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AN EXCLUSIVE MAGAZINE ON CIVIL AVIATION FROM INDIA



A BET ON THE NEXT PHASE

PAGE 6

FLY91 PLACES HISTORIC ORDER FOR 40 ATR 72-600 AIRCRAFT



SJ-100: INDIA'S
NEW CHAPTER IN
CIVIL AIRCRAFT
MANUFACTURING
P 3



SUSTAINABILITY:
A BIG MILESTONE
FOR AVIATION
INDUSTRY
P 9



FALLING RECORDS
AND SHIFTING
PRIORITIES:
INSIDE FIA 2026
P 19

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A JOURNEY OF EXCELLENCE
SINCE 1964



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CONTENTS

SP's airbus

August-September 2026 | VOLUME 19 | ISSUE 4

INDUSTRY / AIRCRAFT MANUFACTURING

P3 | **SJ-100: RUSSIA'S SUPERJET BET ON INDIA
COULD OPEN A NEW CHAPTER IN CIVIL
AIRCRAFT MANUFACTURING**

Russia is pitching ground-breaking aviation partnerships through deals for Il-114-300 planes and the proposed local manufacturing of the new SJ-100 with HAL. Beyond routine aircraft sales, this push offers India a strategic foundation to establish its own commercial aircraft industry.

REGIONAL AVIATION / INDUSTRY

P6 | **FLY91 PLACES ORDER FOR 40 ATR:
BETS ON THE NEXT PHASE OF INDIAN AVIATION**

More airports, safer mobility in Tier 2 and Tier 3 cities and government initiatives are creating opportunities for airlines built specifically around India's growing regional aviation market. FLY91 is one such airline, with the ATR 72-600 aircraft at its operational core.

ENVIRONMENT / SUSTAINABILITY

P9 | **SUSTAINABILITY: A BIG MILESTONE FOR THE
AVIATION INDUSTRY**



Achieving net-zero emissions by 2050 is driving a profound transformation across the aviation sector. The industry is reshaping its entire ecosystem to ensure the future of flight is truly sustainable.

Cover:

Indian regional airline FLY91 has signed a landmark firm order for 40 ATR 72-600 aircraft in a deal valued at approximately \$1 billion. It is the largest ATR order globally by a regional airline.

Cover Design: SP's Design

Cover Photograph: ATR



OPERATIONS / TECHNOLOGY

P16 | **SECURING AVIATION IN AN AI AND
QUANTUM-DRIVEN WORLD**

In today's digital world, aviation is being transformed by artificial intelligence and emerging quantum computing, delivering major efficiency and safety gains while simultaneously creating new security, safety, and cyber risks that demand proactive, coordinated, and future-ready mitigation strategies.

SHOW REPORT / FIA 2026

P19 | **FALLING RECORDS AND SHIFTING PRIORITIES:
INSIDE FIA 2026**

A record number of visitors and billions in confirmed orders reflect Farnborough International Airshow's (FIA) scale this year but the loudest signal was that finance, software and electric aircraft are now shaping commercial aviation as much as engines and airframes

DEPARTMENTS

P2 | **EDITOR'S NOTE**

P23 | **NEWS BRIEFS**



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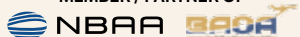


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FLY91, an Indian regional carrier, recently placed an order for 40 ATR 72-600 aircraft valued at approximately \$1 billion — the largest such order globally by a regional airline. This shows that regional aviation in India is a huge market and if nurtured properly, can sustain dedicated carriers by itself.



Goa-based FLY91 has built its entire strategy around the ATR 72-600, prizing its low costs, fuel efficiency and short-runway capability for underserved Tier II/III routes. Having flown 15,000+ flights to 13 destinations, the airline placed a \$1-billion order for 40 more ATR 72-600s — the largest such order globally by a regional carrier — taking its fleet from six to over 60. Rather than chasing coverage, FLY91 targets the “sweet spot” between genuine connectivity gaps and commercial viability, expanding bases progressively as UDAN 2.0 fuels demand for smaller regional aircraft across India. Sarthak Baranwal takes a deep look into how FLY91 and ATR are together developing regional aviation in India.

In the first article, Manish Kumar Jha explains how India can benefit from the Russian push toward a deeper aviation partnership, with UAC and HAL finalising a licensing deal to build the SJ-100 locally, alongside separate orders for 105 Il-114-300 turboprops from three Indian startups. If India localises design, certification and manufacturing rather than mere assembly, the programme could seed a genuine domestic civil-aircraft industry.

In another article by Sarthak Baranwal, he looks at how in chasing net-zero by 2050, aviation is pursuing multiple parallel paths: Sustainable Aviation Fuel (SAF) as the near-term bridge, fleet renewal and radical new engine architectures like CFM's open-fan RISE programme for efficiency gains, and hydrogen or hybrid-electric propulsion as longer-term bets. SAF remains two-to-four times costlier than jet fuel and supply-constrained, pushing airlines into long-term off-take deals while regulations like ReFuelEU mandate blending.

Technology is now deeply embedded the entire aviation sector. Anil Khosla details on the use of AI across aviation — optimising flight paths, predictive maintenance, airport operations, security screening and pilot support — while quantum computing, still nascent, promises gains in logistics, materials and sustainable aircraft design. But these technologies bring new risks: adversarial attacks on AI systems, algorithmic errors, over-reliance eroding pilot skills, and quantum computers' potential to break today's encryption, exposing navigation and communications data via “harvest now, decrypt later” attacks.

Farnborough International Airshow 2026 became its largest edition ever, drawing 1,41,580 visitors from 136 countries and a sixth exhibition hall. Commercial deals topped \$84.7 billion with 353 firm orders, led by Boeing's narrow win over Airbus and SMBC Aviation Capital's blockbuster 200-jet order — though totals trailed forecasts amid production and engine-supply bottlenecks. Beyond metal, the show revealed a broadening ecosystem: newcomers in AI, finance and supply-chain logistics, Vertical Aerospace's historic public eVTOL flight, and a new Finance Summit — signalling that aviation's centre of gravity is shifting toward software, financing and electric aircraft. A show report is included in this issue.

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



With HAL branding and the Indian tricolour, the SJ-100 signals Russia's civil aviation push into India

SJ-100: RUSSIA'S SUPERJET BET ON INDIA COULD OPEN A NEW CHAPTER IN CIVIL AIRCRAFT MANUFACTURING

 BY **MANISH KUMAR JHA**

RUSSIA IS MAKING A renewed push to enter India's rapidly expanding regional aviation market, but this time the proposition is bigger than simply selling aircraft.

Moscow wants to build the SJ-100 in India, with Hindustan Aeronautics Limited (HAL), an Indian DPSU, as its industrial partner, potentially creating the country's first modern, complete passenger-aircraft manufacturing programme since the end of AVRO HS-748 production.

Russia is pitching ground-breaking aviation partnerships through deals for Il-114-300 planes and the proposed local manufacturing of the new SJ-100 with HAL. Beyond routine aircraft sales, this push offers India a strategic foundation to establish its own commercial aircraft industry.

The stakes have risen sharply. Russia's state-owned United Aircraft Corporation (UAC) says more than 80 per cent of its licensing agreement with HAL for localising SJ-100 production has been finalised and that the agreement could be signed by the end of 2026.

UAC Chief Executive Vadim Badekha has also said that the company expects to sign a contract with the first Indian operator at Aero India 2027. If the timetable holds the first Indian-assembled SJ-100 could emerge around 2028-29, followed by

production at a rate of 20–40 aircraft per year. According to UAC estimates, the Indian and surrounding markets could absorb roughly 200–300 aircraft.

At the same time, three Indian start-up airlines have signed agreements covering 105 Russian Il-114-300 passenger aircraft, signalling growing interest in closer India-Russia cooperation in civil aviation and aircraft manufacturing.

The proposed deals include 50 aircraft for Pinnacle Air, up to 20 for Air Kerala and 35 for Sleek Aviation. None of the three airlines has yet begun scheduled commercial operations. Another Indian start-up, Flamingo Aerospace, had earlier agreed to acquire six Il-114-300s, with deliveries expected to begin in 2028.

Russia's United Aircraft Corporation (UAC), which manufactures the aircraft, has been pitching the Il-114-300 as a regional aircraft suited to India's expanding aviation network. For India, the proposed deals also come at a time when the country is looking to strengthen domestic aircraft manufacturing and build a broader ecosystem around civil aviation.

■ **FROM THE SUPERJET 100 TO THE NEW RUSSIAN SJ-100.** One distinction is important. The aircraft Russia is now proposing for India is not simply the original Sukhoi Superjet 100 that entered commercial service in 2011. The original SSJ100 was an international industrial programme, with a substantial Western component base.

Its propulsion system, the PowerJet SaM146, was developed by a 50:50 French-Russian joint venture between Safran and NPO Saturn. The original aircraft also incorporated Western avionics and systems. The SaM146 was estimated at \$5.6 million per engine.

The post-2022 sanctions environment changed the equation completely. Russia, then embarked on an extensive import-substitution programme. The new SJ-100 is designed around Russian systems and components, most importantly the Aviadvigatel PD-8 engine.

Rostec says about 40 imported systems and assemblies have been replaced, including the engine, avionics, landing gear, aux-



Indian regional start-up carriers have committed to acquiring 105 Russian Il-114-300 turboprop aircraft

iliary power unit, flight-control system, electrical power system, air-conditioning and fire-protection systems.

The distinction matters for India: The SaM146 is not the intended engine for new SJ-100 production. The current aircraft is being developed around the Russian PD-8. Rostec reported that a SJ-100 built using serial-production technologies and equipped with Russian systems and PD-8 engines completed its maiden flight in 2025.

