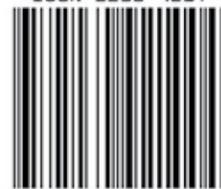


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EXCLUSIVE

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"MY MAIN FOCUS HAS BEEN ON RAMPING UP PRODUCTION TO SERVE OUR CUSTOMERS WHILE PREPARING FOR THE FUTURE, FOCUSING ON SUSTAINABILITY AND INNOVATION."

**— NATHALIE TARNAUD LAUDE
CHIEF EXECUTIVE OFFICER, ATR**

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Cover Design: SP's Design

Cover Photograph: ATR



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The new leadership team at India's Ministry of Civil Aviation takes charge at a time when the Aviation sector is booming with record growth in the number of passengers and aircraft on order. They will need to ensure that this growth continues unimpeded and is duly supported by a robust aviation infrastructure and ecosystem.



Our lead story in this issue features an exclusive interview with Nathalie Tarnaud Laude, Chief Executive Officer of ATR. Taking the helm in September 2022, Nathalie has focused the company on ramping up production to better serve customers while also preparing for the future with an emphasis on sustainability and innovation. Under her leadership, ATR has maintained its reputation as the "King of Regional Aviation." Nathalie's commitment to delivering highly fuel-efficient, versatile, affordable, and future-proof aircraft is central to ensuring ATR's continued market leadership. In her interview, Nathalie highlighted the pivotal role ATR aircraft have played in expanding access to air travel across India, combining exceptional economics, passenger comfort, reliability, airport compatibility, and sustainability.

Aviation has always led the way in technological advancements aimed at safer, more efficient, and environmentally friendly travel. Anil Chopra provides an insightful overview of future airliner designs in his article, exploring innovations such as blended wing technology, advanced flight controls, and aircraft wings made from tiny polymer tiles that reconfigure themselves to adapt to flight conditions, mimicking birds. He also discusses groundbreaking concepts like supersonic bi-directional flying wings and the transition to electric and hybrid-propulsion aircraft.

In his article on the next generation of engines, Joseph Noronha delves into the array of technological options facing large commercial aeroengine manufacturers. These range from simple upgrades of conventional designs to exotic configurations like open fans and cutting-edge hybrid-electric installations, including hydrogen-burning engines. Recent years have seen all major engine manufacturers launch significant projects aimed at increasing fuel efficiency, with a strong focus on integrating new technologies.

A major highlight on the global civil aviation calendar this year is the Farnborough International Airshow (FIA), taking place from July 22 to 26. Established in 1948, the airshow celebrated its 75th anniversary in 2023, marking decades of pioneering aviation excellence and innovation. FIA has been instrumental in numerous aerospace achievements, creating a legacy of inspiring moments that have shaped the industry. FIA 2024 is set to be a beacon of optimism and innovation, showcasing the latest advancements in aviation and space exploration. The 2022 show attracted over 80,000 trade visitors and featured more than 1,500 exhibitors from around the world. With 1,200 exhibiting companies and 74,000 trade visitors expected, FIA 2024 promises to be a crucial platform for global connections, interactions, and business opportunities. Ayushee Chaudhary provides a preview of what to expect at the show.

The recent orders for widebody aircraft from both Air India and IndiGo indicates a clear intent by these two airlines to garner a greater share on international routes. Read all about India's evolution from narrow-body to wide-body jets done by Swaati Ketkar.

All this and more in this issue of *SP's AirBuz*. Welcome aboard and we wish you many happy landings!

Jayant Baranwal
Publisher & Editor-in-Chief

INDIA'S NEW CIVIL AVIATION MINISTER & MINISTER OF STATE FOR CIVIL AVIATION



The Union Minister of Civil Aviation K. Rammohan Naidu and Minister of State for Civil Aviation Murlidhar Mohol were accorded a warm welcome by Secretary Vumlunmang & Joint Secretary Rubina Ali as they assumed their charges on June 13, 2024.

KINJARAPU RAMMOHAN NAIDU (born December 18, 1987) was announced as the Minister of Civil Aviation on June 10, 2024 in the newly formed Government of India, after the general elections in 2024. He won the Indian general election, 2014, 2019 and 2024 as a Telugu Desam Party (TDP) candidate from Srikakulam Lok Sabha constituency in Andhra Pradesh. Kinjarapu Rammohan Naidu earned a

bachelor's degree in electrical engineering from Purdue University and an MBA from Long Island University.

The new Minister of State in the Ministry of Civil Aviation Murlidhar Mohol also officially assumed charge. He was elected as the member of 18th Lok Sabha from Pune, Maharashtra. He previously served as Mayor of Pune Municipal corporation. **SP**

AIRLINES

FLY91 SELECTS ATR'S PAY-BY-THE-HOUR SUPPORT PROGRAMME



ATR and Indian regional airline FLY91 announced the signature of a Global Maintenance Agreement (GMA), a pivotal step towards providing reliable and cost-effective regional air travel across India. Under this comprehensive agreement, ATR will provide repair, overhaul and pooling services of Line Replaceable Units, propeller availability and repair services, as well as engineering and on-site support for FLY91's growing fleet of ATR aircraft. Initially covering two ATR 72-600, the 100 per cent tailor-made pay-by-the-hour contract is set for a duration of five years, with a clear path from FLY91 to substantially increase its ATR fleet within the same timeframe, up to 30 aircraft.

SCOOT'S FIRST E190-E2 COMMENCES REVENUE FLIGHTS



Scoot, the low-cost subsidiary of Singapore Airlines (SIA), commenced revenue flights with its new Embraer E190-E2 fleet. The first aircraft, named Explorer 3.0, departed Singapore's Changi Airport, bound for Krabi, Thailand. The operation of Explorer 3.0 will see an increase in the frequency of Scoot's flights to Krabi and Hat Yai from 7-times weekly to 10-times weekly for both destinations. Scoot's second E190-E2 arrived in Singapore on April 29 and will commence revenue flights soon.

EMBRAER DELIVERS 1800TH E-JET

Embraer has reached a new delivery milestone on the world's preferred small narrow-

body aircraft programme; the delivery of the 1800th E-Jet production aircraft. The new Azorra owned E190-E2 was handed over to Royal Jordanian Airlines. This delivery is the third E2 for the airline which currently also operates four first generation E-Jets. RJ will receive a total of eight E2s under the existing deal.



E-Jets have enjoyed global success in the fleets of 90 airlines and leasing companies from more than 60 countries since the first aircraft entered service in 2004. In 20 years of service, the E-Jets have carried two billion passengers on 26 million flights a distance

of 140 million kilometres with 90 airlines from 60 countries.

ATR ANNOUNCES SALE OF 10 ATR 72-600 TO AVATION



ATR announced the signature of a firm order for 10 ATR 72-600 with Avation PLC. Deliveries are scheduled between 2025 and 2028, showcasing Avation's long-term vision and confidence in the relevance of ATR's products to serve the regional aviation market. The agreement is further complemented by 24 purchase rights, extending until 2034.

This order marks another milestone in the enduring relationship with Avation which began in 2011. Since then, the Singapore-based lessor took delivery of 36 new ATR 72s,

APPOINTMENTS



ATR'S NEW CHIEF FINANCIAL OFFICER

The Board Members of ATR appointed Andrea Coccetti as the company's new Senior Vice-President Finance and Chief Financial Officer, effective May 1, 2024. Andrea brings 20 years of experience having held key financial leadership positions at Leonardo. As the new CFO, Andrea will play a pivotal role in shaping ATR's financial strategies and contributing to the manufacturer's continuous innovation and development initiatives.



ATR'S HEAD OF REGION AMERICAS

ATR has appointed Christopher Jones as the company's Head of Region Americas, effective July 1, 2024 and Managing Director & President ATR Americas, Inc., effective August 1, 2024. Christopher comes to ATR with over 30 years of commercial success in aircraft sales, and has held senior leadership positions with Airbus, Bombardier, and British Aerospace. Christopher will play a pivotal role in developing ATR in the region, especially in the US, and supporting the company's customers.



PRESIDENT OF IAE INTERNATIONAL AERO ENGINES

International Aero Engines AG (IAE) has named Kelly Horan as its President. As President, Horan will lead the integrated programme structure to support the IAE V2500 programme and to ensure financial, business, technical, customer and partner commitments are achieved. She brings more than 25 years of experience in engineering, supply chain and commercial aftermarket to this role.



MAGNIX APPOINTS CHIEF EXECUTIVE OFFICER

magniX, the company powering the electric aviation revolution, announced that Reed Macdonald has been appointed as Chief Executive Officer (CEO). Macdonald will lead magniX as it readies its revolutionary electric powertrains for entry into service.

with two more scheduled for delivery in the coming months, as part of a previous order. Avation currently owns a fleet of 20 ATRs.

INDUSTRY

BOEING ECODEMONSTRATOR TO TEST TECHNOLOGIES



Boeing is testing three dozen technologies on its ecoDemonstrator programme focused on strengthening operational efficiency and sustainability in cabin interiors, one of the most challenging parts of recycling an airplane. The company will begin testing using a 777-200ER (Extended Range).

Besides testing Noise and weight reduction, Waste-reducing materials and Airport noise, The Boeing ecoDemonstrator includes Future cabin concepts like Economy and business class seats with sensors that detect if someone is seated during taxi, takeoff and landing which can improve safety, and reduce crew workload and downtime for maintenance; a touchless water conservation lavatory; and galley technologies to make cabin service more efficient and reduce food waste.

DEUTSCHE AIRCRAFT COMMENCES CONSTRUCTION OF THE FINAL ASSEMBLY LINE FOR THE D328ECO TURBOPROP

Deutsche Aircraft has started preparations for the construction of the new Final Assembly Line (FAL) at Leipzig/Halle Airport. With this development, Deutsche Aircraft has reached a new milestone in the D328eco programme as construction moves forward for the new 40-seater turboprop. The Final Assembly Line will be 100 per cent climate friendly. Through the installation of a photovoltaic system on the roof, all the energy required for production will be generated in a CO₂-neutral manner. Deutsche Aircraft is also focusing on digital processes and is aiming for 100 per cent paperless production.

GLOBAL JET CAPITAL Q1 2024 MARKET BRIEF

In Q1 2024, the business jet market continued to normalise following the record high

utilisation and demand associated with the post COVID-19 pandemic period. Flight operations and transactions slowed from all-time highs; however, flight operations remained well above pre-COVID-19 levels and transactions remained within the range of historical averages. Transactions declined in Q1 2024 due to slower-than-expected new deliveries (attributable to ongoing supply chain and labor issues and delays in aircraft certification).

Over the past few quarters, a shift has emerged with aircraft inventory and values. During the post-COVID expansion, older aircraft became very popular due to their wide availability. However, as the market has normalised, demand for these aircraft has declined. As a result, aircraft listings and inventory for aircraft older than 12 years have increased, while values for this segment have declined. At the same time, inventories and values for 12-year-old and younger aircraft have remained largely stable.

BOEING ANNOUNCES THE WINNERS OF ITS NINTH NATIONAL AEROMODELLING COMPETITION

Boeing announced the winners of the ninth annual Boeing National Aeromodelling Competition, one of India's largest and most popular aeromodelling programmes. This year's competition attracted more than 2,350 students from across 855 institutions in the country. This year, the competition also saw an increase in female participation, with 28 per cent of women participating in final rounds. The Boeing National Aeromodelling Competition for students across India is conducted in association with IIT Bombay, IIT Kanpur, IIT Kharagpur, IIT Madras, and R.V. College of Engineering. The competition started as an annual event in 2013 to provide a nationwide platform for students who have a keen interest in aerospace engineering and related fields.

MRO

SIA ENGG APPOINTED AS STRATEGIC PARTNER BY AIR INDIA

SIA Engineering Company (SIAEC) has been appointed by Air India as its Base Maintenance (BM) strategic partner for the development of Air India's BM facilities located in Bengaluru, India. As part of the partnership, SIAEC will work closely with Air India on the planning, construction, development and operationalisation of Air India's BM facilities in Bengaluru. Projected to be ready in 2026, the BM facilities will comprise both widebody

and narrowbody hangars, including associated repair shops, to support the growing Maintenance, Repair and Overhaul (MRO) needs of Air India Group's aircraft fleet.

TRAINING

ST ENGG FORGES PARTNERSHIP WITH MERLIN FLIGHT SIMULATION



ST Engineering Antycip, European leader in simulation and virtual reality solutions, is delighted to announce its exclusive distributorship agreement with Merlin Flight Simulation Group, the foremost manufacturer of state-of-the-art aircraft design real-time Academic Engineering Flight Simulators.

Through this partnership, ST Engineering Antycip becomes the sole distributor of Merlin Flight Simulation Group's solutions worldwide. With a shared commitment to advancing aerospace engineering education and practice, both companies aim to redefine the landscape of this field, empowering students, academics, and researchers with tools that transcend traditional boundaries and unlock new possibilities for air-vehicle conceptual design, testing, and performance evaluation.

INFRASTRUCTURE

CABINET APPROVES INTERNATIONAL AIRPORT AT VARANASI

The Union Cabinet chaired by Prime Minister Narendra Modi approved the proposal of Airports Authority of India (AAI) for development of Lal Bahadur Shastri International Airport, Varanasi including Construction of New Terminal Building, Apron Extension, Runway Extension, Parallel Taxi Track & Allied works. The estimated financial outgo will be ₹2,869.65 crore for enhancing the passenger handling capacity of the airport to 9.9 million passengers per annum (MPPA) from the existing 3.9 MPPA. The New Terminal Building, which encompasses an area of 75,000 sqm is designed for a capacity of 6 MPPA and for handling 5000 Peak Hour Passengers (PHP). It is designed to offer a glimpse of the vast cultural heritage of the city. ●

EXCLUSIVE

“OUR AIRCRAFT ARE HIGHLY EFFICIENT AND FUTURE-PROOF, AND WE ARE COMMITTED TO PROVIDING AIRLINES AND PASSENGERS WITH THE MOST MODERN, RELIABLE, LOW-EMISSION AND COST-EFFECTIVE AIRCRAFT ON THE MARKET.”



