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A stretch in time

It seems ramping up single-aisle output is not enough of a challenge for Airbus, with chief executive Guillaume Faury backing the development of a third and largest A220 variant

Airbus

Airbus might not have a stretched A220 on its drawing board yet, but given the frequency with which the so-called ‘-500’ is mentioned at the airframer’s briefings, there is a sense that the aircraft is practically being willed into existence by journalists, investors and perhaps one or two airline customers.

The ‘A220-500’ designation has never been official; its origins lie in an abandoned ‘Bombardier CS500’ trademark filed in 2009, and dropped in 2014, several years before Airbus took over the Canadian company’s CSeries programme.

But it seems nevertheless to have stuck. Chief executive Guillaume Faury referred to the A220-500 during a recent capital markets event, indicating that its addition would turn the A220 into a “powerful” family – arguably the strongest endorsement of the hypothetical aircraft to date.

That the A220 has emerged victorious in its clash with the A319neo is beyond doubt. As the CSeries it had secured twice as many orders as the Airbus jet even before the

acquisition – despite the European airframer’s attempt to dismiss the CSeries as being a serious contender. With Airbus’s backing, the now-A220 has recorded more than 770 orders, eclipsing its rival.

The A319neo was born disadvantaged, not only by its development as a shrink but also by the trend for Airbus single-aisle customers to shift the interest fulcrum beyond the A320neo and towards the higher-capacity A321neo.

But even though the A321neo is outselling its smaller sister, the A320neo backlog is hardly a concern, except in the sense that Airbus cannot build the jets fast enough, and it is likely to adopt the “ain’t broke, don’t fix it” approach towards replacing its ubiquitous twinjet.

That effectively leaves the A220-500, likely to slot into the 140- to 170-seat segment, as a solution looking for a problem, unless Airbus finds sufficient rationale to juggle the overlap between two similar-sized aircraft.

Airbus’s development of the A321neo into a sub-family including the LR and XLR could signal a gradual separation of its single-aisle

line-up. If the A320neo’s slide into second place starts turning into a relegation, the A220-500 seems the obvious consolidation route for the lower end of its range – particularly given Faury’s assertion that the A220 “needs” the stretched aircraft to underpin its family potential.

But A320neo deliveries remain strong as Airbus seeks to ramp up single-aisle output to record rates, and the airframer – still focused on the A321XLR certification task – has other A220 priorities to address before embarking on the complexity of developing a new variant.

While it emerged relatively unscathed from the pandemic-driven production-rate upheaval, the A220 programme remains loss-making and Airbus is striving to bring down costs, take monthly production to 14 aircraft, and achieve break-even by the middle of the decade.

Which means the A220-500 will probably be an aircraft in name only for the time being, and Airbus will have to keep repeating its “when, not if” mantra to persistent audiences until possibility turns into necessity. ▀

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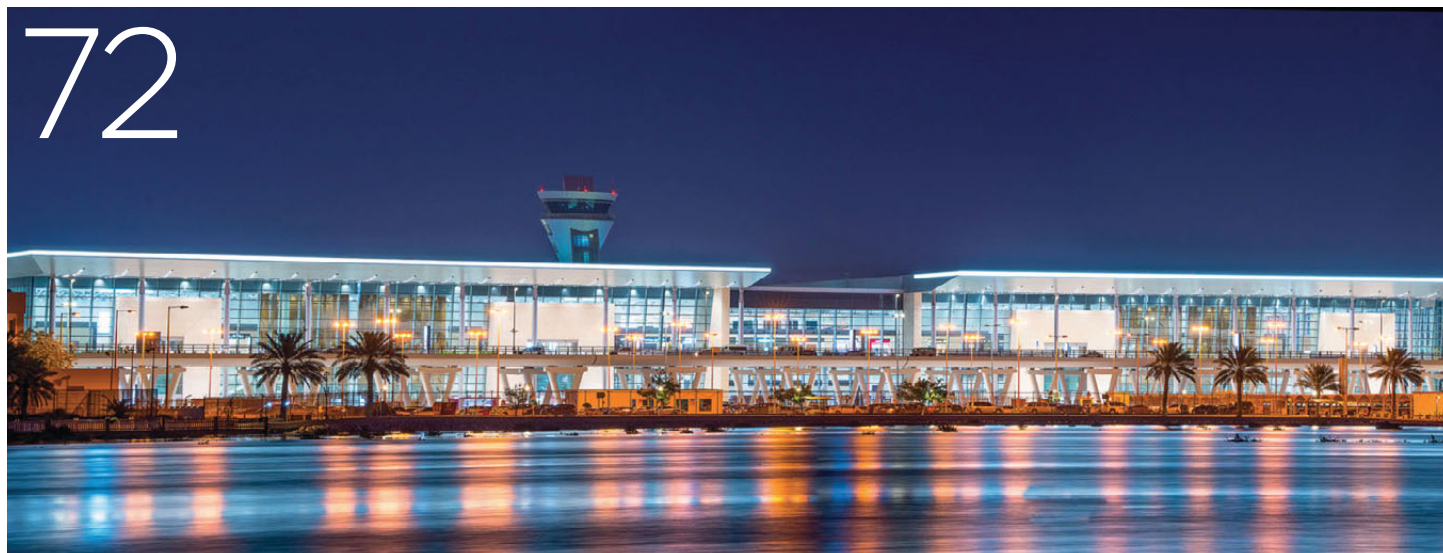
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Jon Hemmerdinger Tampa
Pilar Wolfsteller Las Vegas

Boeing appears set to miss a critical December deadline to secure certification for its 737 Max 7, after it was late in providing some supporting assessments to the US Federal Aviation Administration (FAA).

The FAA brought the issue to Boeing's attention in a 19 September letter to Mike Fleming, the airframer's senior vice-president of the 737 Max's return to service, according to a Reuters report.

"As you are aware, the FAA communicated that Boeing must turn in all remaining System Safety Assessments (SSAs) by mid-September if the company intends to meet its project plan of completing certification work (and receiving FAA approval for this airplane) by December 2022," says the letter, signed by FAA executive director of aircraft certification Lirio Liu.

As of 15 September, the FAA had accepted about 10% of the Max 7 assessments and was reviewing another 70%, the letter says.

"Most concerning, however, is that Boeing has yet to provide an initial submittal for six of the outstanding SSAs," it adds. "We expect many of these documents will take significant time to review due to their complexity and bearing on the overall safety of the new aircraft."

20%

Percentage of Max 7 System Safety Assessments not yet approved or in review by the FAA as of 15 September

Additionally, Liu's letter cites "continuing" discussions between Boeing and the FAA "about realistic timeframes for receiving the remaining documents".

Boeing had been working to get the Max 7 approved before a December deadline after which newly certificated aircraft will require a type of modern cockpit alerting system currently absent from the narrowbody. The company is also working to certify the Max 10 sometime after the Max 7.

Boeing says it "is focused on meeting all regulatory requirements

Max variants to miss certification cut-off

Federal Aviation Administration indicates that approval process for smallest and largest family members cannot be completed before December target, because of incomplete data



Boeing

Boeing will have to install a flightcrew alerting system on its Max 7 if key deadline is passed

to certify the 737-7 and 737-10, and safety remains the driving factor in this effort".

"We will continue to prioritise being thorough and transparent in our documentation and interactions with the FAA, and following established processes to ensure safety and compliance above all else," the company adds.

The FAA will "maintain sufficient staffing to complete the necessary safety reviews in a timely manner", the agency's letter states. "But such work must be completed deliberately and in such a way that

an arbitrary calendar date does not become the driving factor."

The cockpit alert requirement comes from a law, stemming from two fatal Max 8 crashes, signed by then-President Donald Trump on 27 December 2020. Starting two years after its enactment, the FAA cannot certificate transport aircraft lacking a "flightcrew alerting system".

As recently as 21 September, Boeing chief executive David Calhoun had said he thought the Max 7 would make the December deadline.

Meanwhile, the Allied Pilots Association (APA) union, which

Delta Air Lines, which has 100 Max 10s on order, says it has discussed an alternative 'plan B' arrangement with Boeing



Delta Air Lines

represents pilots at American Airlines, has revealed its opposition to any request for an equipment certification exemption for the Max 7 and Max 10 models.

Flightdeck reality

According to a separate letter from the FAA to a federal government committee, Boeing does not expect to receive approval in time.

"We oppose any extension of the exemption and don't agree with Boeing's claim that pilots could become confused when moving from an airplane without the modern alert system to one that is equipped with it. Nothing could be further from our flightdeck reality," says APA president Edward Sicher.

"Boeing needs to proceed with installing modern crew-alerting systems on these aircraft to mitigate pilot startle-effect and confusion during complex, compound system malfunctions," he adds.

"Once these systems are installed and pilots have been properly trained on them, our crews will be better able to identify system failures and prioritise corrective actions that could save lives."

According to Cirium fleets data, Fort Worth-based American has no pending orders for either the Max 7 or Max 10. The carrier currently operates 42 Max 8s, and has a further 87 on order. It also operates 279 examples of the previous-generation 737NG series.

American's major airline competitors, however, have almost 500 of the two new models on order. United

51

Number of deliveries made by Boeing in September – up from 35 in August – and including 36 Max-family aircraft

Airlines has 237 and Delta Air Lines has 100 of the Max 10 on order, and Southwest Airlines has orders for 160 Max 7s. In recent months, Qatar Airways (25) and Canada's WestJet (42) have also placed substantial orders for the Max 10.

For its part, Delta is still counting on the US aviation regulator to certify the Max 7 and Max 10 without requiring extensive and expensive cockpit modifications.

Alternative needed

However, the Atlanta-based carrier said on 13 October that it also has discussed an alternative plan with the airframer.

"There is a plan B, and when we made the decision to buy the [Max] 10 we had a lot of conversations with Boeing because it's a big part of our capacity and we want to make certain that we are not going to be left without an alternative," says Delta chief executive Ed Bastian.

"We are not talking about [plan B] right now, but we remain optimistic that it will get certificated," Bastian adds.

No details of the back-up plan have been disclosed, but it is likely to involve an order for the smaller, but already certificated Max 9.

Meanwhile, Boeing ramped up its aircraft deliveries and logged a solid month of orders in September, handing over 51 jets and securing deals for 96.

Up from 35 the previous month, the shipments total included 36 Max-family aircraft, and seven 787s. The orders total included 51 Max-family aircraft, among them the 42 for WestJet.

By the end of September, Boeing had so far this year delivered 328 aircraft, received orders for 542 and logged 114 cancellations. ■

Mongolian -8 service first to use Chinese airspace since grounding

Alfred Chua Singapore

A Boeing 737 Max was flown in Chinese airspace for the first time in more than three years on 10 October, amid continuing uncertainty over the type's return to service with China's carriers.

According to flight-tracking data, a 737 Max 8 operated by MIAT Mongolian Airlines (EI-MNG) left the Mongolian capital,

Ulaanbaatar, at 04:40 local time, flying southeast over mainland China on a commercial flight before landing at Guangzhou at around 08:18 local time. The twinjet returned to Ulaanbaatar later the same morning.

While China has lifted an operational ban on the 737 Max, its airlines have yet to indicate when they might return the type to the skies. The country's three largest airlines have also omitted

the type from their delivery plans until the end of next year.

Regulators, including from the Civil Aviation Authority of China, and Boeing representatives met in Zhoushan on 14 September to discuss the 737 Max, potentially setting the stage for type's return to service in the country.

Cirium fleets data indicates that Chinese airlines have taken delivery of 102 examples of the Max, with another 229 on order.

Mach 1.7 performance from 2029 hinges on support from a powerplant developer



CFM will not RISE to supersonic challenge

Propulsion specialist's chief executive rules out involvement in Boom's Overture programme, instead keeping focus on delivering "step-change" in emissions and fuel performance

Boom Supersonic

Pilar Wolfsteller Buenos Aires

GE Aviation and Safran Aircraft Engines joint venture CFM International will not step into the supersonic engine game, the company's chief executive says.

Speaking in Buenos Aires on 16 October, ahead of the ALTA AGM & Airline Leaders Forum, Gael Meheust ruled out a potential supersonic engine programme. CFM's current focus is elsewhere, and trying to develop an entirely new class of aircraft engine would only be a distraction, he says.

"We are focusing on developing an engine that will be a step change in emissions and fuel performance," he says. "We are committed to doing it full-speed and it doesn't open an opportunity to do something else for what is potentially just a niche market."

Meheust was referring to the company's RISE – or Revolutionary Innovation for Sustainable Engine – programme, launched in 2021. Its goal is maturing technologies for a new powerplant to enter service in the mid-2030s that promises to deliver a 20% fuel saving over current narrowbody engines.

Flight tests involving an open-rotor demonstrator using Airbus's

'Flightlab' A380 (MSN1) will be conducted in the second half of the decade from the airframer's Toulouse site. Ahead of that, CFM will perform engine ground tests and flight-test validation work at GE's site in Victorville, California.

The companies also plan to later test a hydrogen-fuelled engine, based on GE's Passport powerplant, aboard the Flightlab platform.

Meheust's comments came just weeks after UK engine maker Rolls-Royce pulled back from a potential collaboration with US developer Boom Supersonic, putting the start-up company in

a bind. Boom is developing the Overture, a four-engined airliner it says will carry 65-80 passengers, fly at Mach 1.7 and have range of 4,250nm (7,870km).

A third engine manufacturer, Pratt & Whitney, declines to comment on the Overture programme, but in September said that supersonic civil aircraft were only "tangential" to its core engine market.

So far, both United Airlines and American Airlines have committed to buying the Overture, while Japan Airlines and Virgin Group have placed what Boom calls "pre-orders". United announced last year that it would take 15 examples, while American said in August 2022 that it had "paid a non-refundable deposit on... 20 aircraft".

But Meheust says the supersonic airliner sector is not likely to be large or profitable enough to warrant long-term engineering or financial effort from CFM.

"Is there a market for supersonic? Maybe," he says. "But I don't see that that market is significant enough to divert investment to a supersonic engine."

R-R had on 7 September announced the end of its relationship with Boom, stating that, following the completion of engineering studies, it had "determined that the commercial aviation supersonic market is not currently a priority for us".