■ **WHAT IS THE AIRCRAFT INDIA IS BEING OFFERED?** The SJ-100 is a roughly 100-seat, twin-engine regional jet, with UAC describing it as a short-range narrow-body aircraft capable of carrying up to 103 passengers.

Its target market is therefore not the Airbus A320neo or Boeing 737 MAX directly. Its more natural competition is the Embraer E-Jet family and other aircraft serving the 70–110-seat regional/short-haul segment.

That could give it an opening in India. India's aviation growth is moving beyond the largest metro-to-metro routes. UDAN and the expansion of regional airports are creating demand for aircraft that can economically connect Tier-2 and Tier-3 cities without requiring the passenger volumes of a 180-seat narrow-body jet.

HAL itself estimates that India could require more than 200 aircraft in this category over the next decade, while the wider Indian Ocean regional market could represent another 350 aircraft.

■ **WHAT COULD AN SJ-100 COST?** This is one of the biggest unanswered questions. There is no publicly disclosed current Indian selling price for the SJ-100, and it would be misleading to simply attach the historical Superjet list price to the new aircraft.

The original SSJ100 had a list price of roughly \$50 million by 2018, after earlier prices in the \$30–35 million range. But the Indian SJ-100 would be a different proposition. Its final price would depend on localisation levels and production volumes; important to take account of engine and spare parts pricing.



UAC and HAL signed an agreement on Cooperation in Manufacturing of the SJ-100 in India. The document was signed by Vadim Badekha, General Director of UAC, and Dr D.K. Sunil, the then Chairman of HAL.

Therefore, a credible cost comparison should focus on total life-cycle cost rather than catalogue price.

This is particularly important because a low acquisition price can quickly disappear if an airline faces expensive spares, long maintenance cycles, low fleet availability or replacement components.

The aircraft's economic case will ultimately depend on cost per available seat kilometre, fuel burn, maintenance cost, aircraft utilisation and residual value. For Indian airlines operating on thin regional margins, this will matter enormously.

■ **MAKE IN INDIA: WHAT WILL ACTUALLY BE MADE IN INDIA?** This is perhaps the most important part of the proposed partnership. The January 2026 agreement between UAC and HAL provides HAL with a licence to manufacture and sell the SJ-100 in India, including assemblies, parts and components required for repair and maintenance. UAC, meanwhile, is to support HAL in adapting and upgrading production facilities through technical assistance, engineering support and specialist personnel.

So far, two sides have not publicly announced a definitive percentage for Indian content. That distinction is crucial.

However, these should be regarded as potential areas of localisation rather than components already contractually committed to Indian manufacture. That is where the project could become

much more important than an aircraft assembly line.

If HAL and UAC can develop a tiered Indian supplier ecosystem, the programme could become a platform for Indian companies to enter the global civil-aerospace supply chain.

■ **HAL'S BIGGER GAMBLE.** For HAL, the SJ-100 represents a major strategic shift. The company has traditionally been defence-focused, and its civil business has been small. However, HAL has now indicated that it wants to substantially expand its commercial aviation activities. Its facilities in Nashik and Kanpur could be adapted for civil-aircraft production.

This way, the SJ-100 could serve as a bridge between India's defence aerospace man-

ufacturing capabilities and a future civil-aircraft industry.

India has gained experience in producing military aircraft and components, but producing a commercial airliner is a different challenge. Civil aviation demands extremely high levels of reliability, documentation, quality control, supply-chain consistency and life-cycle support. That makes the programme a valuable industrial test.

India's ultimate objective should not be simply to assemble 200 Russian aircraft. It should be to use the programme to build Indian competence in commercial-aircraft design, certification, systems integration, manufacturing and global after-sales support. These provisions could be more important than the aircraft's initial sticker price.

■ **CAN THE SJ-100 BECOME INDIA'S REGIONAL JET?** The opportunity is real. India needs smaller aircraft to make regional connectivity commercially sustainable. A 100-seat jet can serve routes where an A320-class aircraft may be too large, while offering considerably higher speed and range than turboprops. However, India is not an uncontested market.

Embraer has a strong global reputation in the regional-jet segment. Airbus and Boeing dominate larger narrow-body operations. India's airlines will compare the SJ-100 not only on purchase price but on fuel economy, dispatch reliability, maintenance costs, financing, residual value and global support.

The Russian aircraft therefore has to prove itself economically—not politically. If India localises structures, systems, components, engineering and maintenance—and develops the capability to design and certify its own civil aircraft—the SJ-100 could become the foundation of something much bigger. It will break boundaries in civil aviation. SP

Manish Kumar Jha is a Consulting & Contributing Editor for SP's Aviation, SP's Land Forces and SP's Naval Forces and a security expert. He writes on national security, military technology, strategic affairs & policies.

If the timetable holds the first Indian-assembled SJ-100 could emerge around 2028–29, followed by production at a rate of 20–40 aircraft a year

The SJ-100 could serve as a bridge between India's defence aerospace manufacturing capabilities and a future civil-aircraft industry



(Left to Right) Harsha Raghavan, Chairman, FLY91; Nathalie Tarnaud Laude, Chief Executive Officer, ATR; Minister of Civil Aviation Kinjarapu Rammohan Naidu; Manoj Chacko, Founder, Managing Director and CEO of FLY91; and Alexis Vidal, Chief Commercial Officer, ATR, at the landmark signing ceremony for FLY91's firm order for 40 ATR 72-600 aircraft in New Delhi.

FLY91 PLACES ORDER FOR 40 ATR: BETS ON THE NEXT PHASE OF INDIAN AVIATION

PHOTOGRAPHS: FLY91

BY **SARTHAK BARANWAL**

More airports, safer mobility in Tier 2 and Tier 3 cities and government initiatives are creating opportunities for airlines built specifically around India's growing regional aviation market. FLY91 is one such airline, with the ATR 72-600 aircraft at its operational core.

FOR DECADES, INDIA'S AVIATION map was largely built around its biggest cities. For most domestic carriers, regional routes were traditionally seen as add-ons to their larger networks. But with the steady rise in the number of airports, growing demand for mobility and government initiatives such as UDAN and UDAN 2.0, regional aviation is becoming an increasingly important part of India's air transport network. And young pure play regional airlines like FLY91 are helping shape this market, with the ATR 72-600 at the centre of their strategy.

For FLY91, the choice of aircraft is closely linked to the kind of markets it wants to serve. The ATR is smaller than a typical narrow-body jet, has a carrying capacity of up to 72 passengers, has lower maintenance and leasing costs, is fuel efficient and can operate from shorter runways. These characteristics make it well suited to the operating conditions of Tier II and Tier III airports, many of which are new entities.

The Goa-based pure-play regional airline started operations two and a half years ago with a specific focus on connecting Tier II and Tier III cities and sectors where air connectivity was limited or absent. Its approach was to complement existing transport networks rather than compete head-on for passengers on India's busiest routes.

The early experience has given the airline some confidence in that approach. FLY91 has now operated more than 15,000 flights and runs close to 280 weekly flights to 13 destinations. Its network includes places such as Jalgaon, Sindhudurg, Solapur, Agatti, Hubballi, Vijayawada and Rajahmundry, besides larger cities including Goa, Bengaluru, Hyderabad, Kochi and Tirupati. Some of these routes would probably not be obvious candidates for a conventional airline network. That is precisely the point.

"The inspiration was the opportunity to address gaps in India's regional air connectivity," says Manoj Chacko, Founder, Managing Director and CEO of FLY91. "Many Tier II and Tier III cities have limited or no air services, and we saw an opportunity to build an airline around that need, complementing rather than competing with the wider transport ecosystem." Jalgaon, Sindhudurg and Agatti have since provided some useful evidence for the proposition.

"Routes such as Jalgaon, Sindhudurg and Agatti have shown that there is strong demand when the right destinations are connected," Chacko says. "These routes have demonstrated that regional connectivity can create new travel markets and open up destinations that were previously underserved."

It is a model that depends heavily on the type of aircraft. FLY91 has operated only the ATR 72-600 and now intends to keep it that way. Earlier this month, the airline signed a landmark firm order for 40 ATR 72-600 aircraft in a deal valued at approximately \$1 billion. It is the largest ATR order globally by a regional airline. The order proposes to be a game changer for FLY91. The order will catapult the regional airline from its current six aircraft to a fleet of more than 60 over the coming years.

For a young airline, 40 aircraft is a substantial commitment. But the reasoning behind it is less intimidating. It is actually practical in practice. "We remain firmly focused on the ATR 72-600 because it has worked very well for us... Its size, economics, fuel efficiency and ability to operate from shorter runways make it particularly suited to the kind of regional network we are building," Chacko says.

The ATR 72-600 can seat up to 72 passengers depending on the load capacity defined by the airport it is operating to. A



"We remain firmly focused on the ATR 72-600 because it has worked very well for us... Its size, economics, fuel efficiency and ability to operate from shorter runways make it particularly suited to the kind of regional network we are building"

— Manoj Chacko, Founder, Managing Director and CEO of FLY91

smaller aircraft means a smaller market can be viable. If passenger numbers are lower, the airline is not carrying the same cost exposure that comes with putting a much larger aircraft on the route. FLY91's own assessment is that the ATR's maintenance and leasing costs are significantly lower than those of larger jets, while its fuel efficiency helps further on short-haul operations.

There is another consideration. Regional airports are not always built around the requirements of larger aircraft. The ATR's ability to operate from shorter runways gives FLY91 more options when it looks for new destinations. This is important because FLY91 does not pick routes simply because a city is underserved. It looks for what Chacko calls the "sweet spot" between a genuine connectivity gap and a route that makes commercial sense. Infrastructure, existing connectivity, potential demand, yields and trip costs all form part of the assessment.