NATHALIE TARNAUD LAUDE
Chief Executive Officer, ATR



NATHALIE TARNAUD LAUDE, CHIEF EXECUTIVE OFFICER, ATR

Nathalie Tarnaud Laude has been appointed by ATR's Board Members, Airbus and Leonardo, as Chief Executive Officer, effective from September 17, 2022.

Since joining Airbus back in 2005, Nathalie has held various positions in the Aerospace and Defence Industry. In October 2019, she was appointed Head of the NH90 programme for Airbus Helicopters and NHIndustries' President, with core responsibilities covering the steering of main NH90 programme activities. These include development & certification, industrialisation & production, support & services, procurement & supply chain, commercialisation, offers & marketing and finance, with the target to deliver the NH90 on-time, on-cost and on-quality to customers (serial and retrofit activities) and accelerate transitioning from production to in-service phase with a dedicated initiative in that direction.

Prior to this, she was Head of Treasury at Airbus Helicopters and Head of Operations New Technology Ventures within the Airbus Group CTO organisation, with a wide range of missions encompassing notably the negotiation and follow up of major technology partnerships in the fields of Hybrid-Electric propulsion, Data analytics, AI etc., the strategic, business and financial support to the E-Fan 2.0 (2 seater full electric aircraft) development project and the management of the operations for the Testia entities (Non Destructive Testing subsidiaries of Airbus Group).

From 2005 till 2013 she has been leading M&A transactions for all Airbus Group divisions including notably the business combination attempt with BAE Systems in 2012 (>35bn€ value).

Before this, she was an equity research analyst with Aurel Leven Securities in Paris and a risk manager on equity derivatives for CCF Securities in Paris.

Academically, she holds a MBA from London Business School, a Masters in Finance from Ecole Supérieure de Commerce de Paris and the SFAF diploma. She also attended the INSEAD Transition to General Management course in 2013. She is fluent in French and English. 

In a candid interview, **ATR CEO Nathalie Tarnaud Laude** talks on wide-ranging subjects including Innovation, Sustainability, and the Future of Regional Connectivity with **Jayant Baranwal, Editor-in-Chief, SP's Airbuz**

Jayant Baranwal (Baranwal): Since taking over as the CEO in September 2022, how has been your journey so far?

Nathalie Tarnaud Laude (Laude): My journey with ATR has been both incredibly challenging and rewarding. Coming into this role shortly after the COVID crisis, my main focus has been on ramping up production to serve our customers while preparing for the future, focusing on sustainability and innovation. This is precisely what the regional aviation market is asking us: delivering highly fuel-efficient aircraft, which are also versatile, affordable and future-proof.

As you know, an aircraft is among the most complex industrial products, with stringent rules and regulations designed to ensure the highest levels of safety. Relaunching production and supporting our supply chain to get back to pre-Covid levels has been a true challenge, and last year's results show a very positive evolution, with 36 aircraft delivered, which is 44 per cent more than in 2022. Our target is to keep ramping up with an ambition to reach 80 aircraft produced per year by the end of the decade to meet the growing needs of regional connectivity worldwide.

We also had a record year in 2023 from different perspectives. Our Support and Services activities reached revenues of over \$400 million, which shows that our operators rely on us to support their operations. We welcomed 11 new customers for new and used aircraft, extending further our customer base which already counts almost 200 operators. We recorded over 100 transactions on the used market, which demonstrates the value of the ATR as an asset. Last, but not least, our operators opened 160 new routes with our aircraft in 2023, compared to 150 in 2022, which confirms the relevance of the ATR as a "route opener", as well as the strong demand for regional air connectivity in many areas of the world.

These positive results underline the relevance of our products and services, our capacity to constantly improve our products, and our ability to adapt to changing market dynamics.

It has been a real privilege to lead such a team of experienced leaders and talented individuals, and I'm very excited about the future, given the strong value proposition we bring to the market.

Baranwal: How do you see the future of Regional Turbo-props, especially ATR aircraft?

Laude: We have recently performed a very detailed analysis of the regional aviation market dynamics over the next 15 years. This analysis shows that regional connectivity will grow and develop over years on all continents and that there is a large number of older regional aircraft to replace within the same timeframe. To fulfil this demand, ATR has a tremendous advantage with a low-emission alternative that responsibly connects people and places. Designed by pioneers and driven by continuous innovation, our aircraft are highly efficient and future-proof, and we are committed to providing airlines and passengers with the most modern, reliable, low-emission and cost-effective aircraft on the market.

While aviation faces the imperative of aligning with the Paris Agreement's sustainability goals, demand for air travel remains robust with a forecasted growth in air traffic of above 4 per cent per year in the decade to come. Then it becomes crucial to find a balance between making aviation more environmentally sustainable and the aspirations of individuals to continue to fly.

The turboprop technology is providing low-emission alternatives to thirstier regional jets. Market dynamics are shifting towards sustainability and environmental concerns, favouring turboprops for their fuel efficiency and lower carbon emissions. We are also preparing for stricter regulations and government policies on emissions and noise that will play a major role in shaping the future of turboprops.

If you look at all the new projects around low-carbon regional mobility and short-haul connectivity, they all revolve around propellers: they are the future of aviation.

The future of turboprops is also very much related to the future of regional mobility in general. ATRs, with their unrivalled versatility and economics, provide essential services and a lifeline to communities around the world, and that connectivity in turn empowers communities, opens up economic development opportunities and boosts tourism. Studies show that a 10 per cent increase in

“ATRs, with their unrivalled versatility and economics, provide essential services and a lifeline to communities around the world, and that connectivity in turn empowers communities, opens up economic development opportunities and boosts tourism.”

regional flights generates a 6 per cent increase in local GDP, a 5 per cent increase in tourism and an 8 per cent increase in foreign direct investment. These are the tangible benefits of regional aviation, and our aircraft are the ideal modules to provide these vital links. The fact that more than 40 per cent of ATR aircraft in service are serving essential air services is a great testimony to this.

All trends confirm a strong need for over 2,000 turboprop deliveries over the next 15 years.

Baranwal: What are the key advantages for Operators around the world, for the Regional Turboprops – ATR family of aircraft?

Laude: The ATR aircraft family is renowned for its exceptional fuel efficiency, producing lower CO₂, NO_x, and noise emissions compared to regional jets and other turboprops, thereby complying with stringent ICAO standards. Equipped with the most advanced avionics suite in their class, ATRs incorporate cutting-edge technologies, navigation aids, and passenger comfort features on par with single-aisle jets. Moreover, ATR aircraft are designed to perform reliably in extreme temperatures and at high altitudes, enhancing their capability to access challenging airfields around the world. This robust-

ness also makes them suitable for the growing e-commerce sector and associated needs for regional freighter aircraft.

The ‘family’ approach behind the ATR 42 and ATR 72 also gives our operators a lot of flexibility. The two aircraft models share the same fuselage cross-section, systems, engines, propellers, and cockpit, enabling common type rating and cross-crew qualification. This interchangeability significantly reduces costs for operators by streamlining flight crew training and maintenance. Additionally, approximately 90 per cent of the spare parts are common, which makes it very easy to operate both types of aircraft, and therefore to be able to constantly adapt the number of seats offered on certain routes to demand.

ATR also offers competitive services that enhance operator performance. The ATR Global Maintenance Agreement, for instance, is a great tool to support both established customers and startup airlines. With a proven track record of supporting startups, ATR helps de-risk operations, predict costs, and enhance reliability. Established customers also benefit from ATR's expertise as a manufacturer, with insightful recommendations on operations and a constant strive towards optimisation and anticipation.

Baranwal: What all is ATR doing to stay ahead of the competition, both in terms of aircraft technology and market presence?

Laude: ATR is maintaining its competitive advantage through continuous innovation and constant discussions with our strong, loyal customer base. To remain at the forefront of the regional market, it is essential to relentlessly work on the operational and economic performance of our aircraft. This is why we collaborate with industrial partners and suppliers on product improvements.

Since partnering with Pratt & Whitney Canada in the mid-eighties to introduce the PW120 engine, ATR has continued prioritising innovation, resulting a few years ago in the launch of the PW127XT series. This new engine offers 40 per cent more time on wing, a 20 per cent reduction in direct maintenance costs, and at least 3 per cent fuel burn savings compared to the PW127M, leading to a 45 per cent reduction in CO₂ emissions versus similar-sized regional jets. The PW127XT exemplifies ATR's commitment to developing modern, efficient technologies that meet customer needs, enhancing aircraft availability, and setting new standards for fuel consumption, emissions, and operating economics in regional aviation.

If you look into our long-term vision, the ATR EVO concept addresses sustainability and connectivity challenges worldwide. Recognising that different regions have unique needs, ATR consulted customers to understand their requirements for the next-generation aircraft. The clear feedback was a demand for a low-emission solution that remains versatile and affordable. This led ATR to explore new advancements that maintain the high standards of the current platform. These continuous advancements keep ATR at the forefront of regional aviation, delivering cutting-edge technology, superior passenger comfort, and exceptional environmental performance.

In terms of market presence, what truly makes a difference is the relevance and the value we bring to the market. ATR, with over 40 years of experience, has been able to develop a unique balance between speed and fuel consumption, innovation, versatility, great economics and low emissions. This is why our aircraft are today flying with 200 customers in over 100 countries.

If we look at India, for instance, the first ATR began flying in the country in 1999. Nowadays, there are around 800 passenger aircraft in operation, and almost 70 of them are ATRs. The ATR



ATR has been able to develop a unique balance between speed and fuel consumption, innovation, versatility, great economics and low emissions, and is today flying with 200 customers in over 100 countries

72 is the third most popular aircraft type in India, after the A320 and A321. What's interesting to note as well is that India has the third youngest fleet in the world (6.7 years on average), and the ATR fleet is even younger than that – 5 years old on average. This shows clearly that Indian airlines are looking to invest in state-of-the-art aircraft to carry their passengers. Many of the Indian passengers are first-time travellers, who choose air transport over slower or less comfortable ground transportation options, which also makes them very price sensitive, particularly about domestic trips.

In that kind of environment, with a pressing need to join secondary population centres, and a burgeoning middle-class asking for affordable connectivity, ATR aircraft provide an excellent business case. The ATR 72-600 can accommodate up to 78 passengers, it is the lowest cost per trip aircraft in production, and airlines start making profits with just over half of the seats filled in the plane.

The accessibility to challenging airfields is also key in the success of the ATR in India. Currently, our aircraft are the only modern aircraft capable of flying to short runway airports, such as Kullu, Shimla or Agatti, in the Lakshadweep archipelago. For all of these reasons, ATR aircraft have played over the last 20 years, and will continue playing, an important role in broadening access to air travel across India. They uniquely combine outstanding economics, passenger comfort, reliability, airport compatibility and sustainability. We are proud and honoured to provide Indian people with ATR aircraft which support the Indian government's UDAN initiative in its goal of making flights affordable and ubiquitous nationwide to boost economic prosperity.

Baranwal: ATR is really big on “Sustainability”. Can you share some of your major initiatives taken in this direction?

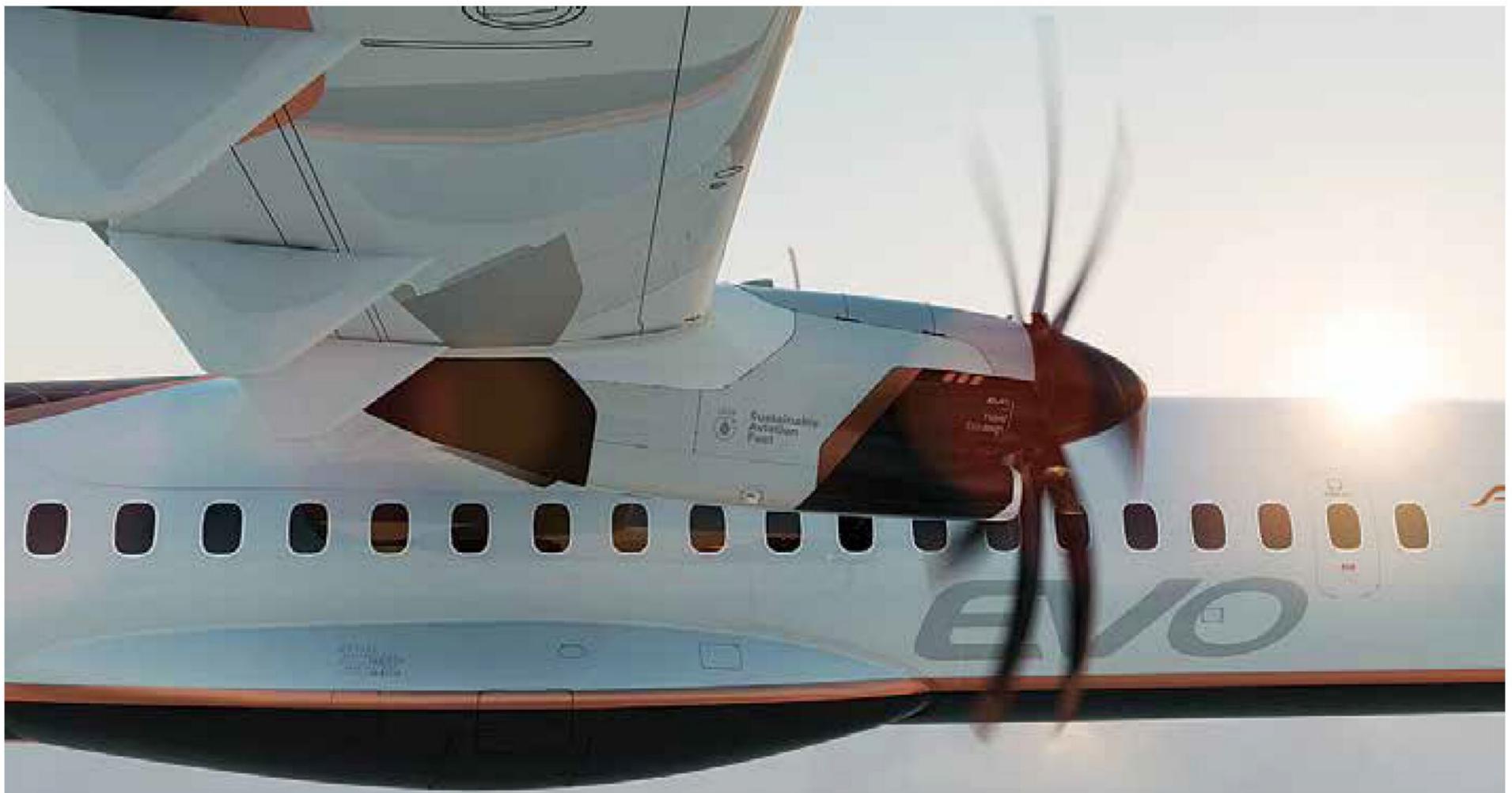
Laude: First and foremost, ATR offers unmatched fuel efficiency, consuming 45 per cent less fuel and emitting 45 per cent less CO₂ than comparable regional jets. Making our aircraft and activities ever more responsible is a pivotal aspect of ATR's strategy.