Denver-based Boom stated at the time that its programme remains on track to deliver a first Overture for passenger service in 2029, adding: "Later this year, we will announce our selected engine partner and our transformational approach for reliable, cost-effective and sustainable supersonic flight." ▶

Open-rotor demonstrator engine will fly on Airbus's 'Flightlab' A380



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A new chapter for Honda Aircraft

Manufacturer's incoming chief executive outlines plans for its next phase of growth, including a successor to the HA-420

Jon Hemmerdinger Orlando

Honda Aircraft's new chief executive, Hideto Yamasaki, arrived at the NBAA show in Orlando in charge of a company he describes as poised to begin a second phase of expansion; a move likely to be spearheaded by the development of a new and larger business jet.

Yamasaki has joined an airframer which has spent the past 20 years carving itself a respectable niche in the ultra-competitive business aviation market.

During those first two decades, Greensboro, North Carolina-based Honda Aircraft developed, certificated and brought to market its HA-420 HondaJet – all under the leadership of visionary former chief executive Michimasa Fujino, an engineer by training.

Things changed earlier this year when Fujino retired, to be replaced in April by longtime Honda executive Yamasaki.

Now, backed by decades of business and sales experience, he aims to revive the company's finances and drive development of the conceptual HondaJet 2600, which is to replace the HA-420.

"I'm concentrating on the 2600," Yamasaki tells FlightGlobal. "We are currently moving into the next phase of this company."

Fujino was the father of Honda Aircraft and its six-passenger HA-420. He envisioned the aircraft's design – with its distinctive over-wing engines – in 1997, then guided Japanese-owned Honda Aircraft through the jet's development.

The aircraft first flew in 2003, but the programme struggled to reach the finish line: development dragged on for 12 years, with US Federal Aviation Administration certification obtained in

2015. It is powered by twin 2,050lb (9.1kN)-thrust HF-120 engines made by GE Honda Aero Engines, a joint venture.

Fujino "created this HondaJet and the Honda brand in the aviation industry", Yamasaki says. "This company made it through alone, not with partners."

Some 225 HA-420s are now flying, and although Honda Aircraft declines to specify the number of aircraft in its backlog, the figure equates to about two years of production, it says.

In recent years, output stood at two to three jets monthly, though this has recently slowed amid the same supply-chain struggles that have hamstrung other airframers.

Honda Aircraft has repeatedly rolled out updates to the HA-420, including its Elite S variant in 2021 and, now, the Elite II, revealed at NBAA (see box, right).

Financial results

Despite technical successes, the airframer's financial results have lagged; Honda's aircraft and aircraft engine business lost ¥3.8 billion (\$25.5 million) in the company's most recent fiscal quarter, which ended in June.

But Yamasaki aims to change that. The Japan-born executive joined Honda in 1985, spending most of his career working in various countries for its automotive division. He has led Honda's operations in Ukraine and Turkey and was general manager, and then senior vice-president of sales, for its Americas unit.

"I was raised... [on] the business side," Yamasaki says. "I'm a sales-oriented guy."

"I'm delegating many things [to my team], which hasn't been the kind of culture previously. I'm not a superman"

Hideto Yamasaki Chief executive, Honda Aircraft

BillyPix

Honda Aircraft



Latest variant extends HA-420's range to 1,550nm with four people on board

Elite II updates enhance HondaJet's appeal

Honda Aircraft has unveiled enhancements to its HA-420 HondaJet, with the new Elite II variant gaining more range, a redesigned spoiler, and several cabin upgrades.

In addition, it plans to bring new automated cockpit technologies to the HondaJet in 2023, including auto-throttle and auto-land capabilities, the airframer said on 17 October.

"The HondaJet Elite II is the fastest, highest and furthest-flying aircraft in its class, achieving a whole new level of performance that redefines what it means to be a very light jet," the company says.

Fuel capacity grows on the Elite II, with maximum take-off weight also rising to 5,035kg (11,100lb), from 4,940kg on the previous-generation Elite S, which was introduced in 2021.

The changes extend the type's range to 1,550nm (2,860km) with four people on board – a 110nm increase over the Elite S.

HondaJets can carry up to seven passengers, cruise at 422kt (782km/h) and reach an altitude of up to 43,000ft.

Other updates for the Elite II include new spoilers to accommodate the jet's increased weight,

"optimising take-off and landing field performance", the company says.

"The HondaJet Elite II once again pushes the boundaries of its category on all fronts of performance, comfort and style," says Honda Aircraft chief executive Hideto Yamasaki.

Additionally, the Elite II will be offered with two new cabin designs, complete with updated materials and colours.

Next year, Honda Aircraft intends to roll out two new avionics capabilities for the HondaJet's Garmin G3000-based cockpit.

In the first half of 2023, the Elite II will gain an autothrottle, followed by an emergency autoland system, to be offered by year-end, which will "autonomously control and land the aircraft without human intervention" in case of pilot incapacitation.

The company is also offering the type with a "stabilised approach" feature, providing pilots "with aural and visual alerts" to enhance landing safety.

"This direction encapsulates the continuous effort to improve the HondaJet through automation, augmentation and situational awareness technologies," Honda Aircraft says.

While Fujino brought HondaJet to its present position, Yamasaki says the company now needs a leader with strong business experience – someone to fix its finances and guide it into a future that lies not with the HA-420, but with its next jet, the larger 2600.

"We have to have another story. This 2600 will be our next story," Yamasaki says. Honda Aircraft's latest HA-420 updates might be "the ending story" for that type.

Honda Aircraft unveiled the 2600 concept in Las Vegas at last year's NBAA event. The aircraft will be capable of carrying 11 people, including up to two pilots, cruise at 450kt (834km/h) and have sufficient range to fly across the continental USA.

The company describes the aircraft as the "first-ever trans-continental light jet" and the "longest-range single-pilot business aircraft".

Those credentials would place the 2600 at the upper end of the light-jet segment, with capabilities knocking on the door of the mid-size category, Yamasaki says.

New competitor

It would seemingly compete with types such as Embraer's Phenom 300E (carrying 10 passengers up to 2,010nm), Cessna's Citation CJ4 (10 passengers/2,165nm) and the Citation Latitude (nine passengers/2,700nm). Like the HA-420, the 2600 will have twin overwing engines and be produced at the company's Greensboro site.

Honda Aircraft has not yet launched a formal 2600 development programme, nor specified a timeline for the jet's arrival. But it is talking with suppliers about the project, and Yamasaki says its ambitions in the space are genuine.

"We are quite serious. We just cannot announce it today," he says.

"This concept – the 2600 – is to be [an] extended version of the 420."

Yamasaki says Honda Aircraft has a sufficiently large customer base to support development of the successor and that they have been asking for a longer-range jet.

He also says his team's experience developing the HA-420 leaves it well positioned to think bigger: "We have learned through the [HA-420] process of development and certification. We want to fully utilise that experience."

Crucially, Honda Aircraft has sufficient financial backing from its parent for the programme.

Yamasaki describes himself as a skilled manager, saying he has surrounded himself with a strong team of sales, finance and strategic leaders.

"I'm delegating many of the things for them, which hasn't been the kind of culture previously," he says. "I'm not a superman." ▶

What's next for Nexus

Textron's advanced air mobility division outlines intended design for long-planned vertical take-off and landing vehicle

Dominic Perry Orlando

After more than a year of silence, Textron eAviation has revealed the proposed design of its Nexus electric air taxi and plans to start building the initial prototype next year.

But despite offering a first glimpse of the size and shape of its urban air mobility vehicle at an NBAA show press conference, the airframer is in no rush to bring Nexus to market, foreseeing service entry around 2030 – at least five years behind some of its peers.

Originally conceived by sister company Bell in 2019, Nexus was first envisaged as a small hybrid-electric vehicle with six tilting ducted fans to provide lift and forward thrust. That then morphed into a full-electric aircraft, with two fewer ducted fans and a small wing to provide lift in forward flight.

But the latest iteration of Nexus – the first to be disclosed since the project transferred into Textron eAviation in 2021 – is a far cry from either of those designs: gone are the ducted fans, to be replaced by two fixed rotors mounted on the aircraft's twin tail-booms, augmented by four tilting rotors on the wing.

And, whereas the earlier designs were relatively compact, the new Nexus has grown substantially: it has a 15m (50ft) wingspan and a maximum take-off weight (MTOW) in the region of 3,630kg (8,000lb) – up to 910kg heavier than previously.

Despite the size, the vehicle is designed to carry three passengers plus a single pilot on journeys of up to 100nm (185km) at a cruise speed of 120kt (222km/h).

But not only is the Nexus now bigger than its forebears, it is also larger than the electric vertical take-off and landing (eVTOL) designs being touted by both start-ups and aerospace giants – many of which are intended to offer similar, or better, performance and arrive on the market much sooner.

Assembly of the initial prototype is due to begin next year at Textron eAviation's site in Wichita, Kansas, leading to a first flight "in the next couple of years", says chief executive Rob Scholl.

Safety threshold

He says the redesign of the Nexus was driven by the fact that "ultimately we have to meet a certain flight safety and economic thresholds for our customers".

"Our bigger aircraft is largely a result of what we think is a pragmatic view of where battery technology is and where it's going, [plus] the systems you have to wrap around it, given the experience we have with Pipistrel," he says, referring to the Slovenian light aircraft manufacturer that was acquired by parent company Textron in April and which now sits in the eAviation business.

"If you look at the aircraft structure, ours is going to be a little bigger – that reflects our experience with crash-test requirements and

fatigue testing, to meet the standards of passenger travel."

Passenger comfort has also played a part in the aircraft's growth, Scholl adds. He says the larger cabin may help customers come to terms with flying in a new kind of aircraft.

Scholl is also unconcerned that the Nexus will be later to market than aircraft being developed by its rivals: for example, Vertical Aerospace intends to have its four-passenger VX4 enter service in 2025, while Airbus is working to a 2026 target for its CityAirbus NextGen.

"We think our design reflects a realistic aircraft that will ultimately be successful in the marketplace. So, while some people might be able to get to the market a little bit earlier, we think we are building a pragmatic aircraft that will work in the marketplace for our customers."

He points out that significant hurdles remain to be overcome before such vehicles can enter the market at any scale, including regulatory, infrastructure, public acceptance, and technological issues.

On top of this, there are economic considerations for both manufacturers and operators, he says, notably around the pace of battery development and industrialisation.

"That affects both the manufacturing of the aircraft and the end operation. If it's wildly expensive to replace a battery system every six months because we are not building enough of these cells, then that's an issue," says Scholl. ▶

See p36



Current proposed design has 15m wingspan and MTOW of 3,630kg

Eco Caravan is among types covered by new collaboration



Tamarack winglets ready to soar

Company signs pact with Ampaire to offer Performance Smartwing update on range of hybrid-electric conversions, as it eyes system's potential as modification for A320ceo

Jon Hemmerdinger & Dominic Perry
Orlando

I daho-based Tamarack Aerospace is partnering with Ampaire to offer its active winglets across a range of aircraft types being converted to run on hybrid-electric power, and also is eyeing the Airbus A320ceo as a potential platform for its technology.

Tamarack is now offering its Performance Smartwing winglet system on Ampaire conversions of Beechcraft King Airs and several other aircraft types, including the Cessna Caravan and De Havilland Canada Twin Otter, the companies announced at the NBAA show on 17 October. Full details have yet to be finalised under their memorandum of understanding, including whether the modification might be standard or optional on Ampaire's platform updates.

The Performance Smartwing system involves composite winglets mounted on wing extensions, which are equipped with "automatically" deployed control surfaces.

The technology, which Tamarack has long offered on Cessna Citation CJ-series business jets, "smooths flight", alleviates loads and improves efficiency, the company says.

"Joint development work has already commenced, with analysis validating synergies between Tamarack's Performance Smartwing... and Ampaire's hybrid-electric propulsion technology," the companies say. The upgrade "will offer customers the option of further

enhancing performance and operating-cost savings", they add.

"Tamarack's technology is a great match with Ampaire's hybrid-propulsion system," says Ampaire chief executive Kevin Noertker.

The Los Angeles-based company has been developing novel propulsion systems for several years, and expects to perform a first flight with its hybrid-electric Eco Caravan conversion within the coming weeks.

Some 170 Cessna CJ-series jets have Tamarack's winglet system installed, and the company is now working to bring the technology to the King Air. It is testing both the 200 and 350 variants of the twin-turboprop fitted with the modification and says it is close to landing three customer orders, with certification expected within one or two years.

Scaling up

Additionally, Tamarack says it is in discussions with the US military about adding its winglets to Lockheed Martin C-130 tactical transports, and is discussing an order with a European client covering the modification of A320s.

"Scaling up the [active winglet] technology is not rocket science," notes Tamarack chief executive Nick Guida.

For the wing fence-equipped A320ceo, Tamarack's current design features a 1.8m (6ft) extension to each wing, plus a 2.4m-high winglet, although these dimensions may still change as it works through the definition phase with potential customers, Guida says.

He forecasts a potential fuel-burn saving of 10-15%, depending on how the aircraft is operated.

Tamarack hopes to begin flight testing a prototype of the modification in around nine to 12 months, leading to supplemental type certification approval within two to three years.

It will deliver the upgrade through a separate joint-venture company, which will include aerostructures manufacturers, MRO providers and lessors, Guida says. That consortium is currently being pulled together, "and the goal is to have it formed by the end of the year".

Airbus has also been approached to gauge potential interest, but Guida says the airframer's participation is not required for the project to go ahead. The two had considered collaborating on a similar proposal last decade, but talks foundered on intellectual property issues.

"Once the consortium is built, we expect to be able to go back to Airbus with more firepower and we will have a better chance of talking to them," Guida says.

The European airframer already offers its own Sharklet design as an upgrade for the A320ceo.

Ultimately, Guida thinks, Tamarack will be able to emulate the success that Aviation Partners Boeing has had on the 737NG, where market penetration for its Blended and Split Scimitar winglets is in the region of 95%.

"We are excited about this because even a little piece of this pie is huge for a company like ours," Guida says. ▶

Crew applied correct power setting
when aircraft reached height of 250ft



Startled pilot forgot to set take-off thrust

Jet2 crew involved in December 2021 event departed Finnish airport using only 70% of available power, after insufficient braking force had been applied during engine run-up test

David Kaminski-Morrow London

Investigators have determined that a Jet2 Boeing 737-800's unexpected forward movement during an engine run-up startled the first officer, who then omitted to set full take-off thrust.

The run-up to 70% N1, intended to clear any ice from the engines, was carried out after the jet had lined up on runway 12 at Kuusamo airport in Finland on 1 December 2021. But while the aircraft was supposed to be held on the toe-brakes, only 600-700psi of brake pressure was applied, when some 1,000-2,000psi would have been necessary.