That is also why the airline's decision to remain with one aircraft type matters as it grows. FLY91 is not building a fleet first and then looking for places to fly it. It is building a network around the economics of a particular aircraft. The next stage is considerably larger than the first. The airline plans to add bases progressively, with five to six aircraft at each base and eight to 10 cities served from each. Its first two bases are Goa and Hyderabad.

The ambition coincides with renewed government attention on regional connectivity. UDAN 2.0 has put fresh emphasis on bringing more Tier II and Tier III cities into the air network. The government's ₹28,840 crore investment under this framework, is intended to expand regional connectivity and bring smaller cities further into the national economic mainstream.



Manoj Chacko, CEO of FLY91, said that together with ATR, the airline is building the regional aviation network that unlocks opportunity, strengthens local economies, and truly keeps Bharat Unbound

There is consequently a larger question behind FLY91's order. Can regional aviation in India move beyond individual subsidised routes and become a viable network in its own right? FLY91's answer appears to be yes, but with a fairly conservative operating philosophy. It looks for markets where an aircraft of the right size can operate economically and where connectivity can complement existing road, rail and air links rather than attempt to replace them. The ATR fits that approach rather neatly.

The passenger experience is another part of FLY91's attempt to keep the model simple. The airline has built a largely digital operation, including automated check-in and boarding passes sent through WhatsApp. It does not operate a traditional call centre. Passengers can purchase meals until boarding and use UPI,

FLY91's own assessment is that the ATR's maintenance and leasing costs are significantly lower than those of larger jets, while its fuel efficiency helps further on short-haul operations

while SmartBag91 allows them to pre-book additional baggage at super discounted rates.

However, none of this changes the fundamental calculation. A regional airline still needs an aircraft that can make the route work. "We have grown steadily and consistently since our launch, and this 40-aircraft order becomes the foundation for our next chapter...Together with ATR, we are building the regional aviation network that Bharat deserves, one that unlocks opportunity, strengthens local economies, and truly keeps Bharat Unbound," Chacko explains.

For FLY91, the ATR 72-600 has therefore become a part of the definition of the regional airline itself. The aircraft is small enough for the markets it wants to serve, economical enough for the routes it wants to operate and flexible enough to reach airports that larger aircraft may struggle to serve economically. FLY91's first six aircraft have allowed FLY91 to test that proposition. The next 40 will determine the leap it can take before soaring into India's regional skies.

FLY91 has wagered on turning a fleet of ATR into a sustainable network, linking India's tier-2 and tier-3 cities. This would demonstrate that regional aviation can become a meaningful commercial business in its own right. For FLY91, the 40 ATRs are the foundation of that gamble. For India, they represent something larger: a bet that the next generation of aviation growth will not simply make the country's busiest airports busier, but will finally bring many of the country's smaller cities into the air network as well. **SP**



ATR successfully performs test flights with 100 per cent SAF in one engine

SUSTAINABILITY: A BIG MILESTONE FOR THE AVIATION INDUSTRY



BY **SARTHAK BARANWAL**

FOR MORE THAN A century, aviation has been an industry defined by movement. It has made distant places accessible, connected economies and transformed the way people and goods move around the world. But as the industry enters another period of technological change, one question has become impossible to avoid: how can aviation continue to grow while dramatically reducing its environmental footprint? The answer is unlikely to come from a single technology.

The aviation industry's commitment to achieving net-zero carbon emissions by 2050 has set in motion one of the most significant transformations in its history. Aircraft manufacturers are developing new airframes and propulsion systems, engine makers are pursuing

Achieving net-zero emissions by 2050 is driving a profound transformation across the aviation sector. The industry is reshaping its entire ecosystem to ensure the future of flight is truly sustainable.

entirely new architectures, airlines are renewing fleets and investing in alternative fuels, while airports are preparing for infrastructure that barely existed on the drawing board a decade ago. At the centre of this transition, however, sits Sustainable Aviation Fuel, or SAF.

SAF is not the only solution to aviation's sustainability challenge. But it may be the most important solution available to the industry today because, unlike hydrogen or fully electric propulsion, it offers a pathway to reduce the carbon intensity of aviation without requiring the immediate replacement of the global aircraft fleet. That makes SAF less a destination than a bridge—and the strength of that bridge could determine how quickly aviation reaches its longer-term ambitions.



A mock-up image created to show what Airbus' fully electric, hydrogen-powered ZEROe aircraft will look like, and how it could be operated at an airport. It features four engines each powered by their own fuel cell stack.

■ **SAF: THE IMMEDIATE OPPORTUNITY.** The appeal of SAF is straightforward. Modern aviation depends heavily on liquid hydrocarbon fuels because aircraft require enormous amounts of energy while carrying that energy over long distances. Batteries remain poorly suited to powering large commercial aircraft because of their weight, while hydrogen will require significant changes to aircraft design and airport infrastructure.

SAF works within a much more familiar framework. Produced from renewable and waste-based feedstocks through approved production pathways, SAF can be blended with conventional jet fuel and used in existing aircraft and engines within current certification limits. The industry's objective is to move progressively toward aircraft capable of operating on 100 per cent SAF.

Airbus and Boeing have both committed to achieving 100 per cent SAF capability for their commercial aircraft by 2030, while engine manufacturers are also conducting extensive testing and certification work.

This compatibility gives SAF a critical advantage. An aircraft entering service today can remain operational for decades. Waiting for an entirely new propulsion technology to replace the existing fleet would therefore leave the industry with a considerable emissions problem in the interim. SAF, by contrast, can begin working with the fleet that already exists.

But technological compatibility is only half the challenge. The bigger question is supply. SAF remains significantly more expensive than conventional jet fuel, with estimates putting its cost at roughly two to four times that of conventional fuel. That price difference makes large-scale adoption difficult without investment, policy support and mechanisms that create confidence for fuel producers. Airlines are consequently becoming more than fuel purchasers. They are increasingly becoming market makers.

Long-term offtake agreements allow airlines to commit to purchasing SAF in the future, giving producers greater certainty

when making expensive investments in new production facilities. Airline-backed funds and partnerships are also being used to support emerging SAF technologies and production companies.

United Airlines, for example, has positioned SAF and carbon-capture investment at the centre of its longer-term decarbonisation strategy. **United CEO Scott Kirby** has been particularly direct about the role SAF must play, saying: "The only way to decarbonise aviation really is SAF." The statement is striking in its simplicity, but the challenge behind it is enormous. The industry cannot decarbonise through airline commitments alone. It needs an industrial-scale supply chain capable of producing alternative fuels in quantities measured not in demonstration projects, but in millions of tonnes.

That is why airline investment matters. It is not simply about purchasing a greener product; it is about helping create the market in which that product can exist at scale. Regulation will play a major role as well. Initiatives such as ReFuelEU Aviation are moving SAF from the realm of voluntary corporate commitments toward legally mandated blending requirements. That changes the equation for airlines and fuel suppliers alike. Sustainability gradually stops being an optional premium and becomes part of the industry's basic cost structure.

The challenge is scale. SAF must move from an emerging alternative into a globally significant fuel industry. That will require investment across the entire supply chain—from feedstocks and production technology to transportation, airport storage and distribution. It will also require careful attention to the sustainability of the feedstocks themselves. A fuel cannot simply be labelled sustainable; its full lifecycle environmental impact has to justify the claim.

The aviation industry therefore finds itself in an unusual position. The technology for using SAF is progressing faster than the infrastructure required to produce enough of it. And that gap is precisely where the industry's other sustainability efforts become important.



Through the RISE technology demonstration programme, CFM is advancing the development of its revolutionary Open Fan architecture, targeting up to 20 per cent greater fuel efficiency compared with today's most advanced engines

■ **MAKING EVERY AIRCRAFT MORE EFFICIENT.** Even in a future dominated by SAF, efficiency will remain essential. The cleanest fuel is still more valuable when an aircraft requires less of it.

Aircraft manufacturers have therefore continued to pursue aerodynamic improvements, lighter structures, better systems and more efficient propulsion. The latest generation of narrow-body aircraft can deliver fuel-burn improvements of approximately 15–20 per cent compared with aircraft that are around 15 years old. Fleet renewal consequently represents one of the most immediate sustainability measures available to airlines.

Replacing an older aircraft with a modern one does not require waiting for hydrogen propulsion, an entirely new airport infrastructure or a breakthrough in battery technology. It is a technology already available at commercial scale.

At the same time, manufacturers are looking further ahead. Airbus is pursuing more efficient next-generation aircraft alongside its hydrogen research, while Embraer's Energia programme is examining hybrid-electric and hydrogen fuel-cell concepts for smaller regional aircraft.

Embraer CEO Francisco Gomes Neto has framed the wider challenge in similarly direct terms: "At Embraer, we recognise the urgency of the climate crisis and we are fully committed to a more sustainable future." This broader commitment underpins the company's work across hybrid-electric propulsion, hydrogen and other alternative-energy pathways.

The underlying philosophy is that sustainability in aviation will not arrive as one revolutionary aircraft that suddenly replaces everything flying today. It is more likely to emerge as a succession of technological improvements, each expanding what is commercially and operationally possible.

■ **RETHINKING THE JET ENGINE.** Engine manufacturers are pursuing some of the most consequential of those improve-

ments. The biggest gains, however, may eventually come from changing the architecture of the engine itself. For decades, the commercial aviation industry has relied on increasingly refined versions of the turbofan. That approach has delivered remarkable improvements, but manufacturers now believe the next generation of efficiency will require more fundamental changes.

CFM International's RISE programme is one of the clearest examples. The programme is centred on an open-fan architecture designed to achieve at least a 20 per cent improvement in fuel consumption and CO₂ emissions compared with today's most efficient commercial engines. Rather than enclosing the fan within a conventional nacelle, the design uses large open, counter-rotating blades to increase propulsive efficiency.