In June 2022, we conducted the first flight in history with 100 per cent SAF in both engines of a commercial aircraft, reducing CO₂ emissions by up to 80 per cent. This flight demonstrates that the technology is ready, and we are waiting for the ASTM certification to be able to offer that full 100 per cent SAF capability to our customers.

While we are working on the 100 per cent SAF certification of our aircraft, we are also making plans for the next generation of ATR aircraft, and that is our EVO concept. We are in the pre-feasibility phase and are aiming at a renewal of the propulsion system with a hybrid electric capability, new propellers, improved cabin and systems - all eco-designed. We want to offer an even more responsible aircraft, 100 per cent SAF compliant, with higher performance and a double-digit reduction in operating costs. We are targeting an entry into service around 2030+.

We have identified three main initiatives to achieve this: sustainable aviation fuels (SAF), mild hybridisation with the ATR EVO, and considering the entire aircraft life cycle. While disruptive technologies are still in development, we are making significant progress today.

And our commitment extends beyond SAF and EVO, as we previously mentioned. We are focused on adopting new materials, optimising route efficiency, and improving aircraft systems. Aircraft



The hybrid electric ATR EVO concept is the natural next step, further reducing emissions compared to traditional aircraft without requiring huge investments in costly and complex infrastructure

decarbonisation is a comprehensive process that encompasses the entire product life cycle, from design to dismantling. Our focus is on reducing waste, promoting reuse, and enhancing recyclability of parts. Currently, 85.5 per cent of ATR parts are recyclable or reusable, and we are actively exploring new designs and materials to further enhance this figure.

These efforts demonstrate our dedication to building a more responsible industry today, even as we await the maturation of more disruptive technologies.

Baranwal: Where do you position your company in the market of air travel / transport, which is likely to be populated by e-VTOL, variety of advanced air mobility solutions, unmanned air travel, upcoming hybrid platforms, etc?

Laude: Most e-VTOL aircraft and air mobility solutions are envisioned to transport a limited number of passengers, while a typical ATR route, however, carries around 1,00,000 passengers a year. This e-VTOL market segment mostly focuses on providing on-demand, point-to-point transportation within urban and suburban areas, aiming to alleviate traffic congestion.

ATR has a strong foothold in the regional aircraft market, primarily serving short-haul routes, and we will continue to focus on

regional connectivity, targeting routes that will probably not be economically viable for less performing aircraft than ATR.

We are committed to ensuring that our aircraft remain the most advanced and lowest-emission platforms available on the market. Our objective is to ensure that our customers can continue to benefit from the versatility and profitability of our products while maintaining affordable air travel for passengers.

Our hybrid electric ATR EVO concept is the natural next step for us and the ideal combination of what the market demands: further reducing emissions compared to traditional aircraft, without requiring huge investments in costly and complex infrastructure. To remain relevant, we will also continue leveraging synergies and sharing expertise with other industry players and partners to remain at the forefront of innovation and offer integrated solutions to our customers. ATR is a joint venture that is supported by two aerospace heavyweights and forward-looking players: Airbus and Leonardo.

Overall, our ability to adapt and innovate will be crucial to position ourselves as leaders in the air travel and transport market of the future. By leveraging our regional expertise, exploring hybridisation, embracing new disruptive technologies, fostering partnerships, and prioritising customer experience, I am confident we will navigate the changing landscape and remain a key player in the industry. **SP**



India's new Civil Aviation Minister Rammohan Naidu in action immediately after taking over charge of the Ministry. He can be seen here inspecting the ongoing construction at Bhogapuram Airport.

NEW LEADERSHIP TO NAVIGATE GROWTH

Will the new Civil Aviation Minister meet the challenges and demands of India's aviation boom?

BY **SWAATI KETKAR**

THE AVIATION SECTOR ALL over the globe has shifted gears and bloomed over the last one year. Revenge travel, new aircraft soaring aircraft orders, business travel, family vacations, increasing investments from leading OEMs and MROs setting up R&D centres, hangars, and training facilities in India, the last couple of years have seen it all. At this juncture, India witnessed the return of Modi 3.0 governance with the reins of booming Indian aviation sector switching to one of the youngest ministers in Modi cabinet – 36-year-old, Kinjarapu Rammohan Naidu, India's new Civil Aviation Minister.

INDUSTRY SPEAKS TO MOCA. "India's new Civil Aviation Minister enters the ministry at an opportune time," says Prakash Babu Devara, Director of product marketing, Cognitus.

"The industry outlook, while quite positive," also faces challenges, Devara adds. To create a win-win situation, the minister can play a crucial role in enabling the industry to navigate these challenges and sustain its growth momentum.

Speaking of Naidu, although he has strong political background and knows his ground well, experts believe he has a host of challenges as the new minister of civil aviation. In fact, one of his very first quotes after officially handling the charge – "Will strive to reduce air fare and make flying more affordable for common man," was cautiously looked upon by domestic airlines who are already operating on wafer-thin margins.

India has one of the largest aircraft orders in the world – 1,150 aircraft by 2035 to be precise, but is the country's foundation firm enough to handle the aircraft and the rising passenger demand. Developing a sound aviation eco-system is one of the

biggest challenges facing our new minister. Besides another key problem is the demand from Middle Eastern carriers for more bilateral flying rights. Jaideep Mirchandani, Chairman of SkyOne advocates for the bilateral rights. He says “Considering this boom, we hope the new minister will address the ongoing demand from the UAE and Qatar for more bilateral flying rights. We seek a balanced approach that promotes fair competition and growth for all stakeholders and opens new avenues for growth.”

■ **AIRPORT DEVELOPMENT.** Another major issue is developing more Indian hubs on the lines of Dubai and here, funding for the expansion plan at private airports remains a major cause of concern. Mirchandani hopes that the ministry prioritises the development of Indian hubs to rival those in Dubai and Doha. “This includes securing funding for airport expansions and solving the resource shortages, such as pilots, engineers, and air traffic controllers, to support rapid growth,” he adds.

“The Minister needs to focus his attention on facilitating the growth of civil aviation to realise the ambitious plans of increasing the number of airports and introducing hundreds of new air routes,” says Subir Hazra, Chief Commercial and Strategy Officer at GMR Services, GMR Group. “MoCA should design policies and take initiatives to develop the major Indian Airports as the global transit hubs to boost international traffic, rival the world’s premier aviation hubs, and increase the operational efficiency,” Hazra echoes Mirchandani’s thoughts.

He further lists down the following pointers for Minister’s eyes:

- Full support should be extended to Airport operators to modernise and extend non-aeronautical services at the airport.
- Airport land development should also be given top priority to compete with world-class standards promising benefits not only to the aviation industry but also to the nation’s overall economic development.

Additionally, the government’s plan to lease out 13 airports to private players is on hold since past four years. Mirchandani also hopes that ministry speeds up the plan to lease out 13 airports to private players. “We hope the revival will be quick, as it is crucial for modernising our aviation infrastructure and enhancing operational efficiency,” he adds.

Arvind Chandrashekhar of Lufthansa Consulting sums it up. “Reinvigorate asset development and capacity expansion, including reinitiating stalled airport privatisation are the key areas that the new minister needs to focus on.”

■ **SKILLING.** Shortage of skilled talent to take up the rising aviation sectoral special posts is a universal key concern, but India will soon face a major brunt of it, as newer and more advanced next-

India’s new Civil Aviation Minister takes charge at an opportune time, with the industry outlook quite positive but facing challenges that need careful navigation to sustain its growth momentum

Gen aircraft start flying in Indian skies. India significantly lacks the skilled manpower required to operate aircraft, maintain aircraft, engines, and components, and manage the supply chain. Therefore, Hazra emphasises on strong focus on establishment of world-class training institutions to create a future-ready workforce.

“Airlines and MROs can only make a limited impact,” Devara adds. He urges the government to take the initiative to make aviation a more attractive career option for students and young people. “Similar to the IT and software industry boom since the 1990s, aviation needs a similar push from the ground level,” Devara adds. He goes on to give various options to the ministry like:

- incorporating more aviation-related courses into the curriculum,
- encouraging the establishment of more aviation academies or centres,
- and creating more career opportunities.

Achieving this requires coordination with multiple stakeholders across the industry, which the ministry can facilitate. Chandrashekhar also urges the minister to enhance crew capacity for the industry through supporting the establishment/expansion of flight training academies and stringently monitoring quality and safety.

■ **DIGITAL TRANSFORMATION.** The aviation sector is ripe for digital transformation, and experts expect the new minister to support the integration of cutting-edge technologies like implementing advanced air traffic management technologies to improve the efficiency and safety of air operations, reducing delays and fuel consumption.

Lynn Frederick Dsouza, National President - Aviation Council, WICCI and Founder & Director - ESPIRIDI feels that the minister should focus his attention to facilitate investments in R&D to drive innovation in areas such as aircraft technology, sustainable fuels, and air traffic management systems. Besides adequate support should be given to encouraging startups and entrepreneurs by creating a supportive ecosystem, fostering innovation and the development of new technologies and services.

Chandrashekhar feels that simpler process and acceleration of technology adoption is the fastest route to progress. “The recent FTI-TTP is a positive step. There are many steps to be taken, e.g. expanding DigiYatra across airports and to international flights, introducing automated immigration, digitising or eliminating entry forms for foreigners, pushing for investment in better security infrastructure and more.” Chandrashekhar adds.

■ **MRO DEVELOPMENT.** Development of MRO-sector is a major cause of concern as the sector has been much neglected over the years. Aircraft – new or old need maintenance and the sheer lack of well-developed capabilities in India has led airlines lose a major chunk of their revenue overseas to repair the aircraft. The minister needs to look into development of third-party MROs, giving them a boost and much-needed respite from the red-tape rules and taxes.

The disinvestment of AI Engineering Services (AIESL), AI Airport Services, and regional airline Alliance Air is still an unsolved mystery post Air India privatisation. Although Air India along with Lufthansa Technic has shown interest in buying AIESL, nothing has been confirmed as per sources.

■ **STRENGTHENING CYBERSECURITY FRAMEWORKS.** With the increasing digitisation of the aviation sector, cybersecurity has become paramount. Experts expect the new minister to prioritise the development and implementation of



India has one of the largest aircraft orders in the world – 1,150 aircraft by 2035, but developing a sound aviation ecosystem to handle the rising passenger demand is a significant challenge

robust cybersecurity policies and frameworks that protect critical aviation infrastructure from cyber threats.

Dsouza further draws attention to incident response and recovery plans like developing comprehensive incident response strategies and recovery plans to quickly and effectively mitigate the impact of any cybersecurity incidents, ensuring minimal disruption to services. She feels that the ministry should focus on state-of-the-art threat detection systems and continuous monitoring of networks and systems to identify and address vulnerabilities proactively.

■ **CARGO DEMANDS.** Civil Aviation's cousin, Cargo sector also needs some attention from MoCA. As Indian airports prepare for a 10-million-tonne air cargo handling by 2030, the Minister of Civil Aviation should spearhead initiatives to bolster infrastructure. Hazra further elaborates his demands for cargo sector as follows:

- Expansion & modernisation of existing cargo terminals
- Establishment of new cargo terminals (including integrated, multimodal, and dedicated facilities)
- Foster collaboration between the government, industry associations, and key stakeholders
- Streamlining regulatory procedures
- Setting up world-class cargo hubs within the country and enhancing air connectivity with major global hubs
- Improving intermodal connectivity
- Simplifying customs clearance processes
- Promoting automation & digitalisation.

■ **THE TWO R'S – REGIONAL CONNECTIVITY & REGULATORY POLICIES.** Effective implementation of policies and regulations that ensure fair competition, passenger safety, and environmental sustainability in the aviation sector is yet another major lookout for the new minister. Speaking of UDAN (Ude Desh ka Aam Nagrik) scheme, Hazra asserts that the minister should also look at the launch and success of such initiatives that promote air travel in underserved and remote areas will accelerate the realisation of goals for the Indian Aviation industry.

Devara feels that while the Modi Government's UDAN scheme had good intentions, it hasn't taken off as planned. "A key reason is the lack of infrastructure, including a need for more airports, improved airport facilities, and upgraded Air Traffic management units. This requires collaboration with state governments for land pooling, capital funding, and obtaining necessary regulatory clearances. The aviation minister can significantly support the industry in this area," Devara asserts. Chandrashekhhar meanwhile advocates for simplification of taxation on aircraft turbine fuel (ATF) along with ensuring full staffing of the DGCA positions and enforcement capability.

He also feels that the ministry should pursue policy design and inter-governmental negotiations to make possible a full aircraft production line in India from one of the major international OEM. "The government should allow the aviation industry to operate in a deregulated manner on commercial aspects," Chandrashekhhar adds.

■ **SUSTAINABILITY.** Indian The government has already set a roadmap for the adoption of SAF for one per cent blending of SAF for domestic flights by 2027 and two per cent for international flights by 2028. To achieve these targets, the minister needs to pay special attention at promoting sustainable initiatives.

Elaborating on various sustainable initiative Dsouza throws light on Green Airport Initiatives. She says "Implementing policies to support the development of green airports that use renewable energy, reduce waste, and have sustainable infrastructure." She further goes on to speak on Carbon Offset Programmes and urges the minister to establish and promote carbon offset programs that allow airlines and passengers to compensate for their carbon emissions, contributing to broader environmental sustainability efforts.