Some 12s after the brakes were applied, as the engines were increasing to 70% N1, the aircraft began to move forward.

The crew had previously agreed that, should this occur, they would release the brakes and continue the take-off roll.

According to the UK Air Accidents Investigation Branch, the first officer felt the 737 start to "slide and yaw" and was "startled" by the movement as well as

the proximity of snow banks next to the runway.

Standard procedures for the carrier require the first officer to press the take-off/go-around thrust button, and then remove their hand from the thrust levers. The captain should then place their hand on the levers for the take-off roll.

But owing to the unexpected aircraft movement, the first officer forgot to push the button, and the jet accelerated with just 70% N1 thrust – rather than the 89% calculated for the departure from runway 12's intersection A.

Cockpit distraction

The captain was distracted by a radio transmission and neither pilot checked the thrust setting.

Flight-data recorder information shows the jet reached the V1 decision speed with just over 1,500m (4,290ft) of runway remaining and was airborne 400m from the end.

"Both pilots reported that something was not right during the take-off but, at the time, neither could resolve what was wrong," says the inquiry. "They felt the acceleration and the cadence of the take-off was slightly slow but thought this

might be due to the runway contamination. The feeling was not compelling enough for them to abort the take-off."

The aircraft (G-JZHL) climbed away slowly until the crew realised, at a height of about 250ft, that the thrust was insufficient and applied the correct power setting.

No passengers were on board the 189-seat 737, and the two pilots and four cabin crew were not injured. The aircraft landed without further incident at London Stansted, but the length of the sector meant the 2h cockpit-voice recording was overwritten.

The inquiry says Jet2 took several steps to increase safety following the event, including monitoring of data to detect issues with brake pressure during engine run-up, introducing run-up with distraction into simulator checks, updating procedures and highlighting the importance of applying sufficient braking.

Investigators note that the first officer, while subsequently trying out brakes in a simulator, found that the pedals had "significantly more travel" than he had previously been using. ■

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Faury 'relaxed' on revised ramp-up

Despite continuing supply chain concerns, Airbus chief is confident about increasing A320neo-family output

David Kaminski-Morrow London

Airbus chief executive Guillaume Faury remains confident about the A320neo-family ramp-up, having shifted the trajectory for achieving a monthly production rate of 65 aircraft.

Speaking during an Aviation Club event in London on 12 October, Faury insisted the ramp-up was a "credible plan", despite continuing supply chain issues.

In July the airframer pushed back the schedule for reaching the 65-per-month rate by six months, to early 2024.

"Early 2024 is the best assessment we have," says Faury, adding that he was "relaxed" about the ramp-up, even though returning to pre-crisis levels of production "takes a lot of energy".

Faury acknowledges the company has "a lot on [its] plate this year", particularly for the final quarter.

But he states that the situation is "not a lot different" from that which Airbus has faced in each of the years from 2017 to 2019.

Airbus is aiming to deliver 700 aircraft this year, and had achieved 437 at the nine-month point of 30 September - equating to 62% of the total.

The airframer had previously reached similar levels of 63%

in 2017 and 2018, years when it delivered a total of 718 and 800 aircraft, respectively.

This back-loading weight eased slightly in 2019 when, at the nine-month mark, the airframer had delivered 66% of its full-year total of 863 jets.

While he admits returning work-force levels in the industry to pre-crisis levels has "proven to be difficult", Faury also believes the further ramp-up plan, to a monthly output of 75 A320neo-family air-

700

Aircraft Airbus aims to deliver this year, having achieved 437 - 62% of this target - at the nine-month point

craft in 2025, is a "good target" and "likely to happen" despite continuing concerns from suppliers, notably engine manufacturers.

Briefing analysts in late September, Faury said the airframer still had some 26 or 29 "gliders" - completed aircraft still awaiting engines - at the end of the first half.

But this has been "reduced to single digits" he says, adding: "A lot of engines were coming over the summer, engine makers have fulfilled commitments in the last weeks.

"So we've seen, very quickly, a change," Faury says.

He adds that he does not know exactly when the supply chain situation will normalise. While some estimates have indicated mid-2023, others are more conservative and suggest the whole year will be affected.

Faury says the airframer is still procuring titanium from Russian supplier VSMPO, which is trading without sanctions, but he says that preparations are being laid to tap alternative sources.

"We're moving forward to be able to be immune from anything that would happen," he says.

But he adds: "A world without Russian titanium is not a world as good as it is today in aerospace."

Faury says an inability to use this source would be a "pure lose-lose situation", but that Airbus is "preparing for that scenario".

Additionally, Faury is optimistic of near-term return to widebody aircraft demand, but remains cautious given the sensitivity of the sector to disruption.

Although single-aisle aircraft orders have come back in "very large numbers" - as illustrated by recent agreements with Chinese carriers - widebody sales have remained subdued. However, he sees that as beginning to change.

"It's starting, slowly but surely, on widebodies as well," Faury says. "It's

'Powerful' potential in expanding A220 family

A stretched A220 is necessary to turn the twinjet into a strong product family, Airbus chief executive Guillaume Faury has signalled to investors.

Speaking at a capital markets event on 23 September, Faury said the A220-500 - as the possible stretch has been loosely dubbed - "makes a lot of sense for us, at a certain point in time".

Airbus currently manufactures the Pratt & Whitney PW1500G-

powered A220-100 and the larger -300 variant, which accommodate up to 135 and 160 passengers, respectively.

"I think [the A220] needs the -500 to be a powerful product range," says Faury. "That's what we hear from airlines as well.

"The -300 is a very good [aircraft]. The potential of the -500 is probably even stronger."

As of end-September, Airbus had booked total orders -



Manufacturer is yet to achieve break-even on A220 programme



Airframer aims to boost narrowbody assembly to 65 per month by early 2024

probably telling us that there will be a moment when widebody orders will probably come, big time, and that's probably not very far out."

He says there are "lots" of campaigns in progress, and insists there is "life in the body".

"The body will be up and strong, and running fast, in my perspective, quite soon," he adds.

Fauray says the reduction in production rates has resulted in a deeper backlog on widebodies, giving the company "a lot of visibility".

The airframer achieved break-even on A350 production in 2019, before the onset of the pandemic, and Airbus has been aiming to repeat this, despite having halved the output to five aircraft per month.

Lower rates

"I don't want to be ahead of myself but we're very close to reaching break-even on the A350 at lower rates," says Fauray.

While single-aisle activity is robust, he says, the demand

situation with widebodies continues to be sensitive.

"You can change a lot of things in the world, and come to conclusion that [single-aisle aircraft] will remain a supply-constrained market," says Fauray. "It's very different from widebodies."

"We have to wait to see [if the widebody recovery happens] to be sure it's coming."

"We want to be prepared," Fauray concludes. "I think it's more likely to come than not." ▶

including those inherited from Bombardier – for 773 A220s: 96 -100s and 677 -300s.

Fauray says he sees the opportunities presented by an expanded A220 line-up "going quite high".

But he stresses that Airbus "still has a lot of work to do" on the A220 programme before it can consider embarking on producing a -500 variant.

Airbus is still trying to achieve break-even on the A220. Fauray says the company is "on

trajectory" for reducing costs on the programme, while ramping-up from a monthly rate of six to 14 aircraft by mid-decade.

An additional consideration would be the impact of an A220-500 variant on the A320neo family's backlog.

Airbus will likely remain sanguine about the effect on the 160-passenger A319neo: the shrink variant has never sold well, with total orders – including those for the corporate jet variant – totalling just 85 at 30

September. To put that figure into context, it is not even 1% of the total orderbook for A320neo-family jets.

And although the A321neo now represents the bulk – 60%, or 3,689 aircraft – of Airbus's undelivered Neo backlog, the airframer will still be cognisant of any potential cannibalisation of the 2,331 orders for the A320neo that are still to be handed over.

Additional reporting by Dominic Perry in London

C919 has long march ahead

Certification of Comac's new narrowbody is an important step for China, but the twinjet still faces many obstacles

Alfred Chua Singapore

The certification of Comac's C919 narrowbody – announced in time for China's National Day celebrations in early October – has been hailed by commentators in the country as a major milestone for the domestic aerospace industry, and a source of immense national pride.

Yet it is only the start of the long journey for the Shanghai-based airframer, one that is overshadowed by a slowing economy and, crucially, rising geopolitical tensions.

On 29 September, a rather low-key – by Chinese standards – certification ceremony took place in Beijing, more than five years since the C919's first flight in May 2017.

However, it took another 24 hours after the certification, images of which were circulating on social media, for China to officially disclose the news, a period notable for the unusual silence from state media and the airframer.

But as Comac – and to an extent, China – revels in hitting a milestone for a programme it hopes will one day rival the Boeing 737 Max and Airbus A320neo family, it must nonetheless confront a number of uncomfortable realities.

For one, the airframer now has to build up its C919's orderbook, or risk the programme being a flash in the pan.

China Eastern is the launch carrier, but to date is also the only firm customer, though Comac is always quick to point out that it also holds hundreds of more tentative commitments. The first C919 is expected to be handed over this year, the airframer states, but with China Eastern only holding five firm

orders, deliveries could, in theory, be wrapped up by 2023.

But the challenges do not end there. As AeroDynamic Advisory managing director Richard Aboulafia puts it: "Comac needs to learn how to build the C919, and in a consistent way."

In addition, the airframer "needs to establish a product-support network, with 24-hour aircraft-on-ground [support], and it needs to be everywhere the C919 flies. That's a massive investment," he says.

Then there is also the desire for type approval beyond its home nation. When flight testing of the C919 was in its early days, Comac outlined big plans for European and even US certification.

Acrimonious relations

Yet, 2022 is a different place to 2017: relations between the USA and China have soured, and show little sign of improvement. While Beijing's dealings with the EU appear less acrimonious, that is not necessarily to Comac's benefit: a recent series of landmark orders by Chinese carriers for Airbus narrowbodies appear to indicate a current preference for Western jets.

Therein also lies the proverbial elephant in the room: the programme is all but entirely reliant on Western technology, from engines to avionics and cockpit systems.

Indeed, in Aboulafia's view, the C919 is effectively "a Western jet with a Chinese veneer and a Chinese final assembly line".

That also adds vulnerability: delays in meeting testing deadlines in recent months were largely due to US sanctions. A 27 September report from Reuters, citing unnamed sources, said the programme faces the

likelihood of missing "certification and production targets", amid stricter US export rules.

Since December 2020, the USA has tightened export regulations relating to China, with companies deemed as having links to the Chinese military subject to special licensing requirements.

China is building up a domestic aerospace industry to wean itself off Western technology, but this will take time and money.

Key projects include the development of an indigenous engine for the C919, the ACAE CJ-1000, as an alternative to the current CFM International Leap-1C.

But little is clear about progress with the CJ-1000: Beijing had originally planned for it enter service in the early 2020s, a goal that has already been missed.

The danger involved in relying on Western engines for the C919 is starkly highlighted by China's experience with the AVIC MA700. Beijing's detention of two Canadian citizens on dubious charges in 2018 resulted in Ottawa's decision to block the export of the aircraft's Pratt & Whitney Canada PW150C turboprops, creating a major programme roadblock.

Still, any effort to fill the C919 with Chinese technology will be expensive and drawn out, says Aboulafia: "Reinventing the C919 as a true Chinese jet would cost tens of billions of dollars and take at least 15 years, an effort that would dwarf the resources needed to merely create the C919 in its current form.

"The more [China] limits imports to give the C919 a higher domestic presence, the more likely it becomes that the US and its allies simply kill it, the way they killed the MA700," he adds. ▀



Airliner is heavily reliant on Western technology



Sole An-225 was destroyed by Moscow's forces during attack on Ukraine

Council culture

Russia fails to obtain sufficient votes to gain membership of ICAO's governing body

David Kaminski-Morrow London

Russia has failed to secure election to the ICAO Council during a voting session at the organisation's Assembly in Montreal.

The election featured two parts: the first focused on countries of chief importance to air transport, and the second those which make the largest contribution to provision of international civil air navigation facilities.

While the ballot is secret, successful election requires a simple majority vote from the contracting states.

Eleven candidate states, Russia among them, participated during the initial part of the election, but only 10 obtained the minimum 86 votes required.

Russia secured 80 votes, a lack of support almost certainly attributable to international disapproval over the Ukrainian conflict.

The 10 elected countries – each receiving between 147 and 152 votes – comprised Australia, Brazil,

Canada, China, France, Germany, Italy, Japan, the UK and USA.

Results of the vote led to a discussion within the Assembly on the legal interpretation of rules on filling a single empty seat on the Council when the sole candidate had not secured election.

The president of the Assembly, Poppy Khoza, described the situation as “unprecedented”.

Second round

All 12 candidates for the second part of the election were successful, receiving 131 to 162 votes.

These countries comprised Argentina, Austria, Egypt, Iceland, India, Mexico, Nigeria, Saudi Arabia, Singapore, South Africa, Spain and Venezuela.

Both the Russian and Ukrainian representatives had previously given statements to the triennial Assembly, which ran until 7 October.

The Russian delegation argued that some countries were “attempting to use ICAO as an instrument of political pressure”, and sought condemnation of bans imposed on the use of sovereign airspace.

It said such measures “devalue” the work of ICAO, and stressed the need for co-operation to address sustainable development of international civil aviation, in order to combat climate change.

Ukraine's delegation referred more directly to the conflict, pointing out that it had resulted in destruction of civil aviation infrastructure, including airports, runways, and the sole Antonov An-225 outsize freighter.

It also recalled the loss of Malaysia Airlines flight MH17, shot down by a surface-to-air missile in 2014. The delegation described the actions as “disrespect” to the Chicago Convention and established ICAO rules on civil aviation.

Russian federal air transport regulator Rosaviatsia believes the vote against Russia's representation on the Council is “political and temporary”, adding that the country is recognised worldwide for its contribution to civil aviation development.

Rosaviatsia points out that it remains a full member of ICAO and will continue to play its part within the organisation. ■



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Eviation takes first step towards new future

All-electric Alice prototype makes maiden flight – but much still hinges on the development of better batteries

Jon Hemmerdinger Tampa

Though Eviation cleared a major milestone with the 27 September first flight of its Alice all-electric prototype, the company's chief executive stresses that notable battery hurdles must still be overcome.

As if to underline the point, certification and service entry have quietly slipped by two years, to 2027.

But to an extent, those problems will come later; for Eviation, the day was all about Alice finally becoming airborne.

"It was good on the numbers," newly-appointed Eviation chief executive Gregory Davis says. "The flight test was executed flawlessly."