The urgency behind that approach has also been acknowledged by CFM's leadership. **Gaël Méheust, President and CEO of CFM International**, said: "The industry can't reach its net zero ambition by 2050 with status quo incremental improvements in fuel efficiency."

It is a useful distinction. The industry's sustainability challenge is no longer simply about making today's engines marginally better; it is about developing technologies capable of changing the efficiency equation altogether.

GE Aerospace and Safran are pursuing the RISE programme as part of a wider effort to develop propulsion technologies capable of delivering a substantial step forward in efficiency. The programme also incorporates hybrid-electric technologies and research into alternative fuels, creating a propulsion platform designed around the broader transition rather than one isolated technological solution. **GE Aerospace CEO H. Lawrence Culp Jr.** has described the broader direction of the company in similarly forward-looking terms: "The future of flight is being shaped today, and GE Aerospace is proud to be at the forefront."

The significance of these developments extends beyond fuel savings. If a future aircraft consumes substantially less fuel, every



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litre of SAF effectively goes further. The combination of efficient aircraft and lower-carbon fuel could therefore deliver a much greater environmental benefit than either approach in isolation.

■ **HYDROGEN: THE LONGER-TERM BET.** If SAF represents the bridge, hydrogen represents one possible longer-term destination. Hydrogen-powered aircraft have the potential to eliminate direct CO₂ emissions during flight, particularly when hydrogen is produced using renewable energy. Airbus's ZEROe programme is exploring hydrogen fuel-cell propulsion alongside direct hydrogen combustion.

Yet hydrogen demonstrates why aviation's sustainability challenge extends far beyond aircraft design. Liquid hydrogen must be stored at approximately -253°C. Its storage requirements are fundamentally different from those of conventional jet fuel, and the fuel occupies considerably more volume. Airports would therefore require new storage facilities, transportation systems, safety zones and refuelling infrastructure.

Airbus CEO Guillaume Faury made this interdependence clear when discussing the future of hydrogen aviation: "This challenge is not only about an airplane. It is about having the right fuels—hydrogen at the right time, the right place, the right quantity, and the right price." That is perhaps the defining characteristic of aviation's sustainability transition: no single company can deliver it alone.

■ THE AIRPORT BECOMES PART OF THE SOLUTION.

For decades, the airport has largely been treated as the interface between the aircraft and the passenger. In a more sustainable aviation system, it becomes something considerably more important. SAF requires production, transportation, storage and distribution systems capable of serving airports reliably. Hydrogen will require an entirely new infrastructure layer. Electric aircraft, if they eventually become commercially viable for larger segments of aviation, would require high-capacity charging infrastructure.

Airbus is already working with airports and energy companies on hydrogen infrastructure concepts, including partnerships in Europe, Norway and the Asia-Pacific region. These initiatives are examining how hydrogen can be produced, transported and ultimately supplied to aircraft.

This represents a shift in thinking. The sustainable aircraft of the future cannot simply arrive at an airport and expect the airport to adapt around it. Aircraft technology, energy infrastructure and airport design will have to evolve together.

■ **SUSTAINABILITY ON THE GROUND.** The environmental footprint of aviation also extends beyond the flight itself. Manufacturers are increasingly examining their own factories, supply chains and production processes. Airbus has established emissions-reduction targets for its own operations, Boeing is investing in more efficient facilities, and Embraer has set targets around renewable electricity and operational carbon neutrality.

Engine manufacturers are pursuing similar goals. Pratt & Whitney's parent company, RTX, has invested in environmental projects focused on areas such as factory waste and water consumption, while also exploring greater recyclability of future engine products. **RTX CEO Christopher Calio** has likewise spoken about reducing water usage and scrap in manufacturing, reinforcing the idea that the sustainability challenge extends beyond what happens in the air.

The idea is increasingly moving beyond simply making an aircraft that consumes less fuel. It is about reducing the environmental impact of the entire lifecycle—from raw materials and

manufacturing to maintenance, operation and eventual retirement. That introduces the concept of a more circular aviation industry, where components are repaired, reused and recycled wherever technically and economically practical.

There is also a remarkably straightforward sustainability measure already available to airlines: replace older aircraft. The latest generations of narrowbody aircraft can deliver fuel-burn reductions of roughly 15–20 per cent compared with aircraft around 15 years old. Fleet renewal therefore offers an immediate reduction in fuel consumption while the industry waits for more radical technologies to mature.

It may lack the glamour of hydrogen aircraft or open-fan engines, but replacing an inefficient aircraft with a modern one is one of the most practical decarbonisation tools available today.

■ **AN INDUSTRY-WIDE TRANSFORMATION.** What makes aviation's sustainability challenge unusual is the sheer number of parties that must move together.

Aircraft manufacturers can develop hydrogen aircraft, but airports must build hydrogen infrastructure. Engine manufacturers can certify engines for 100 per cent SAF, but fuel producers must manufacture it at scale. Airlines can sign offtake agreements, but governments must establish policy frameworks that make investment viable. Corporate travellers can pay a green premium, but the underlying supply chain must have enough capacity to deliver meaningful emissions reductions.

Faury perhaps puts this interdependence most clearly. The transition is not simply about designing an aircraft; it requires the right energy ecosystem around it. That applies to hydrogen, but the principle is equally relevant to SAF. A technologically compatible fuel is of little use if it cannot be produced, transported and delivered at the scale aviation requires.

Safran is pursuing the same broader approach. **Safran CEO Olivier Andriès** has described decarbonisation as a strategic priority for the company, saying: "I welcome this agreement, which is fully in line with Safran's strategic priority to decarbonize aviation." The agreement he was referring to involved Safran and TotalEnergies working together on aviation decarbonisation, including sustainable fuels and more efficient propulsion technologies.

The target of 2050 remains ambitious. It may even take longer than currently anticipated. But ambition is necessary precisely because aviation cannot afford to wait until every technological answer is perfect. Faury has acknowledged the possibility that achieving net zero could take longer than the industry's current target, while maintaining that aviation should not shy away from the ambition of reaching it. "Maybe it's going to take a bit more time, but let's not be shy in the ambition."

The path ahead will not be defined by a single fuel, engine or aircraft. SAF is likely to carry much of the burden of the transition in the near and medium term, while increasingly efficient aircraft, advanced engines, fleet renewal and improved operations reduce the amount of energy aviation requires. Hydrogen and hybrid-electric technologies may eventually reshape parts of the fleet altogether.

The real milestone, is not simply reaching net zero in 2050. It is the transformation taking place long before that date—the gradual replacement of a century-old aviation model with an ecosystem designed around lower emissions, greater efficiency and more responsible use of resources. Aviation has always been an industry built around looking ahead. Its sustainability transition is no different.

The aircraft of the future will not merely have to fly. It will have to fly responsibly. **SP**

CHANGE THE ENGINE, CHANGE THE FUTURE

CFM's RISE programme is shaping Sustainable Aviation

CFM INTERNATIONAL — the 50/50 joint company between GE Aerospace and Safran Aircraft Engines — has spent more than four decades engineering engines that are cleaner, quieter, and more fuel-efficient, from the CFM56 family to today's LEAP engines. According to CFM, its products already comply with ICAO's strictest emissions and noise standards, and cumulative technology gains have cut carbon emissions from its engines by 40 per cent to date. That track record underpins CFM's next major undertaking: the RISE programme.

WHAT IS RISE?

Launched on June 14, 2021, by GE Aerospace and Safran Aircraft Engines, RISE stands for "Revolutionary Innovation for Sustainable Engines." CFM describes it as a technology demonstration programme — not a product for sale — aimed at maturing the building blocks for CFM's next generation of engines, which the company expects could enter service in the second half of the 2030s. The headline target is ambitious: more than 20 per cent better fuel efficiency and correspondingly lower CO₂ emissions compared with today's most efficient commercial engines, alongside full compatibility with alternative energy sources. As CFM's website puts it, RISE is "accelerating development of unpromising new propulsion technologies that will pave the way for next generation aircraft."

OPEN FAN: THE CENTERPIECE ARCHITECTURE

The most visible technology within RISE is the open fan engine architecture. CFM explains that decades of steadily growing engine fan diameters are "ultimately leading to the open fan concept," which it considers "the most efficient and sustainable option" for improving propulsive efficiency. The design removes the traditional fan casing to allow a larger fan with less drag, using carbon-fiber composite blades manufactured through a 3-D weaving process. Notably, CFM says the open fan demonstrator will still cruise at the same speed as current single-aisle aircraft — up to Mach 0.8 — while meeting anticipated future noise regulations, meaning efficiency gains need not come at the cost of operational compatibility.

FUEL FLEXIBILITY: SAF AND HYDROGEN

Beyond engine architecture, RISE is engineered around fuel flexibility. CFM states its future engines will offer full compatibility with Sustainable Aviation Fuel (SAF) and hydrogen, which the

company says could together enable up to an 80 per cent cut in CO₂ emissions. CFM began testing SAF as early as 2006, and since 2016, airlines worldwide have flown more than 4,00,000 flights on CFM-powered aircraft using sustainable fuels. On hydrogen, CFM and Airbus separately announced a demonstration programme to ground- and flight-test a hydrogen-fueled engine — a modified GE Aerospace Passport™ turbofan on an A380 testbed — supporting a targeted zero-emission aircraft by 2035.

HYBRID-ELECTRIC POWER & ADVANCED MATERIALS

RISE also introduces hybrid-electric systems to single-aisle propulsion for the first time, according to CFM, allowing the engine to generate additional electric thrust while also producing electricity for onboard systems. This sits alongside an advanced "compact core" designed to boost thermal efficiency and cut fuel burn, built using next-generation metal alloys and ceramic matrix composites. Together, CFM frames these as the foundational technologies for any future CFM engine.