"To achieve this and accelerate the adoption of sustainability practices in the Aviation Industry, India-specific environmental sustainability frameworks in the Aviation industry should be conceptualised and implemented that cater to the specific requirements of our fast-growing economy, and remove our dependence on global frameworks which are ill-suited for our growth," Hazra concludes.

■ **FINANCIAL PERFORMANCE OF AVIATION INDUSTRY.** While financial performance and strong growth is not the sole responsibility of the Ministry, regulations and initiatives to ensure a good financial health of entities in the Aviation sector should also be one of the top concerns. Dsouza feels that the minister needs to implement mechanisms to support the financial stability of airlines and other aviation stakeholders during crises. "This could involve emergency funds or fiscal incentives," Dsouza adds.

With the increasing pace of privatisation of airports under the PPP model, typically with concession tenure of 30+ years Hazra argues that loan assistance from major banking institutions with repayment period matching the concession tenure and a justified interest rate should be prioritised. Apart from the above, as only a few major airlines control the Indian aviation industry, needful financial and regulatory assistance should be extended to ensure continuity of operations.

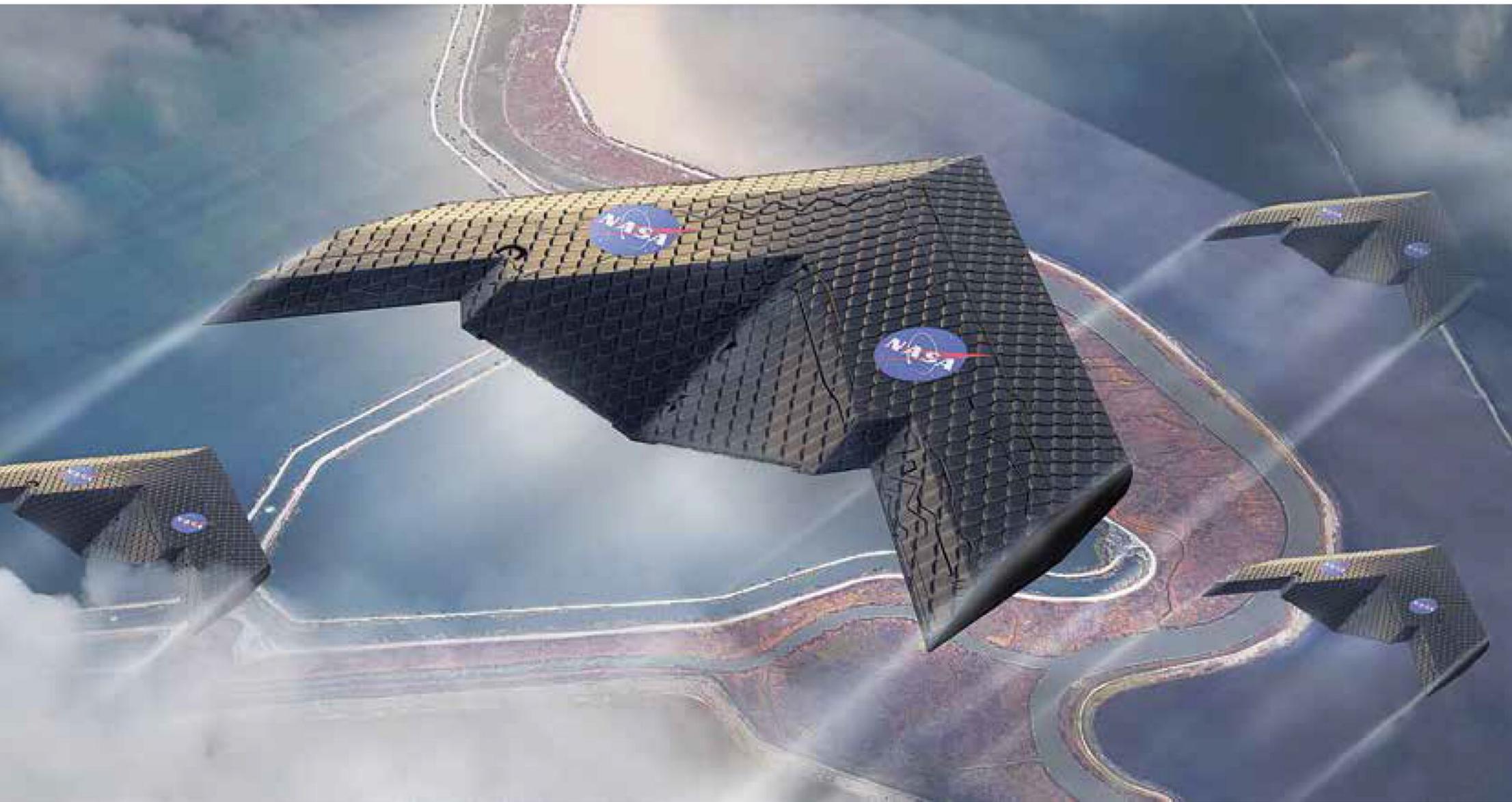
Looking carefully at all of the above, one cannot leave out a key aspect of commercial aviation- The Passenger. The 'one' who can make or mar the reputation of an airline or an airport. In today's world passenger experience and ease of travel holds significant importance as passenger seek more comfort, luxury and safety while travelling. Devara draws attention to a key challenge for passengers – 'overcrowded airports.' "With the surge in air travel demand, major airports across the country are operating beyond capacity. Long queues at security checkpoints, congested terminals, and delayed flights are commonplace, leading to passenger dissatisfaction and hampering operational efficiency. The ministry needs to prioritise this issue and take steps to mitigate these challenges," Devara says.

All-in-all Mirchandani hopes to collaborate under Naidu's leadership to witness the new chapter in the Indian aviation sector. "With the passenger traffic increasing, new airports and major airlines expanding their operations and upgrading their fleets, the future looks bright," Mirchandani concludes. **SP**

NEXT GENERATION AIRLINERS

BY ANIL CHOPRA

Next-generation airliners will feature innovative airframe designs, utilising lighter and stronger composite materials and advanced aerodynamic shapes with alternative propulsion systems to enhance fuel efficiency and reduce carbon emissions.



MIT and NASA engineers demonstrate a new kind of airplane wing

THE AVIATION INDUSTRY HAS made a commitment to achieving “net-zero” carbon emissions by 2050. But this ambitious target cannot be achieved using existing aircraft technologies. New airframe designs, alternative propulsion systems and low-carbon energy sources, as well as innovative solutions to existing challenges, will help significantly reduce CO₂ emissions in future aircraft.

Human beings continue to emulate the birds to make civil aviation more efficient, eco-friendly, sustainable, with longer range, smoother ride, and greater passenger comfort. This is aimed to be achieved through better aerodynamic design, lighter but stron-

ger composite materials, and more efficient and eco-friendly fuel burning engines with lower carbon emissions.

NASA and MIT in the US have come up with a radical new aeroplane wing design that is not only much lighter than conventional wings, but also has the potential to automatically reconfigure itself to meet the flight conditions of the moment – just like birds do when they’re in mid-flight. Built out of tiny, identical polymer tiles they promise faster, cheaper aircraft production and maintenance.

More options such as supersonic bi-directional flying-wing that will allow lower speed take-off, yet, go supersonic in flight. For subsonic mode, the airplane will be rotated 90° so that the side of the airplane during supersonic flight becomes the front

of the airplane. This 'airliner of the future' has a radical new wing design. Many more projects are evolving. Each has its advantages and challenges.

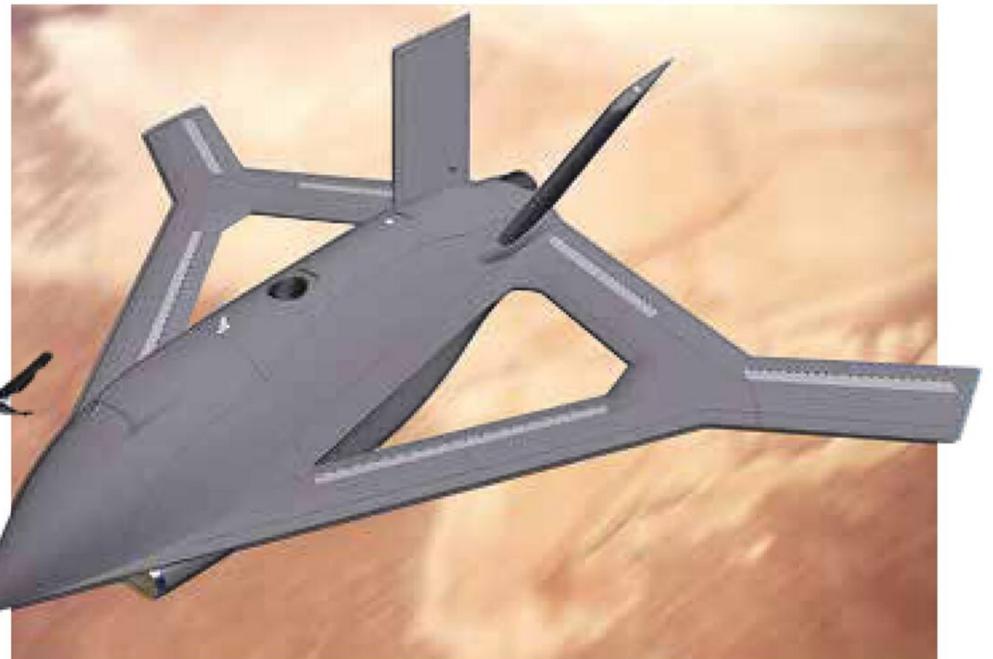
Blended flying-wing design is generally evolving as the concept has got well researched with years of military plane operations.

■ **BLENDED WING BODY (BWB) CONCEPT.** The blended wing body (BWB) concept offers advantages in structural, aerodynamic and operating efficiencies over today's more conventional fuselage-and-wing designs. These features translate into greater range, fuel economy, reliability and life cycle savings, as well as lower manufacturing costs. They also allow for a wide variety of potential military and commercial applications. The first scaled model of KLM Royal Dutch Airlines' futuristic Flying-V aircraft designed by Delft University of Technology flew in 2020.

Airbus ZEROe blended wing concept was unveiled in 2020. ZEROe programme will have three hydrogen-powered, zero-emission aircraft, which can carry 100 to 200 passengers. Airbus'

aircraft. JetZero wants to simultaneously develop three variants: a passenger plane, a cargo plane and a fuel tanker. The US Air Force has just awarded JetZero \$235 million to develop a full-scale demonstrator and validate the performance of the blended wing concept. First flight is expected by 2027, which means the military version of the plane is scheduled to lead the way and perhaps support the development of the commercial models. The plane will initially borrow engines from today's narrow-body aircraft, like the Boeing 737. Eventually the plan is to move to completely emission-free propulsion powered by hydrogen, which would require new engines that haven't yet been developed.

■ **COMPLEXITIES OF BWB AIRLINER.** A wing that is made deep enough to contain the pilot, troops/passengers, engines, fuel, undercarriage, and other necessary equipment will have an increased frontal area when compared with a conventional wing and long-thin fuselage. Boeing has been study-



(Left) Artistic rendering of the JetZero commercial jetliner derivative of their BWB technology demonstrator; (Right) CRANE X-Plane configuration in development for flight testing Active Flow Control (AFC) technologies.

ambition is to bring to market the world's first hydrogen-powered commercial aircraft by 2035. To get there, the ZEROe project is exploring a variety of configurations and technologies, as well as preparing the ecosystem that will produce and supply the hydrogen. In the case of hydrogen combustion, gas turbines with modified fuel injectors and fuel systems are powered with hydrogen in a similar manner to how aircraft are powered today. A second method, hydrogen fuel cells, creates electrical energy which in turn powers electric motors that turn a propeller or fan. This is a fully electric propulsion system, quite different to the propulsion system on aircraft currently in service. The race for hydrogen-powered commercial aviation has started on the ground. Hydrogen has to be produced, transported and stored in the right quantity, at the right time, place and cost. Its production and use must be regulated and certified. Airbus and ZeroAvia have signed to study the feasibility of hydrogen infrastructure at airports, initially in Canada.

In addition to Boeing and Airbus, California-based JetZero, has set an ambitious goal of putting into service a blended wing

ing possible applications for civilian and military transports. Boeing and NASA have been developing a flying-wing passenger airplane that can carry 800 passengers per flight (160 more than a 747). The current airliners fly around 950 kmph. Achieving the same in a much thicker flying wing would mean higher drag, higher engine power, and, consequentially, higher fuel consumption.

The radically new BWB airliner shape would make the planes interiors wildly different to even today's wide-body aircraft. It's much, much wider fuselage could have 15 or 20 rows across the cabin, depending upon how each particular airline will configure it. Passengers not having windows, would require giving artificial screens to project external view. Entry and Exit doors for boarding would require reconfiguring. So will be emergency exit doors. The much larger cabin would require a freshly designed pressurisation system. The airport infrastructure, including parking areas and aero-bridges would have to be redesigned.

The target of operationalisation by 2030 seems ambitious. Building an entirely new airplane from scratch is an enormous

task, given that the full process of certification for even a variant of an existing aircraft can take years.

■ **SUSTAINABLE FLIGHT DEMONSTRATOR.** NASA and Boeing are collaborating to create the X-66A aircraft ‘Sustainable Flight Demonstrator’, which will feature long wings supported by trusses. It could first fly in 2028. Imagine a typical Boeing 737 airliner fuselage, having a high wing and another wing protruding out from the lower part of the plane’s body, effectively creating another large lifting surface. The long skinny wings are more slender and lengthier than typical wings on commercial aircraft and require a connecting brace. The brace also stabilises the wing from possible flutter that may naturally happen in a long thin wing. These will be 30 per cent more efficient and reduce carbon emissions to meet the industry’s demands to decarbonise.

The two-engine aircraft could have a single or two aisles. Even the connecting trusses, or braces generate lift like the old biplanes. The wings also produce less drag because they can reduce vortices at the wing tips. Some are calling it the Transonic

■ **EMBRAER’S ENERGIA PROGRAMME.** Embraer is designing the future of aviation to have a lower impact. It means lower emissions, lower noise levels and lower fuel consumption. To achieve our goals, we’re exploring a wide range of bold but viable aircraft designs in our Energia concepts– reimagining and conceptualising everything from the aircraft’s power source to the shape of the airframe – all to achieve the industry-wide goal of net carbon zero by 2050. Their Energia project is exploring a range of sustainable concepts to carry up to 50 passengers. This project is considering a number of energy sources, propulsion architectures and airframe layouts to reduce carbon emissions by 50 per cent starting from 2030.