The prototype lifted off a runway at Grant County International airport in Moses Lake, Washington shortly after 07:00 local time.

According to flight tracking website **FlightAware.com** the aircraft (N882EV) flew for about 8min, climbing to 2,800ft above ground level before landing safely back at Grant County.

Speaking after the flight, Davis said Eviation aims to begin Alice certification test flights by 2025 and to start deliveries in 2027.

Previously the company had hoped to obtain type certification

in 2025, leading to service entry of the cargo variant that same year, and the passenger model in 2026.

But Davis cautions that achieving even the revised target will require battery improvements – development of which is out of its hands.

"If we have a breakthrough in battery technology, we can pull [the schedule] forward," Davis says. "If the battery technology lags, we might push out the delivery date."

Energy density

"The biggest challenge Eviation has to overcome is the batteries," he says. "We really do need the industry to boost the energy density at the cell level."

Eviation completed much of Alice's initial battery design itself, but Davis says aviation needs help from battery developers.

"We need companies to start looking at how they are going to apply those batteries specifically for aerospace applications," he says.

Few details are known about the prototype's battery system. "Alice's advanced battery system is highly efficient and endlessly upgradeable, enabling range improvements as battery technology evolves," the company says.

Eviation has previously said Alice had a 920kWh battery system weighing 3,600kg (7,940lb).

Based north of Seattle in Arlington, Washington, Eviation had teased for months that Alice's first flight was imminent, with the milestone never seeming to arrive.

Before getting airborne, Alice had pulled onto the runway only to return to a staging area. Davis says his team needed to "reset a screen that we wanted to change the configuration of for that first flight".

Alice then taxied out again, accelerated under full power and lifted into the sky.

Davis says the maiden flight was Eviation's first chance to fully test how Alice's propulsion system, including its batteries, and its fly-by-wire controls perform in real-world conditions, and how the systems interact.

Aircraft made a debut sortie lasting about 8min and climbed to 2,800ft



Certification effort is likely to start 'in or around 2025'



"We have been able to test the actual controllability," Davis says. The company will next determine if the aircraft's performance data matches expectations.

Alice is a prototype of what Eviation says will be a small commercial aircraft capable of carrying two pilots and nine passengers. It is also marketing a cargo variant capable of carrying a payload of 1,200kg.

Maximum effect

Powered by twin Magnix Magni650 electric motors, each producing 700kW (939shp), Alice will have a 8,350kg maximum take-off weight, range of 250nm (463km) and maximum speed of 260kt (482km/h), Eviation claims.

"The first flight of Alice represents the new dawn of electric flight, and underpins Magnix's industry leadership in electric propulsion. We are proud of our partnership with Eviation, and that together we can take this step toward revolutionising the way the world travels," says Nuno Taborda, chief executive of the propulsion provider, a sister company of Eviation.

Magnix has yet to secure certification for its electric propulsion units but says it is "on the path" to gaining that approval,

having agreed the process with the US Federal Aviation Administration (FAA).

Alice's development has already been delayed, including by a January 2020 fire involving lithium-ion batteries on another prototype, which ignited during testing at a site in Prescott, Arizona, destroying the aircraft.

Eviation now expects to begin Alice's certification programme "in or around 2025", Davis says. It plans to assign three aircraft to the effort: another prototype and two manufacturing-representative variants, which will be copies of the aircraft Eviation intends to produce and deliver.

Certification is being pursued under FAA Part 23 rules, which apply to aircraft that have no more than 19 seats.

Initial customers for the Alice include Cape Air (75), DHL (12) and start-up US carrier Global Crossing Airlines. Davis declines to specify Alice's sale price, though media reports have put the figure at \$4 million.

Global Crossing, also known as GlobalX, is the latest to tentatively commit to the Alice, having signed a letter of intent for up to 50 examples in early September.

Miami-based GlobalX intends to make Alice the foundation of an

envisioned carbon-neutral charter service from Florida to the Bahamas and throughout the Caribbean, Eviation says.

GlobalX expects to receive its first aircraft in 2027 and is considering future orders of the cargo variant, the manufacturer adds.

"The Alice aircraft will allow us to offer sustainable, regional flights to and from major markets, and is the first step in our initiative to be a zero-carbon-emissions airline by 2050," says GlobalX chief executive Ed Wegel.

Cargo service

GlobalX began passenger flights in August 2021 with seven Airbus A320 narrowbodies and plans to launch a cargo service in the fourth quarter of 2022.

Davis says the contract demonstrates GlobalX's commitment to innovation and making its charter service sustainable.

"We are delighted to enter this agreement with GlobalX, whose investment in zero-emissions flight demonstrates the airline's commitment to cleaner skies, lower operational costs and the provision of the most-innovative options for air travel," he says. ▀

Additional reporting by Howard Hardee in Sacramento

Concept was tested a decade ago with Boeing/NASA X-48s



USAF to explore blended-wing tanker

Service sets out ambition to fly full-scale prototype before end of 2027, as part of its pursuit of ultra-efficient designs to help cut greenhouse emissions and boost operational efficiency

NASA

Ryan Finnerty Tampa

The US Air Force (USAF) will test a blended-wing aircraft design within five years that could ultimately serve as an aerial refueller or cargo transport.

In its Climate Action Plan report, released in early October, the service says it has set a goal of completing development and testing of a full-scale prototype by the end of 2027.

The blended-wing concept falls under a broader initiative to adopt “ultra-efficient aircraft designs”, which the USAF says will decrease fuel requirements and improve combat capability.

In the report, the service’s civilian leader, Secretary Frank Kendall, says the Department of Defense must embrace the reality of climate change and its associated challenges.

“Our mission remains unchanged, but we recognise that the world is facing ongoing and accelerating climate change,” Kendall writes.

He notes that part of that challenge is reducing the USAF’s reliance on petroleum-based jet fuel, which currently accounts for 80% of its total energy usage.

“Reduction of fuel use offers the most significant opportunity to optimise our operational capability while simultaneously reducing greenhouse gas emissions,” the report states.

A blended-wing-body design “increases aerodynamic efficiency by at least 30% over current air force tanker and mobility aircraft, and enables dramatically greater fuel offload at range to ensure strike capabilities in a contested environment”, it says.

Pursuit of a blended-wing aircraft that is capable of fulfilling tanker and transport missions could have significant implications for aerospace manufacturers.

30%

Projected aerodynamic efficiency boost for blended-wing body design over current military mobility types

The USAF is in the process of acquiring 179 Boeing KC-46A Pegasus tankers – a derivative of the 767 commercial jet – to partially replace its aged fleet of Boeing KC-135s. The service also plans to complete two other tanker acquisition programmes in the coming years.

A KC-Y “bridge tanker” requirement, intended to fill the gap between KC-46A production and the availability of a still-theoretical next-generation refueller, has already prompted promotion of an LMXT platform by Lockheed Martin. Its offer will be based on a modified version of the Airbus Defence & Space A330 multi-role tanker

transport, almost 50 of which are in service today with the air forces of Australia, France, Saudi Arabia, Singapore, South Korea, the United Arab Emirates and the UK, plus a coalition of NATO nations.

Previously badged the KC-Z, but now referred to by the USAF as the Advanced Air Refueling Tanker (AART), its longer term requirement is for a platform employing technology akin to that on the Lockheed F-35. This could include autonomous flight and the use of low-observable materials.

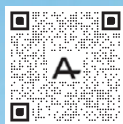
The service says it is collaborating with the Pentagon’s Defense Innovation Unit (DIU) and NASA to “accelerate prototyping of ultra-efficient aircraft designs for future tanker and mobility aircraft”, with a blended-wing-body design being one potential option.

A contract solicitation posted by the DIU in July called for design proposals that provide a 30% improvement in aerodynamic efficiency compared to the 767 and A330.

Exactly where the blended-wing concept fits into the USAF’s tanker recapitalisation plan remains unclear. However, flight testing such a prototype by 2027 could indicate an interest in pursuing the concept for the AART programme, potentially enabling it to bypass the KC-Y requirement altogether.

The US aerospace establishment has previously tested blended-wing-body concepts, such as Boeing/NASA X-48 subscale demonstrators flown from 2007 to 2013. ■

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Seoul strengthens its industrial ties with Airbus Helicopters

European manufacturer to co-operate with South Korean companies on unmanned systems and advanced products

Dominic Perry London
Greg Waldron Singapore

Korean Air and Airbus Helicopters are planning to develop unmanned air vehicles (UAVs) with a vertical take-off and landing capability for South Korea's military.

At a ceremony in Seoul, Jung-woo Park, head of Korean Air's Aerospace Business Division (KAL-ASD), and Bruno Even, chief executive of Airbus Helicopters, signed a memorandum of agreement for the work.

Under the pact, the companies will develop shipborne UAVs capable of reconnaissance missions for the Republic of Korea Navy.

The work will combine KAL-ASD's experience developing UAVs with Airbus Helicopters' work on its VSR700 system, says Korean Air.

Airbus is developing the VSR700 as an intelligence, surveillance, target acquisition and reconnaissance platform suitable for autonomous operation from naval vessels.

Korean Air has not detailed the expected timeline for the joint programme, or subsequent steps.

UAV development is a focus area for KAL-ASD. In August, Seoul tapped Korean Air as its preferred

bidder to develop low-observable UAVs that can work with manned aircraft in combat.

This followed Korean Air's establishment of a next-generation stealth drone research and development centre in June.

At the Seoul ADEX defence show in October 2021, Korean Air also signed a memorandum of understanding to team up with Boeing unit Insitu to develop a lightweight tactical UAV with the ability to take-off and land vertically.

Developmental technology

Korean Air also used the show to promote its developmental KUS-VS UAV, which uses what it calls "lift and cruise" technology. Four rotors are used for take-off and landing, but these are switched off during flight, with a single pusher propeller providing forward thrust.

In the 2010s, KAL-ASD developed the 500MD, an unmanned helicopter based on the MD Helicopters MD500, for which Boeing provided expertise derived from its H-6U Little Bird effort.

Separately, Korea Aerospace Industries (KAI) has delivered the first Light Civil Helicopter (LCH); a locally produced update of the Airbus Helicopters H155. Certification

for the medium-twin had been achieved in September.

Produced in an emergency medical services configuration, the lead aircraft was received by local operator Gloria Aviation; service entry is scheduled for December in Jeju.

Airbus Helicopters has effectively transferred production of the H155 to its South Korean partner as part of their joint collaboration on Seoul's LCH and Light Armed Helicopter (LAH) programmes.

The LCH features updated avionics and a new main gearbox, and is powered by twin Safran Helicopter Engines Arriel 2C2 turboshafts.

Qualification of the LAH is due "in the coming weeks", says Airbus Helicopters, with the step to enable the start of serial production for the Republic of Korea Army by year-end.

In addition, the pair are preparing new joint development programmes. These will "leverage Airbus's technical know-how in the field of helicopter drive systems and flight-control systems, while tapping into KAI's local industrialisation expertise in the country", the European manufacturer says.

Even adds that the pact will "bring tremendous technical and economic benefits to the local aerospace industry for years to come". ▶





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Kyiv advances Bayraktar UAV pact

Ukraine moves to launch domestic production of Turkish type, following high-profile successes against Russian forces

Greg Waldron Singapore

Baykar Technologies and Kyiv are working toward the domestic production of unmanned air vehicles (UAVs) in Ukraine, where the Turkish company's systems have been in high-profile use against invading Russian forces.

Plans for Ukrainian production were discussed during a recent visit to Baykar's Turkish factory by Andriy Yermak, who heads the office of Ukraine's presidency.

"Started visit to Turkey with @BaykarTech," Yermak tweeted on 2 October. "Discussed current and future cooperation projects, in particular regarding UAV production in Ukraine. We continue [to] strengthen Ukrainian defence capability in close cooperation with our strategic partners."

Ukraine's ambition for local production of Baykar UAVs emerged on 10 September in a Facebook post by President Volodymyr Zelensky. Following a meeting with Baykar chief executive Haluk Bayraktar,

257

TB2 unmanned air vehicles currently in service worldwide, with operators including Qatar, Turkey and Ukraine

Zelensky said the "number one topic" was indigenous UAV production.

Baykar's Bayraktar TB2 has been among Ukraine's most prominent weapon systems following Russia's invasion on 24 February.

Substantial footage allegedly shot from the type shows attacks

on invading Russian forces, including the destruction of tanks and other armoured vehicles.

According to Baykar, the system includes the UAV platform as well as ground control systems. The TB2 can take-off and land autonomously and has an operational altitude of 18,000ft and endurance of up to 27h. Four Roketsan MAM-L or MAM-C munitions can be carried on underwing stations.

Overall, says Baykar, 257 TB2s are in service with Azerbaijan, Qatar, Turkey and Ukraine.

Baykar, in a 4 October statement about Yermak's visit, quotes Ukrainian defence minister Oleksii Reznikov as saying his country has received 50 armed UAVs from the company since the start of the war.

A location for UAV production in Ukraine has been identified, says Baykar, without providing additional details. ▶



Armed TB2 has been a key asset since Russia's late-February invasion

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Operating lease on current C/D fleet is due to expire in 2027

Prague backs F-35 as Gripen successor

Czech defence ministry analysis indicates fifth-generation fighter is best placed to meet nation's future requirements

Dominic Perry London

The Czech Republic has submitted a letter of request to the US government relating to the possible acquisition of 24 Lockheed Martin F-35s.

Prague is seeking a replacement for its fleet of 14 Saab Gripen C/D fighters, whose operating lease will come to an end later this decade.

While the Czech government insists that no definitive decision has been taken on the purchase, it indicated in July that its defence ministry had selected the Lightning II to meet its future requirements. The nation also had been offered the Gripen E/F and Lockheed F-16.

The defence ministry's analysis suggests that only "fifth-generation" aircraft will be able to "survive on the battlefield of the future".

Having submitted its letter of request on 3 October, Prague will now begin negotiations with the US government. Key points will include the potential for Czech industry to participate in the F-35 programme, the defence ministry says.

A deadline of 1 October 2023 has been set for the Czech defence minister to inform the nation's government on the parameters of any agreement reached with the USA regarding the F-35.

"Based on this, the government will then decide whether the Czech Republic will purchase them," it says.

If it proceeds with the acquisition, Prague will potentially become the second operator of the F-35 in Eastern Europe, after Poland, which has expressed interest in acquiring 32 examples, but also has yet to finalise an order.