TESTING AT SCALE

CFM's own reporting underscores the scale of validation work underway. The company cites more than 1,000 (and, in more recent updates, over 2,000) engineers dedicated to the programme, alongside

roughly 500 test campaigns and over 3,000 endurance cycles completed as of mid-2026, spanning open fan, compact core, and hybrid-electric systems. In February 2026, CFM, Airbus, and Singapore's Civil Aviation Authority signed an agreement to make Singapore's Changi and Seletar airports the world's first testbeds for evaluating how open fan aircraft would operate in real airport environments.

THE PATH AHEAD

CFM situates RISE within a broader industry pledge: in October 2021, CFM and its parent companies co-signed an Air Transport Action Group declaration committing global civil aviation to net-zero carbon emissions by 2050. CFM President & CEO Gaël Méheust has described RISE as central to that goal, framing it as a way of "pushing the technology envelope" to help the industry grow sustainably. Whether through open fan efficiency, SAF and hydrogen compatibility, or hybrid-electric power, RISE represents CFM's most comprehensive attempt yet to decouple continued aviation growth from its historical emissions trajectory — a technology bet the company is now testing at genuine scale ahead of a next-generation engine planned for the mid-2030s. **SP**



The CFM RISE programme is on track for ground and flight tests



AI and connectivity are reshaping every layer of modern flight operations

SECURING AVIATION IN AN AI AND QUANTUM-DRIVEN WORLD

BY ANIL KHOSLA

THE FIRST CONTROLLED, POWERED, heavier-than-air aeroplane flew on December 17, 1903. This was a basic mechanical machine with no computing power. The progression of computing power from then to the contemporary systems has profoundly transformed the field of aviation. It has enhanced efficiency, automation, and connectivity. A technological revolution is taking place in the aviation industry. This revolution is being driven by artificial intelligence (AI) and Quantum Computing (QC). Integration

In today's digital world, aviation is being transformed by artificial intelligence and emerging quantum computing, delivering major efficiency and safety gains while simultaneously creating new security, safety, and cyber risks that demand proactive, coordinated, and future-ready mitigation strategies

of these technologies has become an operational reality. Artificial intelligence (AI) is well embedded in aircraft operations, while Quantum Computing (QC) is still experimental but set to change things in a big way.

These developments promise unprecedented operational optimisations and efficiency. While these technologies promise extraordinary benefits, they also introduce some security and safety challenges. AI systems are also vulnerable to attacks by adversaries. Quantum computers threaten to render current encryption obso-

lete. Securing the global airspace requires a paradigm shift from traditional defences to a proactive, data-centric security posture.

IMPACT OF AI AND QUANTUM COMPUTING ON AVIATION. Artificial Intelligence (AI). The impact of AI is visible across every facet of flight operations, safety, and security. AI applications and their benefits include the following:

- **Flight Optimisation:** Machine learning algorithms now manage complex Air Traffic Management (ATM) systems, optimising flight paths in real-time to reduce fuel consumption and minimise delays. AI improves fuel consumption by 10 per cent and emissions by optimising routes and managing outages.
- **Predictive Maintenance:** AI enables the evaluation of sensor data to predict failures, thereby increasing reliability and reducing expenses.
- **Airport Performance:** AI optimises check-in, baggage handling, and air traffic control, enhancing passenger journeys.
- **Security:** AI can operate advanced screening systems at airports. It can detect prohibited items through image recognition. Its accuracy is higher than that of human inspectors. AI-enabled biometric systems can digitally streamline passenger identity processing and verification.
- **Autonomous Flight and Pilot Support:** AI autopilot and co-pilot technologies can handle standard flying functions. They can further reduce pilot workload by optimising emergency responses.
- **Design Innovation:** Generative AI can hasten the aerodynamic and material design process.

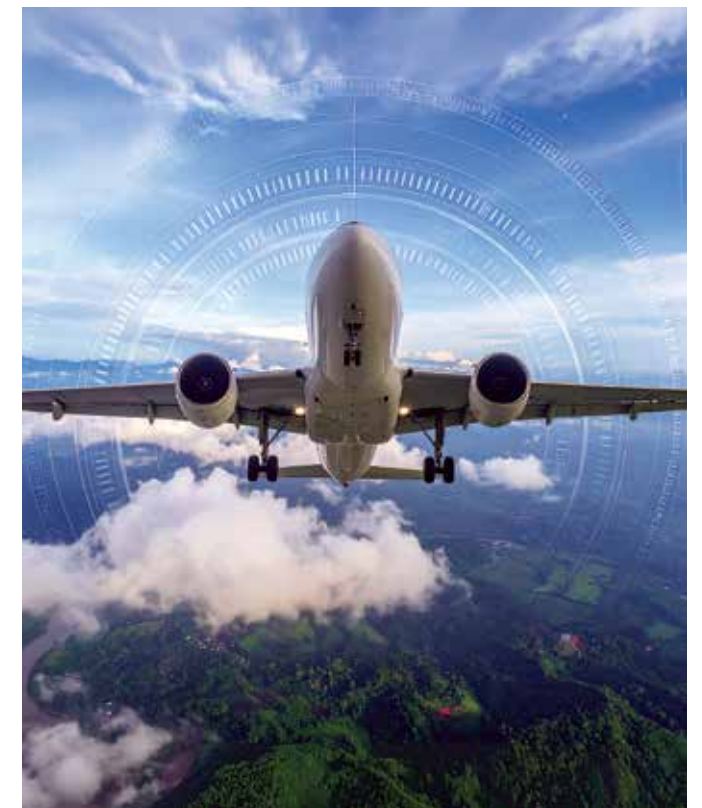
QUANTUM COMPUTING (QC). Though still nascent, it offers complementary advancements.

- **Operational Optimisation:** QC optimises complex logistics issues (e.g., routing, cargo loading), potentially saving billions. Quantum algorithms can solve optimisation problems—such as crew scheduling and fleet routing—that are computationally impossible for classical computers. Quantum sensors could improve navigation precision, and quantum machine learning might enhance predictive analytics.
- **Sustainable Aviation:** QC optimises computational fluid dynamics (CFD) and structural analysis for light, efficient airframes. Quantum simulation is accelerating the development of lighter, more durable composite materials and high-efficiency battery technologies for electric aircraft. Simulates new materials and fuels for hybrid/electric propulsion.

SECURITY AND SAFETY RISKS. Despite their advantages, AI and quantum computing introduce significant risks to aviation security and safety.

AI-related Risks. These primarily stem from vulnerabilities in

Artificial intelligence (AI) is well embedded in aircraft operations, while Quantum Computing (QC) is still experimental but set to change things in a big way



AI-driven systems now guide flight paths and airport operations worldwide

machine learning models. Adversarial attacks—subtle manipulations of input data—can fool AI systems, such as causing airport security scanners to misidentify threats or disrupting AI-managed air traffic control. In autonomous or semi-autonomous systems, like advanced flight control, biased training data or “hallucinations” in generative AI could lead to erroneous decisions, compromising safety.

Quantum Risks. Quantum computing has the potential to become an existential threat to current cryptography. A large amount of data can be processed much faster using quantum algorithms. This can pose a risk to the encryption used to secure aviation systems. It could adversely affect communications, air-ground links, satellite navigation, and avionics data exchange. “Harvest now, decrypt later” attacks—where adversaries collect encrypted data today for future quantum decryption—jeopardise long-lived sensitive information, such as flight plans or maintenance records.

Cyber Threats. These threats are escalating as aviation systems become increasingly interconnected through IoT and 5G. AI-powered cyberattacks, where malicious actors use AI to probe defences or automate phishing, target airlines and airports. Data breaches in passenger systems or operational networks could erode trust and cause disruptions.

Security Risks. Security risks include the following:

- **Data Poisoning and Adversarial Attacks:** AI inputs are susceptible to malicious manipulation. This could adversely affect flight controls, navigation, or airport functionality.
- **System Vulnerabilities:** Ageing systems can become susceptible to AI-based cyberattacks.
- **Generative AI Threats:** AI might be used to evade security by creating deceptive data.



Balancing innovation and risk as smarter skies bring new vulnerabilities alongside AI-driven efficiency gains

- **Encryption Threats:** QC algorithms might compromise public-key cryptography. This could lead to data breaches or spoofed signals.
- **Complex Attack Surfaces:** Multiple layers of interconnected networks and avionics increase the vulnerability to quantum attacks.
- **Safety Risks.** Safety risks include:
 - **Algorithmic Errors:** Algorithmic errors can result in AI bias or data misinterpretation. This can lead to incorrect autopilot or navigation commands, causing an accident.
 - **Over-Reliance:** Excessive reliance on AI can negatively impact pilot proficiency. On the other hand, in-flight analysis can help strengthen safety.
 - **Semi-Autonomous Systems:** Failure of autonomous operations can be disastrous.
 - **Simulation Errors:** Errors in QC simulation can lead to defective designs and unsafe systems.
 - **Cyber-Driven Safety Critical Hazards:** Critical navigation and avionics systems can be disrupted by Quantum and AI-driven cyberattacks. This could lead to failures and unsafe operations.

■ **MITIGATION STRATEGIES.** Addressing these risks requires layered and forward-thinking strategies. The mitigat-

ing strategies need to be all-encompassing, including technology, regulation, and collaboration. Mitigation Strategies include:

- **Post-Quantum Cryptography (PQC):** Shift to quantum-resistant algorithms would be required to protect avionics, communications, and air traffic control.
- **Quantum Key Distribution (QKD):** QKD would be required for unbreakable encryption in high-priority systems such as ADS-B.
- **Resilient AI Governance:** This would include building explainable AI frameworks, ongoing validation, and adversarial testing. It would make it transparent and minimise errors.
- **Redundant Systems:** Classical backups would need to be kept safe to mitigate AI or QC failures.
- **Regulatory Harmonisation:** Global aviation standards would need to be enhanced. These would have to be applied to AI and QC certification, prioritising safety, interoperability, and workforce training.
- **Security by Design:** Quantum-resistant architectures and layered cyber defence would be required in avionics and communications.
- **Automated with Human in the Loop:** Implement AI-enabled automation (such as SOAR) to enhance response time while leveraging a human in the process to limit escalation.

