Industries also participated with zest and zeal.

The seminar conducted two power talks on HAL capabilities and Skill development initiatives by HAL for MRO sector. Four panel discussions on various topics namely “Strategy towards making India into an MRO Hub”, “Expectations of airlines from Indian MROs”, “Approach to create a sound Ecosystem in India for MRO and Skill Development and Human Resource Planning for MRO” were conducted during the seminar. Various eminent personalities from Indian MRO industries like AIESL, Amigo Logistics & Exports, Max Aerospace, AeroChamp, Bharat Aviation, MAB Aviation, Kris Aero Services Pvt. Ltd, HALCON, HAL-Pravara Aviation Institute (HPAI), Thakur Aviation, Amrutvahini Engineering College (AVCOE), Sangamner, Dianois, AVI-OIL etc. participated in four panel discussions organized as part of this International Seminar. The audience was truly enthralled by the enlightening views of panel members and interacted actively during Q&A sessions.

The event concluded with a way forward session through which stakeholders were urged to continue the work that fosters the best possible future for Aviation and coalesce further towards a common goal of establishing India as a global MRO Hub.





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- Flight Operations/ Transportation
- Flight/Simulator Training
- Head of Department
- Human Resources & Training
- Airlines
- Airport Operators
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