24

Aircraft Czech government may acquire to replace Saab combat type

Supplied via Sweden's Defence Materiel Administration, the Czech air force's current fleet of Gripen C/Ds are the subject of a lease agreement that is due to come to an end in 2027, with an optional one-year extension.

Saab chief executive Micael Johansson in late July said that the Swedish company could upgrade Prague's existing fighters, or pitch "a great offer... on capability growth with the next-generation Gripen E".

A decision to acquire the new model – now in production for Sweden and export customer

Brazil – "would be extremely efficient from an infrastructure point of view, and for the transition of people and pilots", he added.

Separately, the US government has cleared Lockheed to resume deliveries of the F-35, despite the presence of a magnet component manufactured using material sourced from China.

Signed by William LaPlante, under secretary for defense for acquisition and sustainment, the National Security Waiver will allow the Department of Defense "to accept aircraft containing non-compliant specialty metals in Honeywell integrated power package turbomachines".

"Acceptance of the aircraft is necessary for national security interests," LaPlante says of the waiver approval, which covers the period until 31 October 2023. "This determination applies to a total of 126 F-35 aircraft awaiting delivery or to be delivered under the Lot 12-14 production contract," he adds.

Installed on every F-35 to have been produced, the magnet at the centre of the supply chain disruption was supplied by an undisclosed company, which Honeywell is in the process of replacing with a US contractor. ▶

Additional reporting by Ryan Finnerty in Tampa

Urban air mobility vehicles and electric aircraft could benefit from use of solid-state storage

At the cutting edge

NASA's SABERS project promises breakthrough in battery technology for aerospace applications

David Kaminski-Morrow London

US aeronautics agency NASA is progressing with solid-state battery designs which are capable of offering increased energy discharge while substantially reducing the weight of the casing.

The agency has been pursuing a programme known as SABERS – Solid-state Architecture Batteries for Enhanced Rechargeability and Safety – focused on the new design, pointing out that such batteries can offer better energy storage and performance than lithium-ion cells.

NASA says the programme has been driven by the need to develop an all-new battery “tailored” to the performance demands of an electric aircraft or urban/advanced air mobility platform. This means achieving significantly higher energy without loss of capacity, and without the fire risks associated with lithium-ion designs.

Solid-state batteries have no liquid in their architecture and are more robust, with less complexity needed for packaging. The SABERS

project, centred at NASA's Glenn Research Center, has been studying sulphur-selenium combinations to store charge.

“SABERS continues to exceed its goals,” says principal investigator Rocco Viggiano. “The possibilities are pretty incredible.”

Energy storage alone is not sufficient, however: the battery must also be capable of discharging the energy at a rate suitable to power an air vehicle.

Discharge multiplied

NASA says the SABERS team has increased discharge rates for the experimental battery 10-fold, and then by another factor of five, in the past year, through tests with innovative materials.

The architecture of the batteries also enables the cells to be stacked vertically in a single casing, rather than separately, as with liquid batteries, saving 30-40% of the battery weight and “far exceeding” the energy capability of lithium-ion cells.

SABERS has been able to demonstrate a capacity of 500Wh/kg for the solid-state battery, Viggiano says the design, while reducing

weight, allows “double or even triple” the energy storage. The battery can also operate in temperatures much higher than lithium-ion cells without the same level of cooling.

“We have seen SABERS grow from an idea we had at lunch one day to, potentially, an energy solution for aeronautics,” Viggiano says.

NASA says the project has “piqued the interest” of another of its research efforts, the SUSAN programme – standing for Subsonic Single Aft eNginE – a hybrid-electric concept aircraft.

SUSAN is a concept for a 180-seat, T-tail configuration airliner powered by a 20MW rear electrical propulsion system generating thrust as well as electrical power for distributed assemblies of small, wing-mounted engines.

This aircraft would have an economic range of 750nm (1,390km). Redundancy is provided by a single-use battery to generate power in the event of engine failure.

The SUSAN design builds on several other developmental technologies, including high-efficiency electric motors, power converters, and advanced materials. ▶

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Generator failure left Saab 340 flying on batteries alone

Crew identified fault on right-hand unit, after previous owner left insufficient time between multiple engine starts

David Kaminski-Morrow London

UK investigators have cited crew experience in the successful resolution of an incident in which a Saab 340 was left operating on battery power alone, with multiple instrument failures, during an engine shutdown exercise.

The turboprop was being used for a training flight from Glasgow to convert crews to the type, with exercises including stalling and engine shutdown and restart.

Four occupants were on board: a type-rating examiner, supervising a captain being trained, and two other qualified personnel trained on the aircraft, including the programme manager overseeing introduction of the Saab 340 to service.

According to the Air Accidents Investigation Branch, the intentional shutdown was partly aimed at demonstrating handling characteristics that were not replicated authentically by a simulator.

But after the left-hand GE Aviation CT7 engine was turned off at 12,000ft, the subsequent relight was unsuccessful.

The crew was able to diagnose that the right-hand generator had failed, preventing cross-start of the left engine.

As a result, the aircraft (G-NFLB) was left flying on battery power and standby instruments alone, with the flight-management computer unavailable and the electronic flight instrument screens having blanked.

Use of structured decision-making procedure helped the crew to understand the situation and prioritise actions. Concern over limited battery life dissuaded them from attempting another relight.

"The crew recognised that time, because of limited battery life, was a crucial resource to manage," says the inquiry. Without load reduction, the battery life would have been less than 15min.

Co-ordination between the crew members and delegation of crucial

conditions ruling out approaches to Prestwick and Glasgow, the crew considered diverting to Islay or Campbeltown airports.

While these airport offered only satellite-based approaches, the captain fortuitously had the electronic flightbag of his primary operator to hand, which included a VOR approach for Campbeltown – allowing the aircraft to descend safely below minimum sector altitude and land 40min after the generator failure.

Cranfield University had acquired the aircraft a few months before the 14 September 2021 incident. It had flown with the organisation for 31h, having previously been in long-term storage for about nine years after withdrawal from the fleet of US regional carrier Mesaba Airlines.

Investigators traced the generator failure to multiple engine-starts by a previous operator with insufficient time between them, which would have allowed the unit to cool.

Given that the left engine would routinely be started first, and its generator then used to start the right engine, the right-hand generator was usually lightly loaded, and damage would become apparent only under high-load conditions such as those involving the in-flight engine restart. ▀

15min

Amount of battery life available to power aircraft's instruments if crew had not taken steps to reduce load

tasks – including time monitoring, communication with air traffic control, and load-shedding of the electrical system to preserve battery endurance – enabled the trainee pilot to focus on flying the aircraft without unnecessary distraction.

The crew also used system knowledge to tie the batteries together, allowing systems on each side to share the battery life, says the inquiry: "The number, experience and composition of the crew aided the [captain] to manage a high-workload and time-critical situation."

With only limited instruments functioning, and the combination of time constraint and weather



Aircraft landed safely at Campbeltown airport, 40min after the incident

Australia's MRH90 Taipans could be replaced by Black Hawks

Canberra slams defence failings

Government review details impact of past flawed procurements, identifying cost overruns, delays and poor platform performance among issues facing armed forces

Greg Waldron Singapore

Australia is still reviewing a possible acquisition of 40 Sikorsky UH-60M Black Hawks, as its current defence minister has slammed

procurement decisions made under previous governments.

Defence minister Richard Marles criticises the management of multiple acquisitions under the previous government of Scott Morrison, saying that programmes with budgets in excess of a combined A\$69 billion

(\$62.7 billion) face major schedule delays and budget variations.

Of those programmes, at least 28 are a "combined 97 years behind schedule", he says. Eighteen procurements are running over budget, with variations totalling A\$6.5 billion.

RAF takes its penultimate A400M

Service receives 21st example of transport eight years after launching operations, while Airbus advances programme with demonstration of expanded tactical capabilities

Craig Hoyle London

The UK Royal Air Force (RAF) has received the penultimate example of its on-order A400M tactical transports, with Airbus Defence & Space having transferred its 21st Atlas on 11 October.

Carrying the service registration ZM420, and with the production serial number MSN056, the airlifter had first been flown on 6

February 2018, before supporting development activities by the airframer, Cirium fleets data shows.

Based at RAF Brize Norton in Oxfordshire and introduced from 2014, the UK's A400M fleet will total an eventual 22 of the Europrop International TP400-D6-powered transports. However, in its *Defence Equipment Plan 2021-2031* publication released last February, the Ministry of Defence indicated that it could

also seek to acquire "further A400M aircraft".

It did not provide additional details about the potential scale of such a follow-on

purchase, but the UK originally had a requirement to field 25 of the type as part of the European launch contract for the A400M programme.

Meanwhile, Airbus personnel on 28 September performed a crew workload assessment mission using its A400M prototype MSN6, with the sortie flown from Brize Norton.

Staged to demonstrate the type's expanding range of tactical capabilities to operator nations, the flight involved MSN6 undergoing air-to-air refuelling behind an RAF A330 Voyager tanker, before conducting low-level flight operations culminating with the aerial delivery of supplies.

"This mission had [great] importance as it provides our customers

Airbus Defence & Space

Airbus Defence & Space

"The Morrison government's investment in defence saw key projects blow out in both cost and time," says Marles. "It's not as though we can go onto the battlefield and overwhelm our adversary by waving a copy of the budget papers in their face."

"Given the current strategic circumstances we face, we need to be better focused on the quality of spending within defence to ensure we are providing our personnel with the best capability," he adds.

Behind schedule

While the bulk of Marles' ire is directed at shipbuilding projects, he singles out the A\$1.4 billion acquisition of 10 Leonardo C-27J tactical transports, observing that they "were delivered four and half years behind schedule and are unable to fly into battlefields".

In July 2021, Canberra redefined the mission of the Royal Australian Air Force's C-27Js – previously hailed as "battlefield airlifters" – to focus on humanitarian and disaster relief missions.

Marles, meanwhile, discussed the planned purchase of UH-60Ms to replace Australia's 47 NH Industries

MRH90 Taipans (the local designation for the NH90) during an interview on ABC radio.

"We've not hidden the fact we are concerned about the Taipans," he says. "It is one of the 28 projects we've described. We are looking at other options, including the Black Hawks that would potentially be provided by the United States. But that review is still under way. I don't want to pre-empt that decision."

But he adds: "We're obviously looking at ways in which we can

get the multi-role helicopter function done in a way which is effective and provides value for money."

In December 2021, the Morrison administration announced it would drop its MRH90s many years before their planned retirement in 2037, citing the "unreliability" and cost of the platform since its service entry in 2014.

In August, the US government cleared a possible Foreign Military Sales deal to provide Australia with 40 UH-60Ms for up to \$1.95 billion. ■



Commonwealth of Australia

C-27Js have been refocused from battlefield to humanitarian missions



Assessment mission involved low-level flight operations

with distinct confirmation and confidence in the maturity of the A400M as a modern and capable tactical asset," says Simon Nicastro, the company's A400M flight & integration test programme manager.

Airbus notes that after the in-flight refuelling, "MSN6 demonstrated

how, despite its weight, it was able to conduct a steep descent and a low-level flight", claiming this to be "a unique capability for a military transport aircraft". This phase of the mission concluded with the A400M dropping four 1t palletised loads from its rear cargo ramp.

"During the flight, the crew received a re-planning order to avoid a certain area simulating a ground threat, and also to modify the load delivery in order to be representative of a complex operational mission our customers could face in a real scenario," says Airbus flight-test engineer Cesar Gonzalez.

Acceptable workload

"All objectives were accomplished, and the mission was fully successful, revealing that the crew workload was fully acceptable for this kind of complex operation," he adds.

Additionally, the RAF's 206 Sqn test and evaluation unit recently conducted low-level trials involving the deployment of paratroopers – a capability to be declared operational by the service next year as it retires its remaining Lockheed Martin C-130Js.

Airbus says it has delivered 112 of the total 176 A400Ms to have been ordered by Belgium, France, Germany, Indonesia, Kazakhstan, Luxembourg, Malaysia, Spain, Turkey and the UK. ■



Former Nordwind Airlines widebody is likely to be among jets prepared for AviaAM Leasing

Conversion club

Multiple deals struck for passenger-to-freighter modifications, including launch order for Mammoth's 777-300ERMF update

Jon Hemmerdinger Tampa
David Kaminski-Morrow London

AviaAM Leasing has become the launch customer for Mammoth Freighters' Boeing 777-300ERMF cargo conversion with an order for six of the type.

Orlando-based Mammoth, one of several companies converting 777s, disclosed the deal on 13 October. Modification work on the initial aircraft will begin in early 2023, but no delivery date has yet been specified.

An image supplied by AviaAM suggests a 777-300ER formerly operated by Russia's Nordwind Airlines (MSN35299) is an early conversion candidate.

"As AviaAM expands its strategic focus in the cargo sector, the superior widebody operating economics of the Mammoth 777-300ERMF will perfectly complement their growing fleet of next-generation freighters," says the conversion specialist's co-chief executive, Bill Tarpley.

"We will meet the demand for widebody converted freighters, to replace ageing ones and accommodate future growth across our group airlines' fleet," adds AviaAM chief executive Tadas Goberis.

Mammoth's partner, Texas-based Aspire MRO, will perform the conversion work at its Alliance airport site in Fort Worth.

AviaAM is part of Cyprus-based aerospace services firm Avia Solutions Group, which owns freighter operators Bluebird Nordic, SmartLynx Airlines and Magma Aviation.

"Having completed multiple 737-800 passenger-to-freighter aircraft

conversions this year, AviaAM is making major investments in multiple freighter types as it continues with its expansion plans in the air cargo market," the companies say.

Mammoth now holds orders from multiple customers for cargo conversions of 29 777s and is working to close orders for another 12 777-300ER modifications – discussions are in "advanced stages of commitment", it says.

Mammoth came into the cargo market several years ago with its 777-200LR and 777-300ER conversion programmes.

Its 777-200LRMF will be able to carry 105t of payload, while the 777-300ERMF's payload capacity will come in at 99t, Mammoth says.

Single option

Mammoth hopes to gain a supplemental type certificate from the US Federal Aviation Administration for its 777-200LR conversion in 2023.

Meanwhile, AviaAM's sister company SmartLynx has formed an Airbus A321 converted freighter partnership with US lessor Aero Capital Solutions – a Texas-based firm that is already involved in the single-aisle passenger-to-freighter sector with interests in 737-800 conversions.

Under the new agreement SmartLynx will operate the converted aircraft while Aero Capital will act as lessor and financier.