■ **CONCLUSION.** Aviation's future is brighter yet more precarious in an AI and quantum-driven world. These technologies can make flying safer and more sustainable. However, the safety and security of aviation stand at risk from associated threats. These risks can be alleviated by proactively adopting mitigating measures. All stakeholders need to invest in them now. The aviation industry needs caution and innovation to ensure safe skies in future. **SP**

Securing the global airspace requires a paradigm shift from traditional defences to a proactive, data-centric security posture



FIA2026 opened as the largest-ever edition, with nearly a quarter of exhibitors first-timers

FALLING RECORDS AND SHIFTING PRIORITIES: INSIDE FIA 2026

BY SP'S SPECIAL CORRESPONDENT, FROM FARNBOROUGH, UK

A record number of visitors and billions in confirmed orders reflect Farnborough International Airshow's (FIA) scale this year but the loudest signal was that finance, software and electric aircraft are now shaping commercial aviation as much as engines and airframes

■ **THE SHOW: SCALE, ATTENDANCE AND OPENING.** The Farnborough International Airshow (FIA 2026) closed on July 24, 2026 having delivered, by almost every measure, the largest edition in its 78-year history. The organisers of the show confirmed that the show drew 1,41,580 trade and public visitors across its five days — a 41 per cent jump on the 2024 edition and nearly double the attendance recorded in 2022. Visitors and delegates travelled from 136 countries, underlining the event's status as one the world's leading air shows.

The scale of the exhibition floor matched the visitor surge. Around 1,600 exhibitors took stand space this year, roughly 64 per cent of them from outside the UK, spread across 28 confirmed national pavilions including India, Japan, Australia, Mexico, Brazil and Switzerland alongside long-established US, European and Gulf presences. Demand for space was so strong that FIL reported the show had 'sold out twice over' more than twelve months before opening day, forcing the addition of a sixth exhibition hall — roughly 5,000 square metres of extra floor — on top of

the previous five. Even with the expansion, more than 50 companies remained on a waiting list for stands that never materialised, a clear signal of how tight capacity had become.

FIA 2026 opened on July 20, 2026 with a trade-only programme running through July 24, before a dedicated public and family day, 'Pioneers of Tomorrow', on July 24, aimed at school-age visitors, apprentices and early-career talent, with free entry for everyone under 21. The show's political and governmental presence was notably heavier than in previous editions: members of the UK Government attended throughout the week, including Wes Streeting MP, Secretary of State for Defence; Kanishka Narayan MP, Minister of State for Artificial Intelligence; and Jonathan Reynolds MP, Secretary of State for Business, Innovation, Science and Trade. A dedicated 'UK Government Hub' occupied Hall 3, hosting the Department for Business and Trade, UK Export Finance and the Department for Transport, described by organisers as the UK Government's largest-ever airshow presence. It should be noted that, in line with the show's traditional roughly 60/40 split between commercial and defence exhibitors, industry observers noted that balance shifting closer to 50/50 for 2026, driven by Europe's rearmament cycle — a defence-heavy tilt that forms the backdrop to this report, even as the analysis below focuses solely on the show's commercial and civil aviation dimension.

■ FIRST-TIME EXHIBITORS: A BROADENING ECOSYSTEM. One of the more closely watched statistics coming out of FIA 2026 was the composition of its newcomers. Roughly 22 per cent of all exhibitors were attending Farnborough for the first time, and, notably, few of them were conventional airframe or component manufacturers. FIL chief executive Gareth Rogers said ahead of the show that many of the new arrivals were concentrated in artificial intelligence, emerging technology, aviation finance and supply-chain logistics — a trend borne out once the doors opened. The new sixth hall itself became something of a showcase for this shift, hosting a cluster of AI, autonomy, digital-engineering and advanced-manufacturing start-ups alongside more established names.

Several first-time exhibitors used the show to launch or introduce new commercial concepts. Wellington-based Aviation Composites New Zealand (ACNZ) came out of stealth mode on the show's opening day to unveil the AC-2 AveniQ, an all-composite, single-turboprop feeder cargo aircraft pitched at operators of ageing Cessna Caravans and Beech 1900s, claiming roughly twice the range at 40 per cent lower operating cost, with applications spanning 19-seat passenger transport, medevac and cargo feeder roles. Toronto-based PULSHN, a newcomer developing proprietary propulsion technology for uncrewed aerial systems, used its Farnborough debut to promote scalable eVTOL logistics platforms for civil and cargo applications, building on flight testing of its 10 kg Whippet UAS. IBM's Cognitus, a digital-transformation specialist, and other enterprise-software and AI vendors, took stand space to pitch data and process-transformation tools to airlines, MRO providers and OEMs — illustrating how software and digital-engineering suppliers have become as visible on the Farnborough floor as traditional Tier 1 and Tier 2 hardware manufacturers. Collectively, the scale and character of this year's first-time exhibitor cohort reinforced a theme that ran through the whole show: commercial aviation's supply chain is no longer defined purely by metal and composites, but increasingly by data, software and finance.

■ ORDERS AND COMMERCIAL DEALS. Commercial order activity remained the week's central storyline, even if the



(Above) Massive crowds and record deals for aircraft manufacturers like Embraer, Boeing and Airbus defined FIA 2026's five-day trading week.

final tally fell short of some of the more bullish pre-show forecasts, which had suggested totals as high as 800 aircraft. According to figures released by organisers and widely reported, FIA 2026 generated more than \$84.7 billion in commercial deals, alongside 353 firm commercial aircraft orders and 904 firm engine orders. Day one alone delivered \$48.8 billion in announced deals, roughly 4 per cent below the opening-day total at FIA 2024, though ADS Group calculated that the value flowing specifically to UK aerospace companies actually rose 13 per cent year-on-year, to an estimated £7.7 billion, reflecting 234 firm aircraft orders and 466 firm engine orders confirmed on the opening day.

Independent trackers converged on a broadly similar order picture for the two big airframers, even if headline totals varied



(Top) Air Cargo made its presence felt at the show; (Middle) VX4 makes history as the first eVTOL to fly publicly; (Bottom) PULSHN's Whippet UAS debuts

slightly depending on cut-off dates and whether preliminary agreements were included. Boeing narrowly outsold Airbus over the week, with 186 firm orders against Airbus's 157 — a lead of 29 aircraft — split roughly 134 narrowbody and 52 widebody for Boeing versus 127 narrowbody and 30 widebody for Airbus. Embraer added a further 50-60 aircraft to the tally, including around 20 passenger-to-freighter E-Jet conversions, led by Brazilian group Abra Group's order covering roughly 45 E195-E2s split across firm orders, options and purchase rights.

The single largest transaction of the show came from leasing giant SMBC Aviation Capital, which placed a firm order for 200 narrowbody aircraft split evenly between the two majors: 100 Boeing 737 MAX jets (a mix of 737-8s and high-capacity 737-10s) and 100

Airbus A320neo-family aircraft (a mix of A320neos and A321neos). By some counts, the SMBC order alone accounted for more than 60 per cent of firm orders recorded during the show's official three trading days. Other notable wide-body activity included Riyadh Air exercising 28 options into firm orders for the Boeing 787-9 and 787-10, AerCap ordering 15 Boeing 787-9s with switching rights to the larger -10 variant, and further Airbus A350-1000 commitments from carriers including Philippine Airlines. Uganda Airlines placed its first-ever direct order with Boeing, for four 737 MAX 8s and four 787-9s, while Luxair converted options into two firm 737-10 orders and added two further options. On the cargo side, MSC Air Cargo was confirmed as the previously undisclosed customer behind an order for five Boeing 777-8 Freighters, extending its existing 777-200F fleet. Industry's order conversations were increasingly shaped less by winning new customers than by the availability of production slots and engines: with the global backlog for commercial aircraft estimated at more than 17,000 units, and engine-supply bottlenecks continuing to constrain deliveries, much of the week's commentary from OEM executives centred on ramping up output rather than simply booking new business.

■ CONFERENCES, SUMMITS AND INDUSTRY DIALOGUE. Beyond the exhibition floor and flight line, FIA 2026 hosted an expanded conference programme reflecting the industry's widening set of priorities. The most significant new addition was the Aerospace Global Forum: Finance Summit, the airshow's first dedicated finance and investment event. The summit convened sovereign funds, institutional investors, banks and aerospace executives for keynotes, panels and closed-door roundtables aimed at connecting capital with growth, R&D and scale-up needs across the sector, including dedicated funding pathways for SMEs and start-ups. Its opening panel, 'Resilient Horizons: Strengthening Global Supply Chains and Financing the Future of Aerospace', brought together senior policymakers, industry executives and financial leaders to discuss long-term investment trends and supply-chain resilience — a topic that recurred throughout the week given ongoing engine and component shortages across the industry.

The show floor also featured dedicated conference theatres running throughout the trade days, covering advanced air mobility, artificial intelligence, propulsion and supply chains, alongside the long-running Enterprise Gateway programme (July 21-23), a three-day, expert-led series of sessions and pitch opportunities aimed specifically at SMEs and micro-businesses looking to break into global supply chains. Notably, Farnborough's flagship decarbonisation conference, the Sustainable Skies World Summit (SSWS), was not held during the airshow week itself in 2026; organisers moved SSWS to a standalone two-day event on March 17-18, 2026, ahead of the main show, reflecting industry demand to align sustainability strategy discussions earlier in the calendar year. Even so, sustainability-focused announcements and dialogue continued at the airshow itself, run through dedicated stages and pavilions rather than a single flagship summit.