Combining a mix of technologies, hybrid-electric propulsion harvests the benefits from maximising thermal and electric engines synergies. By developing higher capacity and longer-lasting batteries, a full-electric aircraft, designed for short-range missions, could reduce the aircraft CO₂ emissions to zero. Hydrogen is a highly promising area as Hydrogen fuel cells have the potential to either run as a single power source or as a hybrid with gas turbines or batteries. Dual-fuel powers a gas turbine with two dif-



(Left) ZeroAvia aims to deliver clean future of flight by enabling electric propulsion and is working on a 30–90 seat aircraft by 2027; (Right) Embraer ENERGIA H2 uses dual-fuel that enables it to power a gas turbine with two different fuel sources (SAF or Hydrogen).

Truss-Braced Wing (TTBW). The long wings and trusses would create the challenge of fitting into the parking gates at the airport. NASA plans to get this futuristic bird flying by 2028, and could be in service in the 2030s.

■ **AIRBUS UPNEXT PROGRAMME.** Airbus and Boeing are trying out new wing configurations for sustainability, and more. Planes with flapping wings may sound more like fiction, but could shape the next generation of business and commercial jets. Some radical wing configurations that change form to counter turbulence, while increasing efficiency. The eXtra Performance Wing that Airbus is developing part of its UpNext programme, “mimics a bird’s feathers and adjusts automatically to maximise aerodynamic flow.” Flight tests for the 165-foot-long shape-shifting wing will soon year on a Cessna Citation VII jet. Like a bird, it dynamically adapts to conditions, using active control technologies. And its folding wingtips, an ancillary design, will allow for increased performance while fitting into the constraints of the airport gates.

ferent fuel sources (SAF or Hydrogen), to maximise operational flexibility and reduce aircraft weight. Using a modified gas turbine, adapted to these new fuel sources, we can increase range and passenger capacity.

■ **CITYAIRBUS NEXTGEN.** CityAirbus NextGen is an all-electric, four-seat vertical take-off and landing (eVTOL) multi-copter prototype featuring a fixed wing and V-shaped tail. This helicopter demonstrator has the potential to reach speeds of 400 km/h, which is significantly faster than standard helicopters. The advanced design also means it will be 10-15 per cent more efficient than standard helicopters. It will serve for safe and reliable passenger transport, medical services or ecotourism missions, and advance urban air mobility services in countries around the world.

■ **OTHER MEANS OF POWERING.** There are other ways of trying to make aircraft greener, including running smaller planes on purely electric power to using sustainable aviation

fuel. On September 24, 2020, ZeroAvia flew the world's largest hydrogen-powered aircraft at Cranfield Airport in England, showing the possibilities of hydrogen fuel for aviation. While some are exploring hydrogen power, others are testing electric planes. Washington State-based Eviation Aircraft is behind the nine-passenger all-electric Alice aircraft, which produces no carbon emissions. In April 2024, Skydweller Aero has conducted the first autonomous flight of its solar-powered, heavy-payload, long-endurance uncrewed aircraft, a modification of the Solar Impulse 2 aircraft that flew around the world on solar power in 2015-16. On March 25, 2022, an Airbus A380, the world's largest commercial passenger airliner, completed a test flight powered entirely by SAF — sustainable aviation fuel — composed mainly of cooking oil.

■ **BI-DIRECTIONAL FLYING WING.** NASA is evolving the revolutionary supersonic bi-directional flying wing that has the potential to revolutionise supersonic flight with virtually zero sonic boom and ultra-high aerodynamic efficiency. The plan form will be symmetric about both the longitudinal and

■ **OTHER ADVANCED TECHNOLOGIES.** Use of 100 per cent sustainable aviation fuel (SAF) will soon be possible. Electric propulsion for urban air mobility, such as the self-flying, battery-electric aircraft will happen soon. Solar power is seeing advances. And then there's hydrogen, which has great potential as long as it can be produced from low-carbon sources rather than fossil fuels. Hybrid power will be the way to go. Aluminium alloys are ideal for hydrogen storage, as witnessed by their use in the tanks of space vehicles.

Advances in materials technology and computing will open the door to radical, futurist new designs for a more eco-efficient plane. Morphing, the change of aircraft geometry that allows change in shape of the aircraft in nearly real time, making it more manoeuvrable, more fuel efficient will soon be an achievable objective.

Full advantage of 3D printing technologies and design bionic structures that are strong and light is happening. It will be possible to experiment with more complex shapes like birds, butterflies, fish, using biomimicry. Airbus' "Maveric" is a blended wing body passenger plane resembling a stingray without a tail.



(Left) Eviation's Alice, the world's first flight-tested fully electric regional aircraft;
(Right) eXtra Performance Wing project aims to improve flight performance by completely rethinking aircraft wings.

span axes. For supersonic flight, the plan form can have as low aspect ratio and as high sweep angle as desired to minimise wave drag and sonic boom. For subsonic mode, the airplane will rotate 90 degree in flight to achieve superior stable aerodynamic performance.

■ **AIR JET FLIGHT CONTROLS.** Recently, the US agency DARPA okayed construction of X-65 plane with air jet flight controls, a new technology that replaces moving control surfaces with Active Flow Control (AFC) actuators that use jets of air for control. The X-65 is an experimental jet being developed by the Control of Revolutionary Aircraft with Novel Effectors (CRANE) programme. Since the first aircraft were invented, they have been controlled by moving surfaces such as rudders, flaps, elevators and ailerons. The CRANE programme aims to do away with these entirely and develop an aircraft controlled fully by jets of pressurised air that alter how the surrounding air flows over the aircraft while in flight. If successful, it could be a game-changing leap for all types of aircraft.

■ **CONCLUSION.** For long the commercial aviation prioritised safety, favouring tried-and-tested traditional 'tube and wing' design, and made only small innovations in airframe design and concentrated more on efficiency of engines. The blended wing body is meant to change that. It will increase payload and efficiency.

It remains to be seen whether a 50 per cent reduction in fuel use is actually possible as both NASA and Airbus quoted a more modest 20 per cent for their designs. Extensive aerodynamic testing and optimisation are essential to fully realise the drag reduction potential of this innovative aircraft design. 2030 entry is unrealistically ambitious.

Civil aviation will continue to grow exponentially. Despite growing numbers many airlines are struggling to make profits. In a very competitive world, efficient flight will be at premium. Technology will continue to step in. Great funding is required for Research and development. India must start working towards own airliners and aero-engines if it has to sit on the global high table. **SP**



The CFM RISE (Revolutionary Innovation for Sustainable Engines) programme will be compatible with 100 per cent sustainable aviation fuel (SAF), capable of hybrid-electric operation, and possibly permit running on hydrogen

GET SET FOR THE NEXT GENERATION!

With all major turbofan makers harnessing their best and brightest brains and investing billions in sustainable aviation the next few years are expected to bring dramatic breakthroughs in cleaner jet propulsion technology.

BY JOSEPH NORONHA

ONE THEME DOMINATES THE thinking of every aeroengine manufacturer worth the name nowadays – aviation sustainability. And sustainability depends on an extremely challenging target coming ever closer. In fact it is only 25 years away. In October 2022, to prevent the aviation industry from effectively becoming an environmental

pariah, member states of the International Civil Aviation Organization (ICAO) agreed to a long-term aspirational goal (LTAG) of net zero emissions from aviation by 2050. Net zero means the amount of greenhouse gases (GHG) removed from the atmosphere is equal to that emitted by that activity. A near-term milestone of reducing carbon emissions by five per cent by 2030 has also been formalised.



The International Air Transport Association (IATA) predicts that the airline industry will serve 4.7 billion passengers in 2024. This will probably more than double to ten billion travellers by 2050. The carbon consequently emitted could make aviation one of the planet's prime polluters. With the clamour for air traffic caps growing ever louder, the need for more fuel-efficient engines is urgent. And the world's leading manufacturers – CFM International, Pratt & Whitney, GE and Rolls-Royce – are determined to deliver these next-generation turbofans sooner rather than later.

■ **REVOLUTIONARY RISE.** The CFM International RISE (Revolutionary Innovation for Sustainable Engines) Technology Demonstration programme was launched in June 2021. RISE's ambitious goals include reducing fuel consumption and carbon emissions by more than 20 per cent compared to today's most efficient engines. It will be compatible with 100 per cent sustainable aviation fuel (SAF), capable of hybrid-electric operation, and possibly permit running on hydrogen. The defining feature of RISE is its open rotor or fan which means the total absence of a pod around the fan blades. The woven carbon composite fan blades will be up to 156 inches in diameter, thus sweeping backward a far greater volume of air than present engines. They will bring a huge increase in the bypass ratio, perhaps to over 70:1. Engines with higher bypass ratios are more efficient because when less air passes through the core less fuel burns.

Another key feature of RISE is the extensive use of ceramic matrix composites (CMC) in the engine's hot section. Made of silicon carbide, ceramic fibres and ceramic resin, CMCs are more heat resistant and twice as strong as metal, yet weigh just a third. In general, the hotter the combustion, the more efficient the fuel burn. But even the strongest metal alloys start to soften at temperatures above 1,100 degrees Celsius. Since CMCs can withstand higher temperatures, they need less than half as much cooling airflow as conventional metal parts. NASA's HyTEC project, which is an integral part of the RISE programme, aims to develop a compact core

that will potentially reduce fuel burn by 10 per cent compared to current engines. HyTEC's hybrid-electric capability means the core will also be augmented by electrical power to further reduce fuel use and carbon emissions. In April 2024, Mohamed Ali, Vice President and General Manager of Engineering for GE Aerospace said about RISE, "We are at a stage of the programme in which we're doing real testing on real hardware and making real progress."

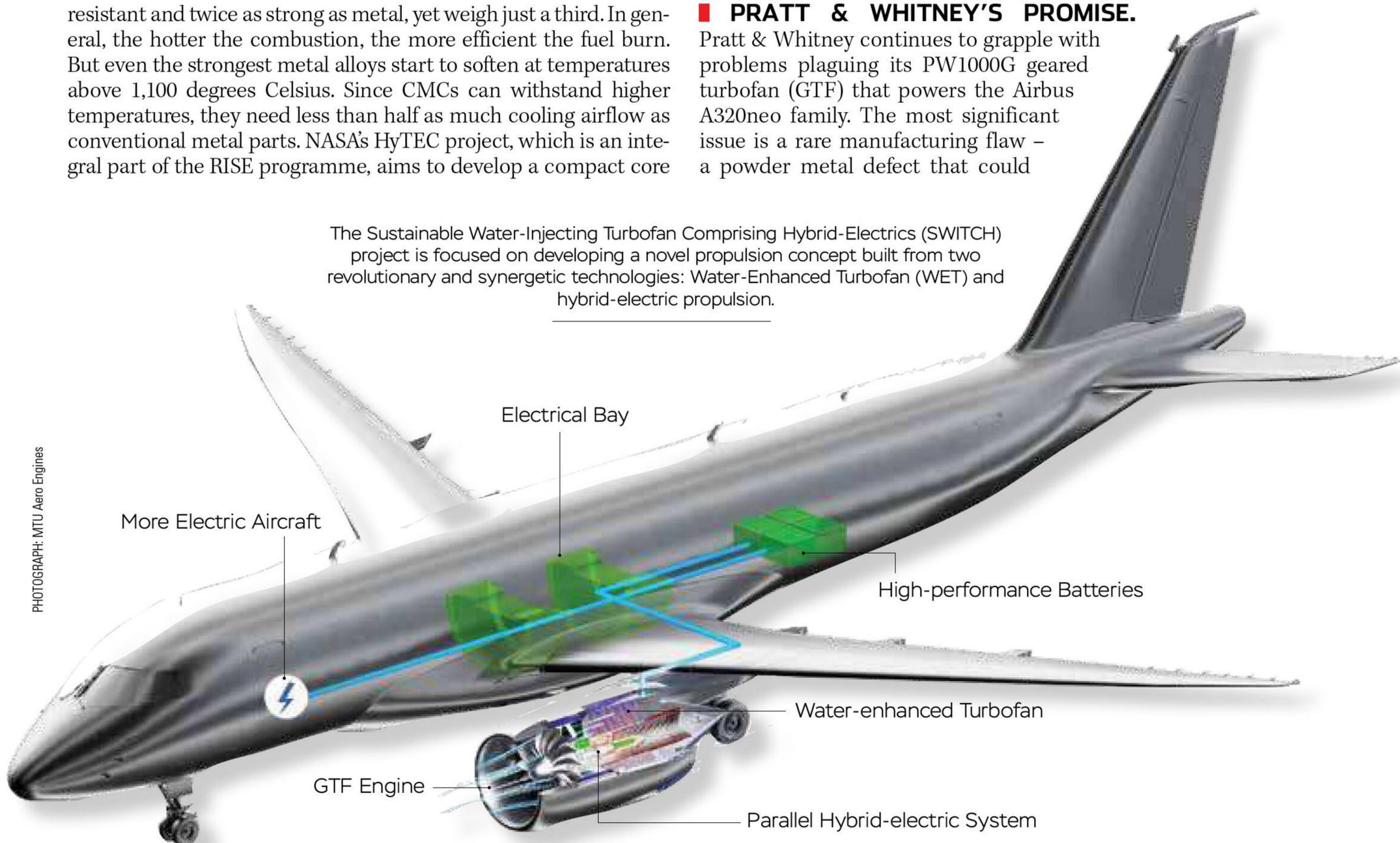
■ **POWER MONSTER – THE GE9X.** Apart from CFM International – its 50-50 joint venture with Safran Aircraft Engines (SAE) – GE Aerospace is working on its own next-generation engine, the GE9X. It is custom-built for the long-awaited Boeing 777X, now expected to enter commercial service in early 2026. The GE9X holds a Guinness World Record and is officially known as "the most powerful commercial aircraft jet engine (test performance)", clocking an astounding 1,34,300 pounds on test. It is also GE's most efficient engine per pound of thrust. Thanks to its advanced suite of technologies, the GE9X will deliver up to 10 per cent greater fuel efficiency than its predecessor, the GE90, with emissions of nitrogen oxides (NOx) 55 per cent below current regulatory requirements.