Four initial aircraft have already been selected through a sale-and-leaseback between the parties, and the twinjets will be delivered in the first half of next year.

The agreement will take the SmartLynx A321 freighter fleet to 15. It has identified the four additional

airframes as ex-Finnair aircraft, with MSNs 941, 961, 1185 and 1241.

SmartLynx chief executive Zygmantas Surintas says the two sides have a "long-established relationship" in the passenger aircraft sector.

"[Aero Capital's] unique mix of hands-on mid-life aircraft expertise, freighter conversion knowledge, and engine support is an excellent fit for SmartLynx," he adds.

Jason Barany, chief executive of Aero Capital, says the company is "eager to break into" the A321 freighter market.

Aero Capital adds that it will "complement" its involvement with 737-800 freighters, which currently totals 40 aircraft.

Elsewhere, lessor AerCap has placed a firm order with Airbus and ST Engineering joint venture EFW for 15 A321 passenger-to-freighter conversions, while taking options on 15 more.

AerCap says the aircraft will come from its own portfolio of passenger jets, with deliveries from EFW expected in the 2023-2025 timeframe.

"The A321 freighter is the best-in-class and most fuel-efficient aircraft to replace the Boeing 757-200 freighter," says the head of AerCap Cargo, Rich Greener.

Cirium fleets data indicates there are more than 300 757-200 freighters in service globally, including examples with major integrators such as DHL, FedEx and UPS.

AerCap's most recent fleet update suggests it had 62 A321s in its portfolio of more than 1,800 aircraft, as of 30 June 2022. ■

*Additional reporting by
Lewis Harper in London*

Substitution strategy

Russian airframer Irkut progresses initiative to replace sanction-hit Western technology on flagship airliner pair

David Kaminski-Morrow London

Irkut has flown an MC-21 test aircraft which was refitted with Russian-built Aviadvigatel PD-14 engines in place of its original Pratt & Whitney PW1400G powerplants.

The aircraft, number 73051, carried out its first flight following the engine swap from the airframer's Irkutsk facility.

It is potentially a symbolic choice as the same aircraft originally performed the MC-21's maiden flight, with PW1400G engines, on 28 May 2017.

After three sorties with the new powerplants the twinjet transferred to Moscow Zhukovsky airfield to join the certification effort.

Irkut says a number of foreign-built components have had to be replaced with domestic counterparts during the switch.

The twinjet became the second MC-21 to fly with PD-14s. Irkut had previously conducted PD-14 flight tests with an aircraft that was fitted from the outset with the Russian engines.

Irkut general director Andrei Boginsky says the company aims to achieve certification of the PD-14-powered MC-21 by the end of this year.

"The powerplant is the real 'heart' of the aircraft," he adds.

Boginsky says the introduction of the second aircraft to the flight-test programme is "one of the key stages" of the import-substitution initiative.

The second example will enable more frequent flights and allow fine-tuning of the MC-21's systems to optimise operations.

Yuri Shmotin, general designer at Aviadvigatel parent United Engine, says the PD-14 is the "flagship" of Russia's domestic aviation powerplant industry.

100,000

Simulated flights expected to be carried out over five-year research and development programme for SSJ-New

Meanwhile, Irkut's other import substitution programme, the SSJ-New, continues to progress, with a pair of the regional jets under construction for flight-testing, while a third airframe is being built for lifecycle tests.

The flight-test aircraft are among five airframes that are being assembled simultaneously.

Irkut owner United Aircraft (UAC) says the SSJ-New will include some 40 domestic systems instead of

imported foreign ones, compared with the regular Superjet 100 on which it is based. That includes new PD-8 engines in place of the earlier aircraft's PowerJet SaM146s.

One of the flight-test aircraft is already being equipped with these domestically produced systems, UAC adds. Certification and serial production are set for end-2023.

Russia's Central Aerohydrodynamic Institute says installation of the main aerostructures for the static-test SSJ-New is under way at its facility, with personnel from the Irkut plant in Komsomolsk-on-Amur supervising the two-month effort.

Its fuselage will be mated with the empennage, wings, and landing-gear, and weights to simulate engines will be fitted.

"A very complex test-bench is being created, especially for these tests, allowing simultaneous testing of the pressurised fuselage [and] all the vital components of the aircraft," says the institute.

Once assembled, the SSJ-New will be subjected to simulated loads representing all stages of flight, with the airframe's parameters monitored to check compliance with certification criteria.

Institute director general Kirill Sypalo says the overall research effort will take around five years and cover more than 100,000 simulated flights. ▀



Airframe performed MC-21's maiden flight, powered by PW1400G engines

Activities to protect the Arctic region include deploying CF-18 fighters to Greenland

Hypersonic threat propels NORAD investment

Adversary efforts to develop and field Mach 5-plus weapons are among the factors driving Ottawa to boost its spending on vital aerospace defence partnership with USA

NORAD

Ryan Finnerty Tampa

Canada disclosed in June plans to spend nearly C\$40 billion (\$29.4 billion) over 20 years to enhance defence of its sprawling Arctic region, citing threats including those from “autocratic regimes”.

Now, one of Ottawa’s top military officials has elaborated the plan to FlightGlobal, specifically citing the need to protect against modern and still-evolving weapon systems, including hypersonic missiles.

“We quickly came to realise that you cannot invest [in] NORAD [North American Aerospace Defense Command] and let it go for 30 years, and then reinvest after,” says NORAD deputy commander and Royal Canadian Air Force Lieutenant General Alain Pelletier. “You need to remain a relevant force for the deterrence, and you need continuous investments, so that you’re able to match the capabilities of your competitors.”

Ottawa’s plan aims to bolster the defences both of its own military and the joint Canadian/US NORAD structure. Its investment will fund the acquisition of radars to track air

and space threats, plus advanced air-to-air missiles and new air-to-air refuelling aircraft. It will also be used to improve NORAD’s communications systems.

These updates will accompany Canada’s plans to purchase 88 Lockheed Martin F-35s to replace its ageing Boeing CF-18 fighters. Its air force is also planning to field up to six Airbus Defence & Space A330 multi-role tanker transports, with the first two on order to succeed its pair of A310-derived Polaris refuellers.

Modernisation effort

“Autocratic regimes threaten the rules-based international order,” the office of Canadian defence minister Anita Anand stated in June when the modernisation effort was launched.

The move comes as defence officials across the Western world focus on threats emanating from Eastern Europe and the Western Pacific. Leaders in Canada want to ensure that its northern reaches, which account for 40% of the nation’s landmass and 75% of its coastline, are prepared.

Pelletier, who is also a CF-18 pilot, says Russian aircraft regularly

probe the region, which he calls the “western flank of NATO”.

He says Ottawa’s planned injection of funds, as well as a corresponding package from the USA, are needed to make up for decades of post-Cold War neglect. He notes that most of the more than 360 million people living under NORAD’s protective umbrella are likely more familiar with the command’s annual Christmas-holiday Santa-tracking website than its detect-and-defend mission.

Since its creation in 1958, NORAD’s missions have evolved from detecting tactical nuclear bombers to tracking intercontinental ballistic missiles (ICBMs) and cruise missiles, Pelletier says.

Although the omnipresent spectre of nuclear-armed ICBMs crossing the North Pole at a moment’s notice is not considered as acute a threat as previously, challenges facing NORAD have, in some ways, never been greater. The command must now adapt to contend with threats posed by newly-developed hypersonic weapons, Pelletier notes.

China and Russia have made development of the ultra-fast missiles a priority. Capable of travelling at

five times the speed of sound, hypersonic missiles offer an opportunity for countries with otherwise less-capable forces to challenge the capabilities and power-projection abilities of the USA and its allies.

The extreme speed of such platforms, and their smaller size compared to ICBMs, makes defending against them more challenging, which is why Pelletier says NORAD investments are so important.

He says the USA and Canada both plan to field more over-the-horizon radars, which will help increase the allies' "air and space domain awareness", allowing NORAD to better detect launches, identify and track incoming hypersonic weapons and predict impact points.

Decision superiority

The result will be "increased decision superiority" for national leaders, he says - while noting that the weapons' Mach 5 performance greatly reduces the "decision time" to respond.

The threat has prompted NORAD to also focus on enhancing its intelligence, with the goal of predicting weapon launches before they occur. "Understanding the pattern of activities that may lead to a decision or deployment of... specific assets" could potentially give leaders days - not minutes - to respond, allowing for "pre-emptive deterrence", Pelletier says.

He notes that NORAD will not operate in a vacuum, but in collaboration with assets and personnel assigned to NATO and the USA's European Command (EUCOM).

"That domain awareness will start, most likely, in the NATO environment, and the first ability to respond may actually be with NATO or EUCOM," Pelletier says, describing NORAD as one layer of North American security. He says a properly equipped NORAD can better enable the USA and Canada to project power globally, as both are currently involved in NATO missions in Eastern Europe.

"To actually influence international security, you need to have a fairly well-defended continent," Pelletier says.

"We need to demonstrate not only good defence posture from Canada and the USA, but also the resilience to continue to operate if any competitors would like to actually deny us an ability to project power abroad." ■

Rival hopes to put Canadian F-35 deal on ice

Saab has voiced its objection to Canada's current discussions with Lockheed Martin regarding the planned procurement of 88 F-35As.

With an acquisition not yet finalised, the Public Services and Procurement Canada (PSPC) agency has moved to negotiate the final terms of delivery with Lockheed, including price per tail number, delivery schedule and economic benefits for domestic industry.

"There should be no negotiation on these critical elements," Saab Canada president Simon Carroll said during a committee hearing on air defence procurement in Ottawa's House of Commons on 29 September. "These elements of the bidder's response were to be committed to and then evaluated as part of the competitive process."

Ottawa in late March announced its preference for the F-35A, following a Boeing CF-18 replacement contest also involving the Swedish manufacturer's Gripen E.

Carroll says the Gripen pitch "offered budget stability, the right capability for the aircraft in creating more interoperability... along with the actual operational and technical capability of the aircraft". It also contained a "100%-guaranteed economic benefits package that would benefit Canada now and well into the future".

The PSPC says its negotiations with Lockheed are part of the "finalisation phase" laid out in the government's bid solicitation.

"During this phase, the top-ranked bidder must successfully demonstrate that a resulting contract would meet all of Canada's requirements and outcomes, including value for money, flexibility, protection against risks, and performance and delivery assurances, as well as high-value economic benefits for Canada's aerospace and defence industry."

An "independent third party" has overseen the entire decision process, to ensure fair treatment of all bids, the PSPC notes.

Lockheed declines to respond to the comments made by Saab - which has yet to file any formal objection - but says it believes the F-35 will strengthen defence of the Canadian Arctic and North American security more broadly.

"The F-35 is the most advanced, most survivable, best value fighter to replace the Royal Canadian Air Force CF-18 fleet," it claims.



Royal Canadian Air Force plans to operate 88 Lightning IIs

Lockheed Martin

Why AAM sector must win hearts and minds

With their technologies maturing rapidly and interest from airlines taking off, eVTOL developers need to convince the public that they will be safe to operate

Howard Hardee Washington DC

If the vision presented by the advanced air mobility (AAM) industry becomes reality, revolutionary aircraft will soon fill the skies over cities and suburbs. But AAM companies face a major challenge before taking off – earning public trust.

US congressman Jay Obernolte of California – who, along with fellow California congressman Jimmy Panetta, launched the bipartisan Congressional Advanced Air Mobility Caucus on 23 June – acknowledges he is “very worried” about public acceptance of emerging aviation technology, and autonomous air taxis specifically.

Speaking during Honeywell’s Advanced Air Mobility Summit in Washington DC on 21 September, Obernolte framed the issue as being on a par with certification from the US Federal Aviation Administration and other regulatory hurdles facing AAM companies. He says the general public have very low risk tolerance for autonomous road vehicles and will probably have a similar attitude towards pilotless aircraft. Potential passengers may

have essentially “zero risk tolerance” and an attitude that “one accident is too many”, he says.

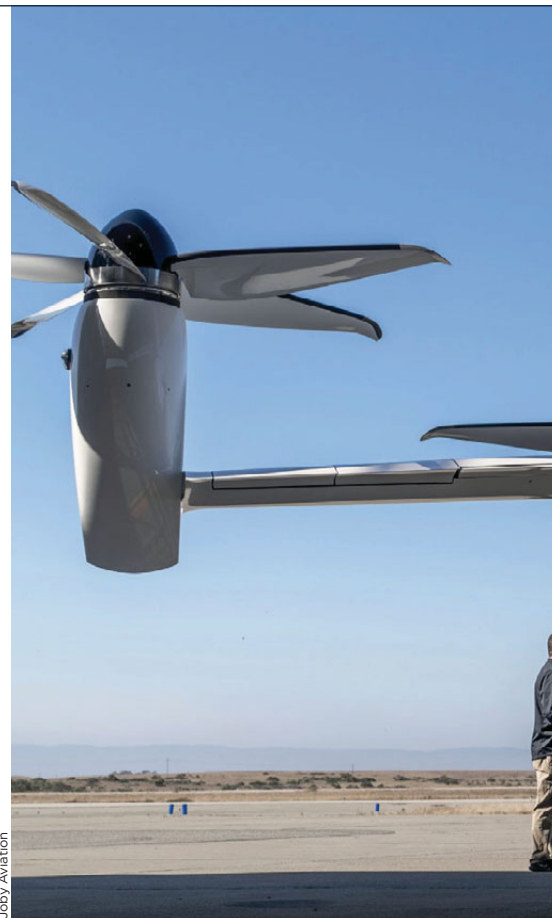
“When one autonomous vehicle gets into an accident, it makes national news, despite the fact that there probably were 10,000 car accidents that day across the country in non-autonomous vehicles,” he says. “We have to accept that as these [aircraft] get much smaller and there are many more of them, there will be accidents.

“So, the question is – and I don’t have an answer – ‘What is the acceptable level of risk for advanced air mobility?’”

Public confidence

The AAM industry appears convinced of the viability of electric vertical take-off and landing (eVTOL) aircraft. Delta Air Lines, long sceptical of the AAM space, recently leapt into the fray with a plan to invest up to \$200 million in air taxi start-up Joby Aviation. Global investment in AAM technologies has exceeded \$7 billion since 2019, according to the Lufthansa Innovation Hub.