■ NEW TECHNOLOGIES: ADVANCED AIR MOBILITY AND INNOVATION. Advanced Air Mobility (AAM) achieved a genuine milestone at FIA 2026: for the first time in the show's history, an eVTOL aircraft flew in the public flying display. Bristol-based Vertical Aerospace's full-scale VX4 prototype completed a public transition flight on opening day — lifting off vertically, transitioning into wingborne forward flight, and returning to a vertical

landing in front of industry leaders, regulators, airline executives and international media. The flight followed an expansion of Vertical's Permit to Fly by the UK Civil Aviation Authority and built on the VX4's first successful piloted two-way transition flight in April 2026. Alongside the flying demonstrations, Vertical displayed a full-scale model of Valo, its four-passenger commercial eVTOL design, in Hall 4, and announced a new customer agreement with Sigma Air Mobility, a Luxaviation Group company, which will add the VX4 to its regional and urban air-mobility portfolio, though delivery terms were not disclosed. Vertical Aerospace chief engineer David King described the flight as a defining moment for both the company and the wider AAM sector, noting that it demonstrated the underlying technology had matured beyond the concept stage.

Vertical was not the only electric-aircraft manufacturer on the flight line: US-based BETA Technologies flew its all-electric, conventional take-off and landing CX300 daily throughout the show, while also displaying its MV250 model statically, making it — alongside Vertical — one of only two AAM developers with prototypes actually flying at the 2026 edition. GE Aerospace contributed two testbed aircraft that drew significant attention from engineers and enthusiasts alike: a Saab 340B hybrid-electric flying research platform, developed jointly with Boeing subsidiary Aurora Flight Sciences under the NASA Electrified Powertrain Flight Demonstration (EPFD) programme to trial megawatt-class

Nearly a quarter of this year's exhibitors were first-timers — and most weren't aircraft makers at all, but AI, finance and supply-chain firms elbowing their way onto the show floor

hybrid-electric propulsion, and the company's long-serving Boeing 747-400 flying testbed. Other AAM and advanced-technology players — including Joby Aviation, Archer Aviation and Quantum Systems — used the show primarily to provide certification and commercialisation updates rather than to fly hardware, while AALTO drew attention with its Zephyr high-altitude pseudo-satellite (HAPS), a solar-powered stratospheric aircraft positioned as a bridge between conventional aircraft and satellites for long-endurance communications and Earth observation. Across the innovation-focused halls, artificial intelligence, autonomy and digital-engineering tools featured prominently in commercial-aviation contexts too, from AI-assisted maintenance and flight-operations software to digital twins and advanced-manufacturing techniques such as large-scale additive printing — reinforcing the sense that this year's most consequential 'new technology' narrative was as much digital as it was aerodynamic.

■ SUSTAINABILITY AND THE ROAD TO NET ZERO.

With the Sustainable Skies World Summit relocated to earlier in the year, sustainability announcements at FIA 2026 itself took the form of individual OEM and airline initiatives rather than a single flagship conference track — but the volume and scope of those announcements suggested decarbonisation remains as central

to commercial aviation strategy as ever. On the show's opening day, Air Canada and Airbus announced plans to jointly invest up to C\$13.7 million (roughly \$10 million) to help establish a commercial-scale sustainable aviation fuel (SAF) industry in Canada, structured as a Sustainability Co-Investment Platform intended to support a Canadian SAF project through to a final investment decision. The initiative is designed to stimulate both SAF production and demand while encouraging government policy support, and the partners said they would continue working with federal and provincial authorities and the Canadian Sustainable Aviation Fuel Coalition (C-SAF) to help the domestic market scale.

Airbus also used the show to unveil a macroeconomic study, conducted with ICF, examining the economic potential of a Canadian SAF industry — estimating that a mature domestic SAF market could generate as much as \$32 billion in GDP and 1,40,000 jobs by 2040, while supporting the aerospace industry's collective goal, set out by ATAG, IATA and ICAO, of net-zero carbon emissions by 2050. Beyond single-country initiatives, discussion at the show continued to focus on the practical bottlenecks constraining SAF at global scale: feedstock availability, production capacity and cost, alongside parallel development pathways in hydrogen and hybrid-electric propulsion — the latter directly visible on the flight line via GE Aerospace's Saab 340B testbed. Supply-chain resilience, closely linked to the sustainability agenda, was also a recurring theme in conference sessions and executive commentary, with several speakers noting that decarbonisation targets cannot be met without parallel investment in diversified, more transparent supplier networks capable of absorbing future shocks.

■ **CONCLUSION: WHAT FIA 2026 MEANS FOR COMMERCIAL AVIATION.** Taken together, the numbers point to a show that comfortably out-scaled its predecessors on attendance, exhibitor count and deal value, even as order volumes fell short of the most optimistic pre-show projections. The gap between forecast and outcome reflects an industry narrative that recurred throughout the week: commercial aviation's constraint today is manufacturing throughput and engine supply, not customer demand. Boeing's narrow numerical win over Airbus, SMBC's blockbuster 200-aircraft order, and continuing wide-body momentum around the 787 and A350 all illustrate an order book that remains deep and diverse, even if the pace of fresh commitments has moderated from the exuberance of previous cycles. But, with 17,000+ aircraft on order globally and engines still in short supply, the real story at Farnborough 2026 was who can actually build and deliver.

Equally significant, for an event historically defined by big airframers and big orders, was how much of FIA 2026's most talked-about content came from outside that traditional core: Vertical Aerospace's historic public eVTOL transition flight, a first-time exhibitor cohort dominated by AI, finance and digital-logistics specialists, and a brand-new finance summit designed explicitly to connect capital markets with aerospace scale-up needs. Sustainability, meanwhile, has become sufficiently embedded in commercial strategy that it no longer needs a single flagship conference to generate headlines — it now surfaces organically in OEM-airline partnerships, national SAF strategies and propulsion testbeds throughout the show. For the trade audience planning ahead, the clearest signal from FIA 2026 is that commercial aviation's centre of gravity is shifting: still anchored by aircraft orders and delivery schedules, but increasingly shaped by software, financing structures and the first generation of electric aircraft now sharing runway time with mainline jets. **SP**

CIVIL AVIATION MINISTER CHAIRS COMMITTEE ON AIRCRAFT LEASING AND FINANCING



September 2, 2026 – The first meeting of the High-Level Committee (HLC) on Aircraft Leasing and Financing was held under the chairmanship of Union Minister of Civil Aviation Rammohan Naidu. The Committee deliberated on measures to develop a robust and globally competitive aircraft leasing and financing ecosystem in India, in line with the rapid expansion of the country's aviation sector.

The Minister observed that aircraft leasing is an established and commercially viable business, with the risks associated with the sector being progressively addressed through appropriate legal and regulatory measures. He also suggested exploring mechanisms for greater allocation of bank credit to the aircraft sector and identifying joint ventures for technical and skill development in aircraft leasing.

The Committee also took up a range of issues to create an enabling environment for aircraft leasing and financing, including taxation, regulatory frameworks, availability of finance and ease of doing business. Discussions included the potential for rupee-denominated financing for aircraft, greater clarity on the applicability of GAAR, and the possibility of renegotiating the Double Taxation Avoidance Agreement framework with Ireland.

MOCA LAUNCHES HUB & SPOKE INTERNATIONAL FLIGHT OPERATIONS FROM AHMEDABAD



September 1, 2026 – The Ministry of Civil Aviation launched Hub & Spoke International Flight Operations from Ahmedabad, making it the third airport in the country to be integrated into India's Hub & Spoke framework for international passenger movement, after Varanasi and Amritsar.

APPOINTMENTS



WILLIE WALSH TAKES CHARGE AS CHIEF EXECUTIVE OFFICER OF INDIGO

August 3, 2026 – IndiGo announced that Willie Walsh has assumed charge as its new Chief Executive Officer to lead the airline's next era of growth and global ambition. Walsh has held leadership positions at several respected aviation organisations including CEO of British Airways (2005–2011); CEO of International Airlines Group (2011– 2020); and most recently serving as Director General of International Air Transport Association (IATA).



AIR INDIA APPOINTS TEWOLDE GEBREMARIAM AS CEO

August 5, 2026 – The Board of Directors of Air India announced the appointment of Tewolde Gebremariam as the airline's Chief Executive Officer and Managing Director, widely recognised as one of the most successful aviation Chief Executives. As CEO of Ethiopian Airlines Group, he spearheaded a multi-billion-dollar expansion, transforming a regional carrier into Africa's largest, most profitable, and decorated airline group—growing revenue by more than fourfold and fleet size nearly threefold.



ZEROAVIA APPOINTS CHRISTINE OURMIÈRES-WIDENER AS CHIEF EXECUTIVE OFFICER

August 27, 2026 – ZeroAvia, Inc., a leader in hydrogen-electric propulsion and power systems for aviation, announced the appointment of Christine Ourmières-Widener as Chief Executive Officer. She will lead ZeroAvia as the company advances toward certification, commercialisation and market adoption of its hydrogen-electric propulsion technologies, and continues as Chair of the Board.



FLY91 APPOINTS PRESIDENT & COO, AND CFO

August 6, 2026 – Regional airline, FLY91, has announced the appointment of Krishnan Balakrishnan as President & Chief Operating Officer and Jitendra Kushwah as Chief Financial Officer.

Krishnan Balakrishnan joins FLY91 from Jazeera Airways, Kuwait, where he most recently served as Deputy CEO. At FLY91, he will lead the airline's day-to-day operations.

Jitendra Kushwah joins FLY91 from FSTC, where he was part of the founding leadership team and served as Chief Financial & Operating Officer. He has previously held senior finance leadership positions at SpiceJet, IndiGo and The Oberoi Group.