The GE9X fan has just 16 fan blades against 22 in the GE90. The large fan with fewer blades to impede airflow gives the GE9X another mark of efficiency – a bypass ratio of 10:1, which is among the highest for a commercial engine. The GE9X engine also has fewer parts, making it lighter and allowing the low-pressure system to function more efficiently.

■ **PRATT & WHITNEY'S PROMISE.**

Pratt & Whitney continues to grapple with problems plaguing its PW1000G geared turbofan (GTF) that powers the Airbus A320neo family. The most significant issue is a rare manufacturing flaw – a powder metal defect that could

The Sustainable Water-Injecting Turbofan Comprising Hybrid-Electrics (SWITCH) project is focused on developing a novel propulsion concept built from two revolutionary and synergetic technologies: Water-Enhanced Turbofan (WET) and hybrid-electric propulsion.





GE9X holds a Guinness World Record and is known as the most powerful commercial aircraft jet engine. Due to its advanced suite of technologies, the GE9X will deliver up to 10 per cent greater fuel efficiency.

lead to the cracking of some engine components of the high-pressure turbine (HPT) blades. The HPT issue became public in July 2023 and the current assessment is that till 2026 Pratt may have to withdraw a total of 600 to 700 engines from A320neo jets for lengthy quality inspections.

However, determined to overcome these hiccups, and promising a much brighter future, the company is focusing on the improved GTF Advantage version of its turbofan for the A320neo. This will deliver an additional one per cent in fuel efficiency compared with the current GTF, increasing to 17 per cent its performance margin over earlier engines like the IAE V2500.

Under a separate project called SWITCH, P&W is developing a hybrid-electric propulsion system for the GTF. It is also pursuing two concepts to address different types of emissions from engine combustors, using water reclamation and steam injection in a hydrogen engine that could cut NOx emissions by 80 per cent.

It will take a slew of highly efficient, next-generation engines burning 100 per cent SAF, to deliver around 80 per cent of the net zero solution by 2050

PHOTOGRAPH: GE_Aerospace / X

■ **ROLLS-ROYCE - THE LARGEST FAN.** Rolls-Royce which has mainly focused on powering widebody aircraft, is now banking on its UltraFan technology demonstrator to enter other market segments.

Rolls-Royce plans to introduce a family of two-shaft and three-shaft, direct-drive and geared propulsion systems, ranging in thrust from 25,000 to 1,10,000 pounds, for both narrowbody and widebody airliners that could enter service in the 2030s. It is also working on so-called micro hybridisation – integrating an electric starter generator with a smaller engine. This involves using electrical power during some phases of flight to supplement other improvements in energy efficiency.

In November 2023, Rolls-Royce ran the UltraFan at maximum thrust of 85,000 pounds – the highest power yet achieved by a gear-driven turbofan. This figure is about 5,000 pounds higher than the thrust level for which the engine was designed. Part of the test was conducted using 100 per cent SAF. The UltraFan is projected to improve fuel efficiency by 10 per cent over the Rolls-Royce Trent XWB when burning conventional fuel. It is designed with a 140-inch fan, six inches wider than the fan on the GE9X, the largest turbofan currently flying.

The UltraFan also has a 50-megawatt power gearbox, a composite fan system, hybrid ceramic bearings, and CMCs. It contains several new technologies that will deliver greater fuel efficiency, which in turn means lower emissions and enhanced sustainability.

■ ALTERNATIVE ENERGY.

SAF is an alternative fuel to fossil fuels that can greatly reduce emissions from air travel. It is produced from non-petroleum feedstocks like agricultural waste, municipal solid waste, waste oil and fats, green waste, and non-food crops. It can also be made synthetically by capturing carbon directly from the air. According to IATA, only 13 per cent of the net zero target is expected to be met from new technology engines, including electric and hydrogen powered ones, while as much as 65 per cent must come from SAF. That is why an important feature of every next-generation engine is 100 per cent SAF compatibility. And wherever possible efforts are being made to incorporate electricity and hydrogen functionality as well.

In May 2024, the International Aerospace Environmental Group (IAEG) formed a new work group to study the impact of 100 per cent SAF on airplane and engine systems and evaluate technical issues. GE Aerospace will join Airbus, Boeing, Dassault Aviation, Safran, and other companies in coordinating 100 per cent SAF testing results. Work Group 13, as it is called, will periodically share its findings with ASTM International, a standards-setting organisation, in a larger effort to develop new specifications for the use of 100 per cent SAF. This initiative is significant because burning SAF is essential to get the maximum gain from next-generation engines. In fact, the main hurdle in the path of using 100 per cent SAF is not technological. It is the limited current production of SAF and the steep ramp up required to attain the projected 449 billion litres the airline industry will need globally by 2050.

There is also intense activity in the field of battery-driven electric aircraft. However, range is a major limitation because one litre of lithium-ion battery pack stores 20 times less energy than one litre of jet fuel. Hybrid-electric aircraft are probably more practical as they enjoy the best of both worlds. In a hybrid-electric configuration, the aircraft uses a combination of energy sources – jet fuel and electricity – either in tandem or alternately. This optimises the overall energy efficiency and reduces fuel consumption.

Further into the future, hydrogen is the most exciting energy source with the potential to completely rid the aviation industry of its “high polluter” tag. With a specific energy-per-unit mass three times higher than jet fuel, and if generated using renewable energy, hydrogen emits no CO₂. However, it occupies four times the storage volume for the same energy output. For this and other reasons, there are formidable design, performance, safety and regulatory challenges to overcome before hydrogen-powered commercial flight can become a reality.



Rolls-Royce UltraFan contains several new technologies that will deliver greater fuel efficiency, lower emissions and enhanced sustainability

■ **WANTED – CLEAN SHEETS!.** With all major turbofan makers harnessing their best and brightest brains and investing billions in sustainable aviation the next few years are expected to bring dramatic breakthroughs in cleaner jet propulsion technology. It will take a slew of highly efficient, next-generation engines burning 100 per cent SAF, to deliver around 80 per cent of the net zero solution by 2050. Electricity and hydrogen propulsion may take some decades to make a significant impact.

Ultimately, engine makers can do only so much. To attain the commanding heights of fuel efficiency, aircraft manufacturers need to be on the same page. Currently Airbus and Boeing cannot build aircraft fast enough to satisfy their eager customers and reduce their huge backlogs. But if they bask in this glory, and are content to churn out the same planes for many more years, the airline industry will definitely miss out. There is welcome evidence that plane makers and engine manufacturers are coming closer. For instance, both the Airbus A350 and Boeing 777X will have custom-built engines meant to maximise their capacity, fuel efficiency and range.

However there is no news yet of firm plans to build all-new narrowbody planes. Last year, Rolls-Royce chief technology officer Grazia Vittadini summed up the imperative for Airbus and Boeing to go for clean-sheet designs in order to fully reap the benefits of next-generation engine technology: “Dear airframers, give me an aircraft and you will have your engines.” **SP**



FIA traditionally has been a lucrative venue for all commercial aircraft manufacturers to sign mega deals with operators. Seen here are Embraer E195-E2, with Boeing 777 and Airbus A350, at Farnborough Air Show 2022 (File Photo).

A LEGACY OF AVIATION EXCELLENCE

 BY **AYUSHEE CHAUDHARY**

ESTABLISHED IN 1948, THE Farnborough Airshow has grown into a premier biennial event in the aviation world. As we emerge from recent global challenges, the Farnborough International Airshow (FIA) 2024 is set to be a beacon of optimism and innovation, highlighting the latest advancements in aviation and space exploration. The 2022 show attracted over 80,000 trade visitors and featured more than 1,500 exhibitors from around the globe. At its peak in 2012, the event saw an attendance of over 20,000 visitors. Even during the COVID-19 pandemic, the show adapted to a virtual format, continuing to connect the industry. With 1,200 exhibiting companies and 74,000 trade visitors expected, FIA2024 promises to be a vital platform for global connections, interactions, and business opportunities.

The Farnborough Airshow, taking place from July 22nd to 26th at the Farnborough International Exhibition & Conference Centre, is the premier industry-focused airshow of the year. This year's event will focus on six key themes: Space, Defence,

The Farnborough International Airshow (FIA) 2024 will be a feast for aviation geeks, featuring a diverse lineup of aircraft from leading manufacturers and airlines including jets, wide-body planes, helicopters, and drones, extensive discussions and networking opportunities.

Sustainability, Innovation, Future Flight, and Workforce Development. While commercial aerospace isn't officially a theme, it remains central to the show, with Airbus and Boeing expected to announce major customer orders, as they did in 2022 with deals totaling \$50.8 billion.

As the 2024 Farnborough Airshow nears, the list of participating aircraft continues to grow.

The Farnborough International Airshow 2024 is experiencing unprecedented demand for exhibition space, sponsorships, and

Established in 1948, the Farnborough Airshow has grown into a premier biennial event in the aviation world



marketing opportunities, signaling strong optimism in the aerospace industry. Organisers project a 14 per cent increase in commercial revenues, positioning the airshow as the leading marketplace for a growing industry.

Despite supply chain challenges, both the aerospace and space sectors are set for significant growth. The International Air Transport Association (IATA) projected global airline industry profits of \$5 billion in 2023. The Maintenance, Repair, and Overhaul (MRO) sector is also recovering, with stable or increasing budgets expected over the next 24 months. The space market, valued at \$280 billion in 2010, has surged to approximately \$447 billion, with projections from McKinsey and the World Economic Forum suggesting it could reach \$1 trillion by 2030. Reflecting the industry's robust recovery, over 90 per cent of commercial exhibition spaces and chalets for FIA2024 are already reserved. To meet the high demand, Farnborough International is constructing 17 new chalets, more than half of which are already sold.

Farnborough International will display a wide range of aircraft, including passenger planes, and private jets. The airshow has unveiled the initial lineup for the 2024 event, featuring a diverse array of aircraft including jets, wide-body planes, helicopters, and drones. The airshow will showcase leading manufacturers and airlines with civil aircraft such as Air India's A350, Airbus' A220-300, A321 XLR, and A330-900 NEO, ATR's 72-600 and 72-600F, Embraer's E195-E2 and E-Freighter, and Qatar Airways' Boeing 787-9 and Gulfstream G700. The FIA2024 website has a complete and updated list of attending aircraft.

As the Farnborough Airshow 2024 approaches, early industry reports suggest significant announcements. Notably, Qatar Airways is expected to place a large order for new widebody aircraft to enhance its long-haul fleet. Reports indicate that the airline might order over 100 jets. Both Airbus and Boeing could benefit from this deal. While Boeing's initial presence is modest, more announcements are anticipated.

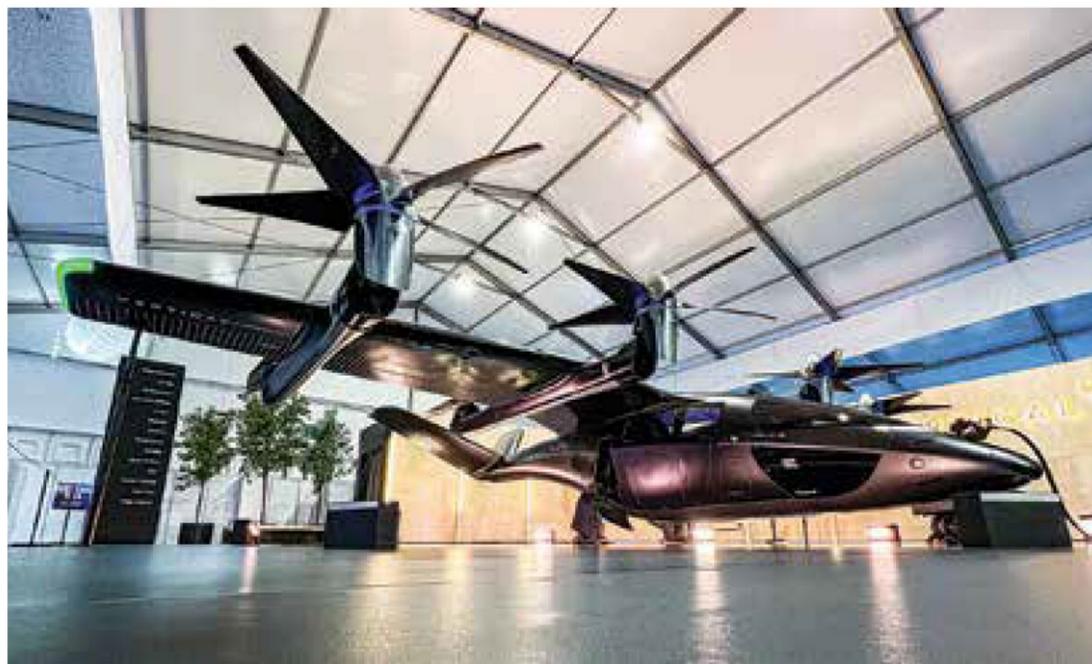
■ 75 YEARS OF INNOVATION AND CONNECTION.

On September 7, 2023, Farnborough International Airshow celebrated 75 years of pioneering aviation and innovation. The Society of British Aircraft Constructors (SBAC) chose Farnborough as the site for its growing airshow in 1948. The inaugural event, held from September 7-12, 1948, showcased sixty-six different British aircraft, including the launch of the Cierva W.II Air Horse. Since its inception, Farnborough has been the stage for numerous historic firsts in the aerospace industry. These include the launch of the world's first jet airliner, the de Havilland DH.106 Comet 1, in 1949; The Black Arrows' record-breaking 22-aircraft formation loop in 1958; the BAC-Aerospatiale Concorde's debut in 1970 with a low fly pass over spectators; and the Airbus A380's debut in 2006. Over 75 years, the Farnborough International Airshow has evolved into a catalyst for aerospace innovation and a global platform for showcasing technological breakthroughs and

engineering feats. It is also a venue where historic partnerships are forged, and goals like sustainable aviation are pursued.