But convincing potential passengers is another matter. Fostering



Joby Aviation

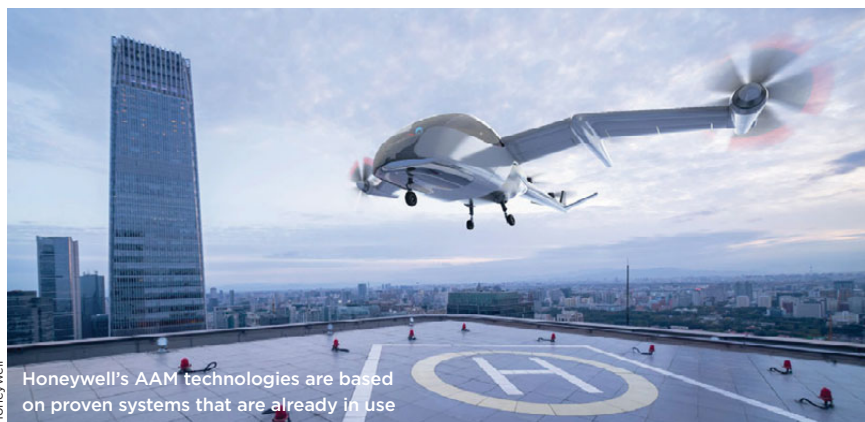
public acceptance of AAM is cited as a leading issue in a May 2022 report from the US Government Accountability Office.

“The public has never seen these aircraft in operation, and acceptance of large numbers operating in close proximity to people and buildings will require a concerted effort on the part of industry and government to show these aircraft’s safety by demonstrating safe, reliable operations,” reads the report.

Jia Xu, chief technology officer of Honeywell’s urban air mobility and unmanned aerial systems units, says developing trust in AAM systems involves two elements – technical and behavioural.

“We have to understand the technology – it has to be validated and tested and certified in many cases,” he tells FlightGlobal. “The other aspect is behavioural; we have to see this kind of stuff flying on a regular basis to believe it.”

Industry is moving to automate cargo operations first, Xu says, partly to demonstrate how the technology works: “That’s going to pave the way, because we are going to see this operate seamlessly one day. Sure, the safety level has to be there, but people will eventually figure out that, ‘Hey, instead of carrying cargo, this could be carrying passengers.’”



Honeywell

Honeywell’s AAM technologies are based on proven systems that are already in use



Delta Air Lines is planning to invest up to \$200 million in air taxi start-up Joby Aviation

“The technology has to be tested and certified in many cases. We [also] have to see this kind of stuff flying regularly to believe it”

Jia Xu Chief technology officer urban air mobility, Honeywell

Automated cargo flights could begin commercial operations within the decade, Xu says. He points to the Nuuvu V300 – a hybrid-electric vertical take-off drone being developed by Pipistrel, a company acquired by Textron in April. Honeywell is developing the flight-control, satellite-communication and sensor systems for the cargo drone, which is set to launch within five years. “That’s a capability coming online very quickly,” he says.

Safety is a top priority for companies specialising in autonomous aviation technologies. For example, autonomous aviation company Xwing – which in 2021 completed a gate-to-gate demonstration flight of a Cessna Caravan retrofitted with its autonomous flight technology – recently partnered with NASA to support development of safety systems for pilotless aircraft.

“We can’t have catastrophic failures with AAM any more than we can with commercial aircraft,” Xu says. “If you look at the track record of commercial aircraft today, they are extremely safe. We are there today because of the depth of engineering expertise that companies like Honeywell can bring to bear.”

Engineering pedigree

The fly-by-wire systems that Honeywell is developing are “a new kind of technology”, Xu says, but are based on those currently used by commercial aircraft.

“What we bring to the table is the pedigree, the maturity of safety engineering that can assure the public that this is technology built on solid foundations,” he says.

Like many competitors, Archer Aviation has a vision for a ride-sharing service, using eVTOL

aircraft to fly passengers less than 50 miles (80km).

The company is betting on piloted rather than autonomous aircraft as the backbone of the service, with its in-development Midnight – due to be unveiled on 16 November – seating four passengers and a pilot.

“There is no path today to fly an unmanned aircraft with passengers,” says Bob Ellithorpe, Archer’s vice-president of programme management. “We have set a bar to make the aircraft as safe or safer than commercial airlines, and having a pilot in the aircraft is a symbol of that commitment.”

“It’s not only about applying the regulations of the national airspace as a piloted aircraft,” Ellithorpe continues. “It’s also about giving the flying public confidence that we mean what we say when we talk about safety.”

Boeing-backed air taxi developer Wisk Aero, meanwhile, recently revealed its self-flying “Generation 6” prototype.

“There are actually a number of risks in a piloted version,” says Marc Allen, Boeing’s chief strategy officer. “Get up in a helicopter over Los Angeles and see how it feels when more than 10 are up there. The only way you can do it at scale is going to be with autonomy.”

Jolly Green II ready for CSAR role

US Air Force's new Crew Rescue Helicopter declared fit for initial operations, as service starts transition from Pave Hawk

Ryan Finnerty Tampa

Sikorsky's HH-60W Jolly Green II combat search and rescue (CSAR) helicopter has achieved initial operational capability (IOC) for the US Air Force (USAF).

Announced on 12 October, the milestone had been marked during a ceremony conducted at Moody AFB in Georgia the previous month.

"The declaration signifies that the US Air Force now possesses sufficient HH-60Ws, logistics requirements and trained airmen to support a 30-day deployment to any independent location with a package of four aircraft," the service's Air Combat Command (ACC) says.

Sikorsky says it has so far delivered 24 HH-60Ws to the USAF, which has a programme of record requirement to eventually procure 113 of the type.

"Current and future combat environments require us to manoeuvre further and faster than ever before, and the capabilities provided by the Jolly Green II support the platform's viability for our personnel recovery core function for as long as possible," says ACC operations director Major General David Lyons.

The W-model rotorcraft will replace the USAF's current fleet of HH-60G Pave Hawk CSAR helicopters; another variant of the UH-60 Black Hawk.

The ACC says the new model offers "a range of improved capabilities", including increased range and survivability, a new fuel system and upgraded avionics.

The USAF says the HH-60W was designed with full digital integration in mind, allowing for faster

data transfer and better integration with other military platforms.

"The future of air force rescue is secure and our team is ready to recover anybody, anytime, anywhere, against any adversary," says Colonel Russ Cook, commander of the 23rd Wing, one of the first USAF units to receive the new type.

Giant legacy

The HH-60W, whose Jolly Green II name nods to the Vietnam War-era Sikorsky HH-3E "Jolly Green Giant", is the only dedicated CSAR helicopter in the US Department of Defense's fleet, and draws on "the proven survivability and reliability of the UH-60M Black Hawk", says Sikorsky. It was designed and built specifically for the role, which requires flying into contested or enemy-controlled areas to recover isolated personnel, the airframer adds.

Design features include the installation of a larger, 644USgal (2,438 litre)-capacity main fuel tank, versus the HH-60G's 360USgal tank, a new mission computer, plus improved armour and ballistic protection around the cockpit and cabin. Sikorsky notes that the platform's support and ownership costs benefit from "retaining 100% commonality with all UH-60M engine and dynamic components".

By contrast, the previous-generation Pave Hawk – operated since 1982 – is described by the USAF as being a "highly modified" variant of the US Army's baseline UH-60.

"This [IOC] declaration is a vote of confidence from USAF leadership and demonstrates the critical role of the HH-60W," says Nathalie Previte, vice-president of Sikorsky's army and air force systems division.


The USAF in June 2014 selected the HH-60W via its Crew Rescue Helicopter competition, the highly specific requirements for which precluded potential rivals from submitting bids. Its programme had a projected total cost of \$7.9 billion, with an original schedule calling for initial deliveries to take place during fiscal year 2019.

The service took its first examples of the type in 2020, and performed final operational test activities earlier this year. In a June report, the US Government Accountability Office noted that these had been delayed by around eight months, "due to lack of access to mission-ready aircraft equipped with an operational radar warning receiver".

Additional reporting by Craig Hoyle in London



HH-60W is refuelled by an HC-130J tanker as part of developmental and operational testing


 Assets like the F-22 offer great capability, but high costs have constrained fleet size

US Air Force

USAF not fighting fit, general warns

Air Combat Command chief reveals concern over erosion of squadron numbers moving service into 'era of strategic risk'

Ryan Finnerty Washington DC

The US Air Force (USAF) does not have enough multi-role fighter squadrons to adequately support the missions it has been assigned, according to General Mark Kelly, the commander of the service's Air Combat Command.

At the Air & Space Forces Association conference near Washington DC on 21 September, Kelly said the USA no longer fields an overwhelmingly dominant air force.

"We have [left] the era of conventional over-match and entered an era of strategic risk," he says.

Kelly, a Boeing F-15 pilot, argues that the USAF needs 12 more multi-role fighter squadrons to meet global demand for air combat power. The service currently operates 48 such fighter-interdiction units, plus an additional nine squadrons equipped with the Fairchild Republic A-10 ground-attack aircraft.

With a USAF fighter unit totalling 18 to 24 aircraft, adding 12 squadrons would represent a substantial acquisition. Kelly calls for adding 72 new aircraft annually.

In a speech titled "The force we present", Kelly described the decline in US air combat power.

At the time of the 1990-1991 Gulf War, the USAF maintained 134 fighter squadrons, he notes. Ten years later, at the time of the 11 September 2001 terrorist attacks, that number was 88.

In an August report, the Mitchell Institute for Aerospace Studies said the decline in the USAF fleet was the result of two decades of budgets prioritising the US Army during ground wars in Iraq and Afghanistan. This led the USAF to adopt a "divest to invest" strategy, during which the service deactivated older assets to free money for investment in modernisation.

The report was highly critical of that approach, saying: "The nation requires much more from the air force than the resources allocated to it allow."

Flight hours

In addition to having just half the fighters and one-third the bombers it maintained in 1990, some 80% of the USAF's current fighters exceed their specified design lives. Also, flight hours per fighter pilot have decreased over the same time to roughly 20 monthly, the report added.

While Kelly says the USAF boasts some of the most advanced and highly capable aircraft, he stresses that capability is not a substitute for capacity. Referring to the European theatre during the Second World War, he notes that while the capabilities of German aircraft and rockets were unmatched, the UK and USA had many more aircraft, enabling the Allies to subdue the Luftwaffe and German industry.

In that campaign, air superiority allowed Allied ground forces to advance across the continent

and liberate Western Europe. The alternative, Kelly says, would have been a long and bloody slog, akin to the fighting that is now happening in Ukraine.

"If a nation wants an air force that can execute air superiority at a time and place of its choosing... then you need a first-class air force," Kelly says.

USAF leaders like Kelly, and analysts from groups like the Mitchell Institute, say the USA's air power strategy has been steadily veering toward capability and away from capacity.

A recent war game conducted by the Center for Strategic and International Studies suggested that the USA and allies in the Western Pacific could lose up to 900 aircraft in a conflict with China over Taiwan.

Kelly says deterrence and security commitments in Europe and the Asia-Pacific region alone require 20 fighter units, while another eight are needed to support operations in the Middle East.

North America also has a substantial need for combat air power, with eight squadrons tasked to homeland defence, eight to provide air security to the president and capital region, and eight in reserve.

The final eight units in his 60-squadron vision would be removed from operational duty for aircraft modernisation and retrofits.

"When you have conventional over-match, strategic risk is low," he says of the proposed strengthened organisation. ■

Lilium continues transition

German developer stays firm on certification target for eVTOL jet, as demonstrator performs key manoeuvre

Dominic Perry London

Lilium's new chief executive says the start-up remains confident that it can obtain European certification in 2025 for its electric vertical take-off and landing (eVTOL) jet.

But former Airbus executive Klaus Roewe – who joined the company on 1 August – told investors on 28 September that flight testing of the Lilium Jet could still throw up unexpected issues.

"We are confident with 2025 but we only know now what we know today," he says.

To date, flight testing has been conducted with a series of remotely piloted, scaled demonstrators, the latest of which, Phoenix 2, carried out a high-speed full transition on 23 September during a flight from Lilium's base in southern Spain.

Achieved at 100kt (185km/h), the transition for the first time involved the electric fans in both the wings and the canards tilting for forward flight. A transition using solely the wing fans was achieved in June.

In a quarterly letter to shareholders released on 28 September,

Lilium says the flight testing validates its computer modelling of the manoeuvre. "At each juncture, our computer models predicted what the real-world aircraft would do – something now validated again by real-world testing."

An additional scaled test asset, Phoenix 3, has since joined its sister aircraft in Spain and will fly later this year. However, a production-representative prototype of the piloted Lilium Jet will not be airborne before 2024.

Ducted fans

Known internally as "Pegasus", the certification article will feature 30 battery-powered ducted fans, rather than the 36 seen on the demonstrators, and will use a production-compliant battery system.

A critical design review milestone should be passed in mid-2023, giving the company around a year to assemble the aircraft.

"It takes so long because we want to do it thoroughly and with rigour," says Roewe.

Although he concedes that there will be "challenges" in bringing the six-passenger aircraft into

service, the company's 2025 goal should not be impacted, he says, observing: "A schedule that has no margin is condemned to fail from the beginning."

Additionally, Lilium claims internal testing of its batteries indicates they will achieve the company's target of at least 800 cycles at service entry. These results will now be independently verified, it adds.

Range and payload capabilities of the production Lilium Jet will hinge on the ability of the Zen-labs/Customcells-sourced cells to deliver as promised.

Based on current test data and modelling, Roewe says the Lilium Jet's "operational range" will be 94nm (175km), with a maximum range of 135nm, "the delta being reserves that you need to hold".

However, confirmation of those figures will only be obtained when the full aerodynamic and propulsive efficiency of the aircraft is known. Full-scale windtunnel testing will begin shortly, he says, adding to ongoing ground trials of the ducted fans.

Lilium continues to work with the European Union Aviation Safety Agency (EASA) on the certification

Vertical on the up after VX4's first flight

Vertical Aerospace has performed a short tethered first flight of its four-passenger VX4, kicking off the test campaign for the electric vertical take-off and landing (eVTOL) aircraft.

Conducted inside a hangar at Kemble airfield in Gloucestershire, southwest England on 24 September, the flight lasted a little over 10min, reaching a height of about 1m (3ft).

Vertical's chief test pilot Justin Paines was at the controls for the mission, a break from some of the company's eVTOL rivals which have opted to carry out uncrewed maiden sorties.

Vertical says it had to demonstrate higher safety standards in order to gain regulatory permission for the crewed first flight.

Vertical will now progressively increase the height of the VX4's tethered flights, reaching a maximum of 15m.