The launch of Hub & Spoke operations from Varanasi was done on June 25, 2026 and then expanded from Amritsar Airport on July 28, 2026. With the addition of Ahmedabad, the hub-and-spoke operations will further strengthen global connectivity, with flight AI 1117 connecting passengers to 22 destinations, primarily across Europe, Southeast Asia and the Middle East, while the evening service AI 1121 will extend connectivity to 17 destinations across North America, East Asia, Southeast Asia, Australia and Europe. Under Hub & Spoke, immigration, check-in and baggage check-through will now all be completed at Ahmedabad itself, with baggage travelling straight through to the final international destination.

The Hub-and-Spoke model is a key component of the Government's International Aviation Hub Strategy, aimed at positioning

India as the preferred aviation hub for Indian travellers by 2030 and a leading global aviation hub by 2047.

CIVIL AVIATION MINISTER FLAGS OFF TRANSHIPMENT CARGO OPERATIONS AT DELHI AIRPORT

August 19, 2026 – Civil Aviation Minister Rammohan Naidu flagged off the scaled-up phase of India's transshipment (TP) cargo reform at Delhi International Airport Limited's Transshipment Excellence Centre (TEC), IGI Airport, Terminal 2. Proof of Concept for Domestic-to-International transshipment commenced on June 20, 2026 on the Chennai–Delhi–Frankfurt sector using DIAL's TEC, with Air India operating the service end-to-end. Since its launch, the PoC transshipped 280 MT of cargo, with aircraft capacity utilization rising from 75 per cent to nearly 100 per cent.

Based on the success of the PoC, the network was expanded to four additional domestic origin stations; Bengaluru, Ahmedabad, Mumbai and Hyderabad along with two new international destinations; London and Copenhagen. The expanded network is projected to increase Air India's monthly cargo carriage on these lanes from 1,763 MT to 3,183 MT, an increase of nearly 80 per cent.

NOEMI AEROSPACE SIGN MOU WITH SKYHOP



August 25, 2026 – NOEMI Aerospace has signed a Memorandum of Understanding (MoU) with SkyHop Aviation, India's first dedicated commercial seaplane operator, to start with the introduction of up to 15 NOEMI amphibious aircraft into the Indian market. The agreement provides NOEMI with early engagement with government-backed seaplane operations as India moves forward with an ambitious national strategy for regional connectivity.

SkyHop is building a dedicated seaplane network in India, with initial operations focused on connecting the islands of Lakshadweep with each other and with the mainland. The company is targeting a fleet of up to 40 aircraft by FY2030.

Under the MoU, SkyHop and NOEMI will evaluate the technical, operational, commercial and regulatory requirements for introducing NOEMI aircraft into SkyHop's future fleet. The collaboration will also explore opportunities for a broader strategic partnership in India, including the potential for future manufacturing and assembly of electric and hybrid NOEMI aircraft in the country.

INTENT FOR ESTABLISHMENT OF 11 NEW FTO IN COUNTRY

August 5, 2026 – In a significant step towards strengthening India's pilot training ecosystem, Letters of Intent (LoIs) were awarded today for the establishment of 11 new Flying Training Organisations (FTOs) across seven Airports Authority of India (AAI) airports by Union Minister of Civil Aviation, Kinjarapu Rammohan Naidu.

Forty-one Flying Training Organisations are currently operating from 63 flying bases across the country. With the addition

of these 11 new FTOs across seven AAI airports, India's annual pilot training capacity is expected to increase by 750 cadets per year, providing a substantial boost to the domestic training ecosystem.

The FTO ecosystem witnessed the establishment of six new FTOs over the last two years. During this period, the number of training aircraft available with Indian FTOs has increased from 324 to 385, resulting in a 25 per cent rise in annual flying hours across the pilot training ecosystem. The expansion has translated into a significant improvement in pilot output. The number of Commercial Pilot Licences (CPLs) issued increased from 1,347 in 2024 to 1,652 in 2025, the highest number issued in the last decade, with 2026 expected to witness a further increase.

DEUTSCHE AIRCRAFT ACHIEVES FIRST FLIGHT MILESTONE IN LANDING GEAR CERTIFICATION

September 8, 2026 – Deutsche Aircraft has reached a major milestone in its landing gear certification programme with the successful completion of Low-Speed Taxi (LST) and High-Speed Taxi (HST) testing, followed by the initial phase of flight testing.

A legacy D328 aircraft operating as a dedicated flying testbed has successfully completed its first five development flights, achieving all planned test objectives. Since flight testing began on August 5, 2026, the aircraft has accumulated over 15 hours of test time with the new landing gear system, including both flight and ground testing activities. This accomplishment represents a significant step forward in the maturation and certification preparation of the next-generation D328eco*.

ATR IDENTIFIES DEMAND FOR 209 NEW DOMESTIC AIR ROUTES IN INDONESIA

August 19, 2026 – ATR, the world's leading regional aircraft manufacturer, has identified 209 new domestic air routes in Indonesia that would be economically viable if served by regional turboprop aircraft.

Total demand for these routes is 16 million passengers per annum and the airport infrastructure already exists.

There is enormous scope to develop new domestic air routes in Indonesia, because 70 of the country's 180 airports, with paved runways, currently have no scheduled passenger services.

ATR discovered the new economically-viable air routes using its proprietary MobilityMonitor platform which identified the travel patterns of 35 million Indonesian residents. This group – a representative sample of the broader Indonesian population – did 780 million inter-city journeys in a year.

These journeys involved various types of transport, including: cars, motorbikes, buses, ferries, trains and planes. Around 90 per cent of these journeys were 100 to 800 kilometres, a range perfectly suited to turboprops like ATRs.

GE AEROSPACE ADVANCE NEW SERVICES TECHNOLOGIES

August 18, 2026 – GE Aerospace announced that engineers at its Bengaluru technology centre are helping advance and scale new services and maintenance technologies that improve engine durability, reliability, and time on wing for customers worldwide.

This includes supporting global deployment of 360 Foam Wash across MRO shops, expansion of AI-enabled inspection technologies, and continued progress in durability testing for engines operating in harsh environments. Teams in Bengaluru are also advancing next-generation propulsion technologies, helping mature the CFM RISE programme and hybrid-electric propulsion.

US FAA CERTIFIES NEW BOEING 737-7 AIRPLANE

August 3, 2026 – The US Federal Aviation Administration has granted Boeing an amended type certificate for the new 737-7 airplane, clearing it for commercial service. The smallest and longest-range member of the 737 MAX family, the 737-7 model serves an important market segment by offering 135 to 160 seats (in a two-class configuration) while providing about 10 per cent more range potential than its siblings. Like other 737 MAX jets, the 737-7 reduces fuel use and CO₂ emissions by 20 per cent and noise footprint by 50 per cent compared to the airplanes it typically replaces.

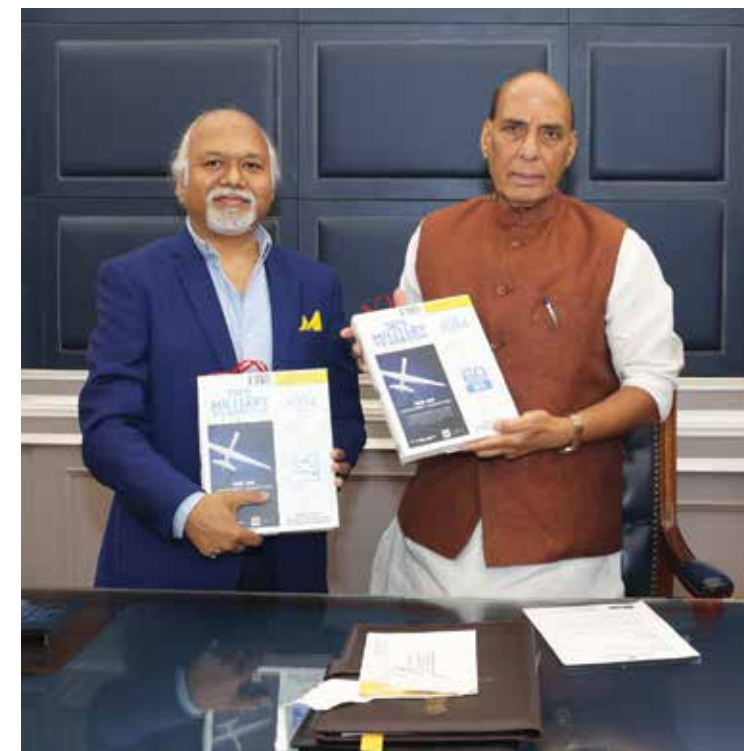
AKASA AIR AND BPCL SUCCESSFULLY OPERATE COMMERCIAL FLIGHT USING SAF

September 9, 2026 – Akasa Air successfully operated a commercial flight using conventional aviation turbine fuel blended with 1 per cent Sustainable Aviation Fuel (SAF), supplied by Bharat Petroleum Corporation Limited (BPCL). The initiative builds on the Memorandum of Understanding signed by Akasa Air and BPCL in July 2026 to explore adoption of SAF, along with other opportunities supporting aviation decarbonisation. The flight will provide both organisations with insights and practical learning that can help inform future initiatives.

The flight comes as India works towards its ambition of achieving 5 per cent SAF blending by 2030 and reflects the aviation industry's broader focus on reducing carbon emissions. It also contributes to the International Air Transport Association's goal of achieving net-zero carbon emissions by 2050. ●

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Mr Jayant Baranwal, Chairman & Managing Director and Editor in Chief of SP Guide Publications presented copies of SP's Military Yearbook to H'ble Defence Minister Shri Rajnath Singh at his office. Honorable Defence Minister was full of praise for SP's Military Yearbook as well the journey of SP Guide Publications (founded in 1964). Also warmly appreciated the bouquet (of publications) which consists of wide-ranging and varied focus-based publications by SP Guide Publications.

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