■ KEY THEMES OF FIA2024.

Space. FIA2024 will explore critical issues in space technology, from deep space exploration to commercial flights. The Space Zone will feature a wide array of exhibitors and host engaging sessions in the Space Theatre. Highlighting the growing importance of space, plans are underway for a sepa-



FIA is used by the Industry to showcase their technological advancements. The show provides dedicated exhibition areas to innovations like in Advanced Air Mobility (AAM) solutions (File Photos above).

rate Farnborough International Space Show in March 2025 to advance the space domain.

Sustainability. Addressing climate change, FIA2024 will focus on sustainability and the path to Net Zero. Thought-leading sessions will emphasise collaboration across global sectors to advance sustainable aviation and safeguard the planet's future.

Innovation. FIA2024 will showcase groundbreaking advancements in aerospace technology. The event will provide a platform to discuss industry challenges, set future agendas, and highlight the latest innovations shaping the sector.

Future Flight. With advancements in Advanced Air Mobility (AAM) solutions, FIA2024 will highlight companies revolutionising aerospace. Dedicated exhibition areas, conference showcases, and displays will celebrate the future of flight technology.

Workforce. FIA2024 will address the changing aerospace workforce, emphasising the need to inspire the next generation of STEM professionals. The Pioneers of Tomorrow event will focus on closing the skills gap by connecting students and young professionals with industry opportunities, affirming that developing future talent is key to the industry's sustainability and growth.

The Delegations Programme's return in 2022 was a major success, facilitating networking and business, and will continue in the 2024 edition. FIA2024 will offer thought-provoking sessions, engaging exhibitions, and networking opportunities with aerospace leaders, aiming to drive discussion, collaboration, and innovation for the future of aviation.

■ **EXPOSING & EXPANDING AEROSPACE INNOVATION.** FIA2024 will be a hub of aerospace innovation, showcasing groundbreaking advancements from leading companies. The event features several key elements:

- **Space Zone:** Engage with the global space community in the Space Zone, located in one of the show's state-of-the-art sound stages. This area offers unparalleled networking opportunities and showcases pioneering companies in the space industry. Building on the success of FIA2022, which featured presentations from figures like ESA Astronaut Tim Peake and NASA Astronaut Charles Duke, the Space Zone at FIA2024 promises to be a highlight.
- **Flying & Static Display:** Experience aviation innovation with over 90 aircraft on display, from advanced commercial planes to military designs. The flying and static displays will feature captivating aerial performances and up-close views of cutting-edge technology, providing a glimpse into the future of aviation.
- **FINN Sessions:** Attend thought-provoking discussions at the FINN Theatres, where industry leaders and experts share insights on sustainability, workforce development, and more. These sessions facilitate dialogue and collaboration among aerospace and aviation stakeholders.
- **Airline Leaders Summit:** Join global airline executives as they discuss key issues and trends shaping the industry's future. With past speakers like Sir Tim Clark of Emirates Airline and Willie Walsh of IATA, the summit offers invaluable insights into the challenges and opportunities in aviation.
- **Pioneers of Tomorrow:** Inspire the next generation of aerospace leaders with this STEM-focused event. Featuring hands-on activities, career workshops, and inspirational speakers, 'Pioneers of Tomorrow' provides students and young profes-

sionals with unique opportunities to explore the aerospace industry's exciting possibilities.

The airshow promises five days of unparalleled opportunities to explore cutting-edge technology, forge partnerships, and advance sustainable aerospace initiatives. Farnborough International Airshow 2024 marks a significant milestone for the civil aviation sector, setting new heights in innovation, collaboration, and market growth. As the event gears up to showcase cutting-edge technologies and foster strategic partnerships, it



Aviation industry flag bearers and thought leaders converge at FIA to discuss and chart out the future at various conferences and seminars (File Photos above).

underscores the sector's resilience and forward momentum. Celebrating 75 years of aerospace excellence, the airshow will spotlight critical themes such as sustainability, future flight technologies, and workforce development, positioning itself as a crucial platform for industry leaders. The Farnborough Airshow's role in driving progress and shaping the future of civil aviation is unparalleled, making it a cornerstone event that will influence the sector for generations to come. FIA2024 aims to be a beacon of innovation and collaboration, shaping the future of the aerospace industry for generations to come. **SP**



Decarbonising aviation requires a collaborative effort across the industry, and ATR is actively engaged with partners to promote sustainable practices and technologies

DESIGNING THE RESPONSIBLE AIR CONNECTIVITY OF TOMORROW

ATR is committed to decarbonising regional aviation, with targets validated by the Science-Based Targets initiative to significantly reduce GHG emissions by 2030

 BY **ATR AIRCRAFT**

REGIONAL AVIATION PLAYS A vital role in global economic and social connectivity. Turboprop aircraft ensure accessibility to remote areas, facilitating the development of territories and enabling crucial services like healthcare and education to reach even the most isolated regions. However, as the world grapples with the pressing challenge of climate change, we understand the need to rethink how we travel. At ATR, we are at the forefront

of efforts to decarbonise regional aviation and ensure more responsible air connectivity.

■ **THE IMPORTANCE OF REGIONAL AVIATION.** Regional aviation is more than just a means of transportation. It is a crucial pillar of local economies, offering direct and indirect jobs and promoting the development of related industries such as tourism and commerce. Studies have shown that a 10 per cent increase in regional flights can

lead to a 6 per cent increase in local GDP, a 5 per cent increase in tourism, and an 8 per cent increase in foreign direct investment.

As the world's leading manufacturer of regional aircraft, ATR has built almost 1,700 turboprops with 48 to 78 seats since its inception in 1981. Our aircraft are designed to be robust, capable of landing on all kinds of terrain, and cost-effective to operate for airlines, while providing comfort, safety, and cutting-edge technologies to passengers. Our aircraft operate in some of the most remote corners of the world, from the Bahamas to the Baltics, offering a lifeline to many remote communities.

■ **ADDRESSING THE CLIMATE CHALLENGE.** ATR is fully committed to contributing to the decarbonisation of aviation, along with all industry players. In January 2024, the Science-

tainability of our aircraft. One of our most significant advancements is the introduction of the PW127XT engine. With this new engine, the ATR 72-600 burns well over 3 per cent less fuel than the previous engine series and emits 45 per cent less CO₂ per trip compared to a similar-size regional jet. This reduction translates to saving 4,400 tonnes of CO₂ per aircraft per year. Moreover, ATRs produce virtually no contrails, which are a significant contributor to climate change. With 69g of CO₂ emitted per seat per km, ATRs offer a more responsible solution than single-occupancy cars and meet the most stringent standards for external noise.

ATRs are, by design, very suited to the challenges of our time, and ambitious plans are underway to reduce emissions even further. We continuously explore new technologies and innovations to make our aircraft even more efficient and sustainable.



Regional aviation is crucial for economic and social connectivity, facilitating access to remote areas and essential services like healthcare and education

Based Targets initiative (SBTi) validated our short-term emissions reduction targets, which include reducing absolute GHG emissions from operational processes and energy consumption by 50.4 per cent by 2030 and reducing absolute GHG emissions generated by our aircraft fleet in service by 30 per cent within the same timeframe, compared to 2018 levels.

To achieve these ambitious goals, we are investing in more energy-efficient infrastructure, renewable energy, optimised manufacturing processes, and sustainable practices throughout our value chain.

■ **CURRENT DECARBONISATION INITIATIVES.** Our current decarbonisation initiatives are based on four pillars: continuous development of our aircraft family, sustainable aviation fuels (SAF), hybridisation with the ATR EVO, and the aircraft life cycle.

Continuous Innovation. Continuous innovation is at the heart of ATR's strategy to reduce emissions and enhance the sus-

Sustainable Aviation Fuels (SAF). Sustainable Aviation Fuels (SAF) are widely recognised as one of the quickest ways to significantly reduce CO₂ emissions in the aviation industry. SAF is a renewable energy source derived from organic matter, waste, or non-fossil raw materials. It can be seamlessly integrated into existing aircraft and infrastructure, generating about 80 per cent fewer GHG emissions over its lifecycle compared to conventional fuel.

ATR aircraft are certified to fly with up to 50 per cent SAF. In June 2022, we achieved a significant milestone by completing the first-ever flight with 100 per cent SAF in both engines of a commercial aircraft. This historic flight demonstrated the feasibility and potential of SAF to dramatically reduce the carbon footprint of aviation.

The "Book and Claim" Scheme. Given the current limitations in SAF availability and production capacity, ATR supports the development of a "book and claim" mechanism. This system is an effective way to scale up SAF deployment and accelerate the

sector's decarbonisation. The "book and claim" scheme allows airlines to purchase SAF from competitive sources worldwide, regardless of geographical proximity. It decouples environmental credits from physical SAF, reducing the need for global transportation and complexity. Airlines receive credits for CO₂ emission reductions even if the physical fuel is used by other operators at local airports near the production site. This innovative approach ensures that the benefits of SAF can be maximised and distributed more efficiently.

The ATR EVO. The ATR EVO represents our mid-term solution to significantly reduce emissions while maintaining the accessibility and versatility that are key assets of the ATR family. This hybrid electric aircraft concept combines a new high-performance thermal engine with an electric motor and batteries, aiming for a 20 per cent reduction in CO₂ emissions compared to current aircraft and improved performance. The ATR EVO is designed to deliver enhanced efficiency, reduced noise, and lower operating costs, making it an attractive option for regional airlines.

We aim for an entry into service by 2030+, marking a significant step forward in our journey towards a more sustainable future. The ATR EVO will not only help reduce the environmental impact of aviation but also ensure that remote and underserved regions continue to benefit from reliable air connectivity.

Aircraft Life Cycle. Aircraft decarbonisation extends beyond flight phases and must consider the entire aircraft life cycle, from design to dismantling. At ATR, we are committed to improving the sustainability of our aircraft throughout their lifecycle. This includes exploring new designs and materials to enhance the recyclability of our aircraft.

In partnership with TARMAC Aerosave, we have successfully recycled three ATR aircraft in 2023, and four more are scheduled to be dismantled this year. Currently, 85.5 per cent of ATR parts are recyclable or reusable, and we are actively exploring new recycling processes to increase this number in the future. Our goal is to contribute to the circular economy and reduce the environmental impact of our operations.

■ **A COLLABORATIVE EFFORT.** Decarbonising aviation cannot be achieved by a single manufacturer alone. It requires joint efforts with airlines, airports, regulators, and the entire aviation ecosystem. Collaboration is essential to drive innovation, share best practices, and develop effective solutions to the complex challenges of climate change.

At ATR, we believe that regional aviation is well-positioned to lead the industry's transformation towards more sustainable practices. Our commitment to innovation and sustainability aims to ensure that all regions of the world remain connected and accessible, fostering economic development while minimising environmental impact.

We are actively engaged with our partners across the aviation industry to promote the adoption of sustainable practices and

technologies. By working together, we can accelerate the transition to low-emission aviation and ensure a brighter, more sustainable future for generations to come.

■ **CONCLUSION.** As the climate challenge underscores the need for more responsible air travel, ATR is dedicated to designing the responsible air connectivity of tomorrow. Our compre-

PW127XT ENGINES ON ATR 72-600

(Compared to powered by PW127M)



-3%

block fuel

+40%

more time on wing
for fewer maintenance events

-45% CO₂ per trip

than a similar-sized regional jet



Sustainable Aviation Fuels (SAF) offer a substantial reduction in CO₂ emissions, and ATR aircraft have demonstrated successful flights using 100 per cent SAF

hensive approach to sustainability includes continuous innovation, the adoption of sustainable aviation fuels, the development of hybrid electric aircraft, and a commitment to improving the entire aircraft life cycle.

We invite you to join us on this journey towards a more sustainable future. Together, we can ensure that aviation continues to play a vital role in global economic and social connectivity while minimising its environmental impact. At ATR, we are proud to lead the way in creating a more responsible and sustainable aviation industry.



IndiGo's order for Airbus A350 wide-body aircraft represents a shift in the focus from domestic to international markets by Indian carriers

INDIA'S EVOLUTION FROM NARROWBODY TO WIDEBODY JETS

India has always been a dominant narrowbody market, with less than 10 per cent of its fleet being widebody aircraft. However, the recent orders for widebody aircraft from Air India and IndiGo indicates a clear intent by these two airlines to garner a greater share on international routes.

 BY **SWAATI KETKAR**

INDIA – A NARROWBODY DOMINANT MARKET. Did IndiGo sound a war bugle when the airline placed an order for 30 A350-900 widebody at an estimated cost price of approximate \$9 billion? Probably! Experts believe IndiGo sent a clear message not just to Indian operators but to international competitors too – The message was loud and clear – ‘IndiGo has jumped into the long-haul market, and we will soon overtake it.’

The deal will not just help IndiGo to embark on its next phase of becoming one of the leading global aviation players but will also aid in IndiGo's firm commitment to the 'growth of India'. With the new widebody set to roll, are you are under the impression that IndiGo's regional expansion plan will take a back seat? Well, IndiGo is currently in talks with ATR and Embraer for a firm order of 50 aircraft with options of 50 more.

At present IndiGo has 45 ATRs with 78 seats configuration. This new order is a testament that IndiGo is looking at overall expansion – regional routes catering to Tier II, Tier III cities with smaller planes, international routes with its new A350 widebody order all the while continuing to expand its domestic network with its largest order of 500 A320s placed last year.

■ **THE TURKISH WET-LEASE PROPELLED INDIGO TOWARDS THE FIRM ORDER.** Although IndiGo is the undisputed ‘narrowbody king’ of India, the airline has some experience with widebody space having recently leased two B777 for Istanbul route from Turkish Airways. Experts feel that this move by IndiGo was long anticipated. After experimenting with the wet lease deal with Turkish Airlines on Istanbul route, rumours were flying thick and fast about IndiGo soon to place a large order of widebody aircraft. Finally on April 25, 2024, IndiGo put all rumours to rest and signed an order of 30 A350s with an option of 70 more. The exact configuration of the (A350-900) aircraft will be decided at a later stage while the deliveries of new aircraft will commence from 2027.

“It was indeed long awaited,” says Ajay Kumar of KLA legal. IndiGo, having captured the domestic market, is looking to spread its wings and cover more international routes. Placement of wide-body order, therefore, came as a no surprise at all,” Kumar adds. “Besides, the wet leases are always more expensive as compared to the conventional dry leases and is used by airlines as stop-gap arrangements,” adds Harish Venkateswaran, Vice President - Technical & Head of CAMO, at AirFleet Managers. “Hence this widebody order is certainly not a surprise,” Venkateswaran adds. “After the exit of Jet Airways, there was a gap in India’s long-haul market, reasons Prakash Babu Devara, Director of Product Marketing, Cognitus. “While carriers like Air India and other international airlines, along with their Indian code-share partners, attempted to fill this void, the market remains open for an Indian carrier to step into the shoes vacated by Jet Airways,” Davara adds.

■ **WHERE WILL INDIGO FLY ITS A350?** “While it is difficult to predict with accuracy, in my opinion, IndiGo will be looking to consolidate the existing routes and cover certain new

Experts believe IndiGo sent a clear message not just to Indian operators but to international competitors that IndiGo has jumped into the long-haul market



Earlier this year, IndiGo signed an order with Airbus for 30 A350s with an option of 70 more wide-body aircraft.

international destinations, such as Australia and Europe,” reasons Kumar.

Middle East seems to be already taken up to a great extent, particularly by the likes of Emirates and Etihad. Both the Middle Eastern carriers have an established first and business class product. “IndiGo doesn’t have any experience in this area. So, if and when they come with such a product, the comparison and competition will be serious and they need to be on the ball from the word go!” argues Venkateswaran.

However, there is a void created by Go First and Jet Airways downfall. With the ever-increasing business activity between India and Middle East and the EU, Kumar feels IndiGo will have plenty of opportunity to prove its metal.

This deal will also position IndiGo as direct competitor to Air India and foreign airlines like Emirates and Qatar on various lucrative routes. But will IndiGo override Air India in international expansion as they did with domestic market? “There is no doubt that IndiGo is doing exceptionally well and have balanced, but aggressive expansion plans,” says Kumar. “Their market share is already in the range of 60 per cent and adding more international flights is definitely the way forward for them. Air India on the other hand is backed by TATAs who are working overtime to bring back its lost glory. TATAs of course have Vistara under their belt too which is an excellent product. We can, therefore, expect, a healthy competition between IndiGo and Air India in the future,” Kumar adds as an afterthought.

Venkateswaran however feels IndiGo will take the lead in the race. “IndiGo has always been very aggressive right from day one. It would not be incorrect to assume that the wide-body order is to get a head start over Air India in this game,” Venkateswaran predicts.

“There are significant distinctions between the Low-cost carrier (LCC) model and the Full-service carrier (FSC) model,” Devara says. “One key difference lies in the operational approach: LCCs typically operate on a point-to-point model, whereas FSCs employ a Hub & Spoke model. Moreover, the business models themselves diverge in terms of revenue management, profitability strategies, and ancillary product offerings.”

Apart from what experts predict, the move is indeed a welcome news for the passengers as well as the Indian civil aviation market. Going ahead, it will be interesting to watch how the two airlines woo passengers to garner a greater share on international routes.

■ **AIRBUS’ A350S STRATEGIC ENTRY INTO INDIA.** As the pandemic receded in late 2021 and Q1 of 2022, discussions revolving widebody aircraft in India began to change. Airbus began its demonstration tour of India to crack the Indian widebody market. Around March 2022, Airbus was already in talks with Tata Group for potential widebody order. Boeing had always dominated the widebody market in India with Air India flying the

This deal will position IndiGo as a direct competitor to Air India and foreign airlines like Emirates and Qatar on various lucrative routes

B777s and B787s. Airbus had come to India armed with the new A350 to create a dent in Boeing’s widebody share. According to Airbus, A350s can seat up to 480 passengers depending on the configuration while offering the lowest cost per seat and can fly non-stop on ultra-long-haul routes of 18,000 kms.

Calling A350 as the catalyst for India’s international travel revolution, Airbus was confident that A350 will change India’s long-haul landscape. And did it? The wheels of fortune for India’s widebody sector began to change as Air India in February 2023, placed an order of 470 aircraft, of which 70 were widebody. Air India received its first A350 at the first day of Wings India Air Show in January 2024.

The Indian civil aviation sector has been growing steadily over the past many years. In fact, according Airbus, India may require about 2,800 to 3,000 additional aircraft in next 20 years to cater to the burgeoning demand.

Agreeing with Airbus prediction, Kumar adds, “Indian carriers are, of course, more confident and ambitious now and would look to expand to claim their share in the international market. This would require widebody aircraft to cover the long distance and to give their passengers a world-class service,” Kumar further asserts.

Venkateswaran too agrees wholeheartedly with Airbus and its predictions. He goes ahead to explain the passenger dynamics of today’s times. “Frequent flyers would agree that at times

it is really difficult to get seats on flights operating to South East Asia. e.g. if you want Business class seats to Singapore in the next day or so, you may not get one.” Venkateswaran says. “Similarly, there is a huge demand on the economy class, driven primarily by two groups of passengers one the young Indian population which is headed out to study at universities abroad and the other is the Tourist group. Both groups are getting bigger thanks to the huge growth in the Indian Middle Class.” Venkateswaran explains.

■ **INDIA’S TRANSITION FROM NARROWBODY TO WIDEBODY, HEADED FOR A DUOPOLY?** India has always been a dominant narrowbody market. The widebody market simply never took-off in India over the last 15 years. As a result, foreign operators grabbed a huge chunk of international passenger traffic from India as domestic carriers like IndiGo were busy spreading their wings across India. Prior to the orders from Air India and IndiGo, Indian markets has just 67 widebody aircraft, less than 10 per cent of the total fleet. This was one of the major reasons why foreign airlines gained on their share of profits from international routes to and from India while Indian operators completely lost out.

The present commercial aviation sectoral situation in India is very dynamic. On one hand we are witnessing dominant airlines placing huge aircraft orders while some of the seasoned airlines filing for bankruptcy. “The collapse of two major aircraft carriers in quick succession, with SpiceJet also struggling and Akasa being a relatively new player, it appears that Indian aviation may well be headed for a duopoly,” predicts Kumar.

Indian market is well placed with diverse airline business models which will segment the market well to deliver customised value propositions. “Another area which will play a critical role to make wide body operations successful is efficient alliances and partnerships to deliver wide network and seamless customer experience,” explains Nair. “Strong wide body network will allow us to arrest our erosion to foreign hubs, however it will not be easy as we (Indian carriers) will face strong competition with one-stop players on price,” Nair further elaborates. It’s an established fact that barring few brands airline seat is perceived to be a perishable commodity and price can drive decision making.

Apart from price-war, capacity limitation and prime slot entry is another issue for new players coming in the market. “The newer players will have to look beyond the Tier 1 cities and this is where there is a lot of untapped potential,” says Venkateswaran.

Going ahead, Devara believes India will experience a duopoly in its aviation sector for a significant period, “ranging from 5 to 6 years if I’m optimistic and 8 to 10 years if I’m pessimistic,” Devara further predicts a ruthless analysis of India’s aviation market. “The Indian aviation industry is not for the faint-hearted—it demands substantial business acumen, industry connections, and, most importantly, robust financial backing,” says Devara. “Even for Akasa, it may require 5 to 6 years to establish a substantial market share domestically, and it’s unlikely that any new entrants will challenge the dominance of IndiGo or Air India in the foreseeable future.” Devara adds.

All-in-all it will be interesting to see how the airline brands will connect with Indian consumers to command a premium for non-stop offering.

■ **START A NEW ERA FOR INDIAN AVIATION?** India is exceptionally well placed, geographically, to cater to huge traffic



Expansion of the wide-body fleet will help Airlines in India gain better market share of the long-haul market

potential which is more than 10 million pax annually flying one-stop between Asia Pacific, Europe and North America. However, we have been losing this traffic to overseas airport hubs located in Asia and Middle East. Additionally, around 25 million passenger traffic annually from India use overseas airport hubs to connect to various parts of the world. Now with Indian airports evolving as world-class hubs and with dynamic changes in the airline landscape we can witness strong airline-airport partnerships which can arrest this erosion.

“The stakes are higher and airlines which have a robust domestic network stand to have an advantage as they can use their domestic operations to feed the international operations,” argues Venkateswaran. “The newer players in the market would need to stabilise their domestic network and turn profitable before venturing into the international widebody market,” Venkateswaran adds.

Apart from network stability, Girish Nair, partner and aviation sector lead, KPMG also points out to widebody operations and its own set of challenges like heavy operational cost. “Airline

needs to achieve brutal cost leadership and extreme clarity in their business model,” argues Nair. “We have not seen success with no frills model in long-haul flights hence it will be interesting to see how business models will evolve to create hybrids where experience is not compromised to achieve impressive cost metrics,” Nair further adds.

Kumar of KLA Legal argues that although Akasa has been growing steadily since its inception and has a good order book, they would eventually require widebody fleet for more expansion, but as of now they may prefer to stick to the MAX variant.

Meanwhile, Devara feels it’s possible that Akasa Air might place a A350 order in future. “As I mentioned, the long-haul market is open for new players, and considering that Akasa’s team consists mostly of former Jet Airways employees, they have the expertise to operate as a full-service carrier.”

Currently, Akasa has commenced operations with the Doha route, and in the near future, they may expand to other Middle Eastern and Asian routes using their existing narrowbody fleet. “Given their long-term ambitions, there’s no reason why they wouldn’t venture into long-haul routes with widebody aircraft,” Devara argues.

“We have seen our airlines placing unprecedented aircraft orders which reflects the changes in consumer behaviour when it comes to consuming air travel,” sums up Nair. But going forward strong widebody fleet is critical to realise India’s true potential and maximise our air traffic,” Nair forecasts.

Just like they say in cricket, a match is not lost till the last ball is bowled, we never know how the overall airline operations might turn out in near future. As for IndiGo with the new order the airline has yet again proved its versatility in crafting its own path, only time will tell how profitable this path will be. For now, let’s celebrate, to be a part of this dynamic industry called ‘Aviation’. **SP**

Indian carriers are more confident and ambitious now, looking to expand to claim their share in the international market, requiring widebody aircraft to cover long distances and provide world-class service

BOOSTING AVIATION INFRASTRUCTURE

A robust infrastructure, for the thriving aviation industry in India, is essential for sustaining economic growth, as it facilitates the swift movement of goods and people, which enhances business efficiency and global connectivity

FOLLOWING THE GENERAL ELECTIONS in the country which saw the Narendra Modi government come back to power for the third time, Telugu Desam Party (TDP) leader and Lok Sabha MP from Srikakulam in Andhra Pradesh, Rammohan Naidu, took charge as the new Minister of Civil Aviation on June 13, 2024. At 36, he is the youngest minister in the recently formed Union Cabinet under Prime Minister Narendra Modi.

Soon after taking over as the Civil Aviation Minister, Naidu said that the key priorities of the ministry would be to create an 'ease of flying' scenario, making air travel more accessible and convenient for every citizen. He emphasised that the benefits of aviation should reach every corner of the country, with focus on Tier II and Tier III cities.

In line with Prime Minister Narendra Modi's vision for Viksit Bharat (Developed India), Naidu said "we are going to formulate and implement 100-day action plan to drive immediate progress in the India's aviation sector. This plan will serve as a stepping stone towards achieving the long-term Vision of Viksit Bharat as India celebrates 100 years of its independence in 2047". The Union Minister also emphasised on the importance of use of technology in enhancing passenger experience, and plan to leverage artificial intelligence and social media to address passenger concerns effectively. He assured that the ministry would prioritise passenger comfort and convenience in all policy decisions. Naidu further outlined specific initiatives aimed at enhancing air connectivity, promoting eco-friendly practices, and accelerating infrastructure development across the country. He pledged to work closely with state governments, industry stakeholders, and alliance partners to realise these goals.

Finally, it seems that the Government has its priorities correctly worked out for the development of the Aviation sector. A proper plan for the development of Aviation infrastructure in the country is the first step and should not be bypassed. Not just the airlines and the airports but the whole aviation ecosystem needs to be augmented. Infrastructure is the foundation on which any industry thrives. A robust infrastructure is required for the growth of any sector. While it is very heartening to see thousands of aircraft being ordered by Airlines in India, has enough thought been given to the aviation infrastructure that will be required to

support the operations of these aircraft. It begs to question where the cockpit and cabin crew for these aircraft will come from; who, how and where will these aircraft be parked and maintained; and do our airports have the capacity to handle a huge influx of passengers on these aircraft. With so many airplanes flying around, upgrading Air Traffic Management systems with advanced technologies like satellite-based navigation will be required to optimise airspace utilisation and ensure smooth air traffic flow.

This whole revamp of aviation ecosystem in the country will require government policy initiatives, incentives and supports, public-private partnership, significant investments, so a road-map on how to go about doing it, defining all the steps and bringing all stakeholders on board in the right first step. In this regard, the statement "We want to lay a strong foundation on the foundations that have been already laid by my previous ministers," by the new Civil Aviation Minister becomes critical as it promises continuity in government policies and building on the initiatives already taken. A shared vision with continuity in government policies ensures that the industry can leverage the efforts already put in for the development of the sector.

Additionally, keeping environmental considerations in mind, government policies should promote eco-friendly practices in new and existing airports, including energy-efficient buildings, renewable energy sources, and waste management

solutions. Airlines should be encouraged to invest in newer aircraft models with lower carbon footprint and noise pollution.

A robust aviation sector is crucial for the growth of a national economy, serving as a catalyst for trade, tourism, and investment. Moreover, it generates significant employment opportunities, both directly within the sector and indirectly through related industries such as manufacturing, services, and tourism. By addressing these points and ensuring a comprehensive approach to aviation infrastructure development, India can create an ecosystem that positions itself as a major player in the global aviation sector. The new Civil Aviation Minister's focus on boosting Aviation infrastructure by building upon existing initiatives and fostering collaboration among stakeholders is a critical step in the right direction. **SP**

— ROHIT GOEL



Kinjarapu Rammohan Naidu,
India's new Minister of Civil Aviation

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