Under a test plan outlined by the manufacturer, once tethered flights are complete, the VX4 will move to low-speed untethered flights at a height of up to 15m, before transitioning from vertical to horizontal flight – with its rotors tilted forwards – and envelope expansion work, which

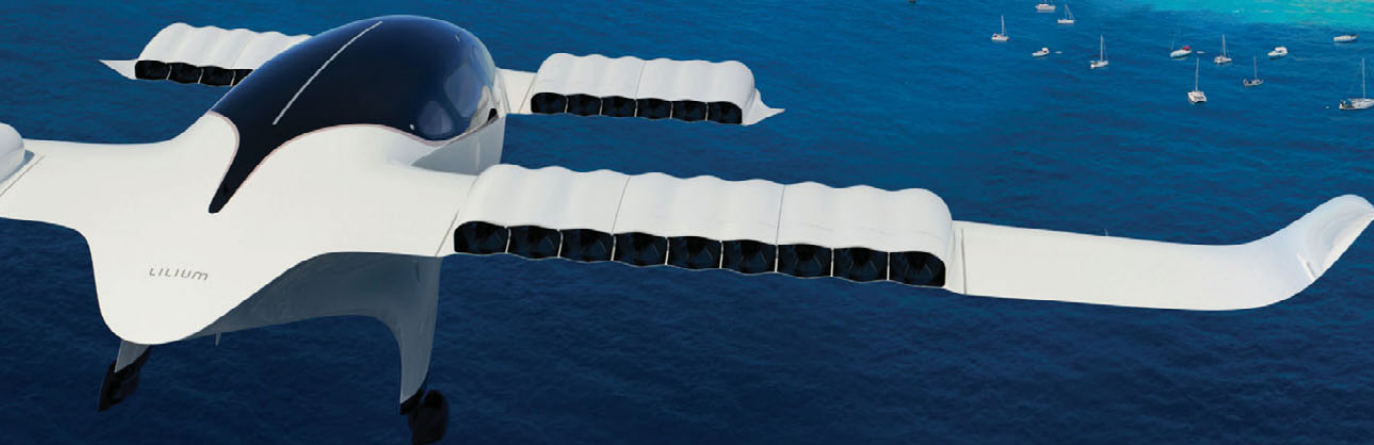
will be carried out at altitudes of 5,000-10,000ft.

Vertical says it is too early to know the schedule of subsequent tethered flights, or when the VX4 can make an untethered sortie. Certification is targeted for 2025.

Future test aircraft will follow; the initial example is not equipped with the Rolls-Royce-supplied electric propulsion units that will power production aircraft.

Customers for the VX4 include American Airlines, Gol, and Virgin Atlantic Airways. Vertical says it has received more than 1,400 conditional pre-orders for the aircraft.

Aircraft's operational range is expected to be around 94nm



means of compliance for the jet, with around 28% still to be agreed.

Roewe says the most important items have already been ticked off, adding: "I would say it's a matter of keeping the momentum and rigour we have with EASA to get them done."

Lilium, like all start-ups with no revenue, needs to continue bringing in investment in order to fund its development spending.

Cash spend in the three months to end-June was €63 million (\$60 million), in line with the €60 million outlay in the previous quarter.

Cost control

However, Lilium anticipates a rise in spending in the second half due to "increased supplier contracting activity". This will be offset by "active budgetary measures, including headcount control", it adds.

Full-year spending will be around €250 million, it says. Liquidity at the end of the second quarter was €229 million, and an additional €75 million line of credit became active on 24 June.

Chief financial officer Geoff Richardson says the company is

"At each juncture, our computer models predicted what the real-world aircraft would do – something now validated again by real-world testing"

Lilium

evaluating its future requirements, including an inflow of pre-delivery payments (PDPs) from next year.

"I am very confident that between the PDPs, future potential debt and potential equity opportunities we will be able to extend the cash runway," he says.

Lilium intends to begin converting tentative deals into "binding commercial agreements" by the end of 2023. In addition, the company has recently applied for a "fairly significant government loan" from an undisclosed country.

Such grants are a "very attractive, non-dilutive part of the mix going forward", Richardson adds.

Lilium will initially offer a four-passenger version of the Lilium Jet designed for the premium market, before bringing a 'shuttle' variant into service. It has amassed 483 commitments for the aircraft, with the most recent a 12-unit deal with Austria's Globe Air for operation in southern France and northern Italy.

Additionally, it plans to launch sales of the Lilium Jet to private individuals, with the aircraft to feature a "tailored cabin and dedicated services on attractive financial terms"; an orderbook for this model will open later this year, Lilium says. ▶

ZeroAvia tows Caravan to new era

Fuel cell propulsion specialist selects venerable Cessna single-engined turboprop for retrofit conversion programme

David Kaminski-Morrow &
Dominic Perry London

Advanced powertrain developer ZeroAvia has selected the Cessna Grand Caravan as the launch platform for its ZA600 hydrogen fuel cell propulsion system, with certification targeted for 2025.

Covered by a “non-exclusive” development agreement between ZeroAvia and Cessna owner Textron Aviation, the partners will work to integrate the 600kW ZA600 powertrain onto the Grand Caravan.

ZeroAvia says its solution will be available as a retrofit for existing Grand Caravan customers, with the replacement of the 675shp (503kW) Pratt & Whitney Canada PT6 engine with the ZA600 powertrain to be covered by a supplemental type certificate (STC).

Tanks for gaseous hydrogen will be located underneath the Grand Caravan’s wing, “ensuring operators can maintain seat capacity or cargo space”, says ZeroAvia. But it has not detailed the planned location for the fuel cells and related systems.

In June, ZeroAvia indicated it hoped the ZA600 would be certificated in 2024. It is not clear if the new 2025 target relates to the aircraft STC or to the powertrain itself.

ZeroAvia has previously announced agreements regarding Grand Caravan conversions, including with the Red Sea Development Company and low-carbon lessor Monte.

Development of the ZA600 powertrain has been taking place under the UK government-funded HyFlyer II programme, modifying a twin-engined 19-seat Dornier 228 to run partly on fuel cell power.

The aircraft’s port-side Honeywell TPE331 turboprop engine has been replaced with an electric motor, while the fuel cell and cooling systems, and gaseous hydrogen tank, plus back-up batteries, are housed inside the rear fuselage.

Flight tests of the converted Do 228 from ZeroAvia’s UK R&D facility



Modification will see hydrogen stored in under-wing tanks

at Kemble airfield in Gloucestershire are “anticipated over the next few weeks”. Medium-speed taxi tests were conducted in September.

ZeroAvia’s focus on the venerable Grand Caravan is the latest modification project to target the utility turboprop. Battery- or hybrid-electric conversions are already being proposed for the platform by Ampaire, Dovetail Electric Aviation and SurfAir Mobility.

New acquisition

Meanwhile, ZeroAvia has bolstered its powertrain capabilities with the acquisition of fuel-cell stack specialist HyPoint.

ZeroAvia has co-operated closely with HyPoint, particularly in the UK, over the past couple of years.

The acquisition follows a tie-up with Scandinavian energy company PowerCell Sweden, for the supply of low-temperature proton exchange membrane (PEM) fuel-cell stacks.

ZeroAvia says the latest agreement, the terms of which have not been disclosed, gives the company access to HyPoint’s high-temperature PEM fuel-cell technology, describing it as a “promising avenue” to increased energy density and power output.

ZeroAvia chief executive Val Miftakhov, who was already on HyPoint’s advisory board and had personally invested in the company,

says the deal is a “hugely important step” to consolidate its position in hydrogen-electric powertrain development for the aviation sector.

“There are no other organisations with the breadth of expertise and world-leading intellectual property in hydrogen-electric aviation that we now have,” he adds.

HyPoint’s engineering team will join the ZeroAvia hydrogen power-generation systems division and will be integrated with ZeroAvia across UK sites in Kemble and Sandwich, Kent, where HyPoint opened a new facility in February.

ZeroAvia says HyPoint chief Alex Ivanenko will become general manager for VTOL and new segment development, focused on rotorcraft and other activities beyond the fixed-wing propulsion sector.

“HyPoint has garnered recognition as an innovator developing technology with the potential to significantly expedite the introduction of fuel cell propulsion into larger aircraft,” says ZeroAvia.

Ivanenko states that the acquisition is a “natural next chapter” for HyPoint, enabling it to take advantage of ZeroAvia’s resources.

“It will accelerate our product development and, as a result, partners from different market segments will get mature products based on novel [high-temperature] hydrogen fuel cells,” he adds. ▀

AW189 behaved like 'nodding dog' due to software glitch

UK search and rescue helicopter performed a series of uncommanded pitch changes during training flight



Dominic Perry London

A software shortcoming caused a search and rescue (SAR) helicopter to behave like a “nodding dog” as it performed a series of uncommanded pitch oscillations, UK investigators have determined.

In its final report into the 30 July 2021 incident, the Air Accidents Investigation Branch (AAIB) says the Leonardo Helicopters AW189 (G-MGCT) cycled through repeated pitch changes of up to 20° after its pilots selected particular SAR modes in the automatic flight-control system (AFCS).

In that instance, which took place during a training flight off the southwest coast of Scotland, its crew was attempting to replicate behaviour the co-pilot had experienced on a similar sortie earlier that month, on 5 July.

“Owing to concern of the hazard that this flightpath behaviour may present in a degraded visual environment, the crew decided to fly the same profile and configuration in day VMC [visual meteorological conditions] to see if the unexpected flightpath oscillations re-occurred,” says the AAIB.

Following the completion of training tasks, the crew set-up the helicopter for a flight management system-directed sector search pattern – a SAR-specific function – at 1,000ft. As soon as the pilot monitoring selected the transition down mode, which triggers an automatic descent to 200ft above ground level on the AFCS, “the aircraft began to oscillate in pitch”.

“On recognising the unusual flightpath behaviour of the aircraft, the pilot flying deselected the autopilot modes and returned the aircraft to normal stabilised flight,” the AAIB says.

Subsequent analysis of the flight-data recorder showed the AW189 pitching up to a maximum of 12°, then shifting to 3° down before the helicopter was returned to level flight as the crew took manual control.

Similarly, data for the 5 July incident showed the “helicopter entered a cycle of pitching up and down manoeuvres, with the biggest transition being from 6.9° nose down to 17.1° nose up about 6.5s later”, the report says.

The co-pilot described the helicopter as behaving in a “nodding dog cycle”, while the pilot who was flying said it was “not violent but uncomfortable”.

Behaviour reproduced

Test flights carried out by operator Bristow Helicopters in September 2021 also successfully reproduced the behaviour across multiple airframes; pitch oscillations typically ranged between 17° nose up and 8° nose down, the company’s test pilot reported.

A review of the incident data conducted by Leonardo Helicopters determined that there was a “software design shortcoming” that had been introduced during the development of the Phase 5 software standard for the AW189.

Although the operational capability for SAR missions had been improved with the Phase 5 software release, it also created a

“priority conflict” between two modes, where, in certain circumstances, “the system is trying to acquire both a groundspeed and a separate airspeed datum”, says the AAIB.

“Pitch is used to control speed and the different speed targets result in pitch oscillations,” the AAIB notes.

Risk assessments carried out by the manufacturer and regulators in Europe and the UK concluded that the helicopter’s behaviour, although a non-compliance issue, was “not unsafe”.

Leonardo Helicopters has since incorporated a fix into its Phase 9 software release, which gained certification in July this year.

Uptake of the Phase 9 software by UK AW189 SAR operators – chiefly Bristow – will be monitored by the Civil Aviation Authority, the report adds.

In addition, the AAIB points out that the 5 July incident was not reported by the pilots at the time or caught by Bristow’s helicopter flight data-monitoring (HFDM) system; the investigation was only triggered after the crew reported the 30 July event.

“The fact that this event was not detected through the HFDM programme highlights that there can be events where the safety of the aircraft can be potentially put at risk, without other elements of the [safety management system] detecting it,” it says.

Bristow has since “reinforced the need for flightcrews to report events regardless of the perceived severity or completeness of the detail,” the AAIB adds. ▀

Asia-Pacific's MR-woe

As flight demand rebounds in the region, with a knock-on effect for maintenance services, providers are wrestling with a clutch of issues, including a sluggish supply chain

Alfred Chua Singapore

At the MRO Asia-Pacific exhibition in September, there were two words on everyone's lips – supply chain.

Like their airline counterparts, MRO providers in the Asia-Pacific see “encouraging” signs of recovery in the region, especially with border restrictions largely eased. As more flights resume and aircraft are used more intensively, the positive impact has been seen in business areas such as line maintenance, according to suppliers FlightGlobal spoke to at the event.

However, amid the sense of optimism that a corner has been turned, MRO providers are acutely aware that more pressing challenges await them, including a tight labour market and high levels of inflation.

But the biggest concern of all relates to the supply chain.

According to many MRO providers, the issue was already apparent before the coronavirus pandemic, but was made worse both by firms downsizing during Covid-19, as well as the war in Ukraine. They state there is little to do but to wait, as workshop timelines get pushed to the right, and schedules are reshuffled due to component delays.

Coupled with a strong uptick in maintenance requirements, MRO firms acknowledge they are treading a delicate line between demand and supply.

HAECO chief commercial officer Richard Kendall tells FlightGlobal

that while supply chain issues have not affected base maintenance work “as much”, the impact has been more profoundly felt in its cabin services division, which manufactures cabin products and performs cabin modifications and retrofits for airline customers.

He says: “We have seen impact in terms of cabin modification programmes being affected by kit supplies. But we have our own manufacturing – we are an OEM ourselves in terms of cabin seating and interior, monuments and samples – and we’ve definitely seen supply chain issues affecting our own delivery performance.

180

Maximum number of days it took for parts ordered by AirAsia-linked MRO provider ADE to arrive

“We have operators coming to us saying that an aircraft has been booked for a C-check and a cabin modification programme... but we don’t have a kit for that, so we have to bring in another aircraft for a C-check and [postpone the cabin modifications] to a later date,” Kendall says.

Collins Aerospace regional director for customer and account management Hart Duan adds: “Demand forecasting is getting more difficult as the post-pandemic recovery

does not follow any conventional trends we have experienced before.

“I think it’s important for the industry to establish strong local presence and sourcing capabilities in countries throughout Asia-Pacific to minimise their exposure to evolving market and trade forces, and work closely with their customers to better understand their needs for more accurate forecasting on demand and requirements.”

Mahesh Kumar, chief executive of Malaysia-based Asia Digital Engineering (ADE), says managing supply chain issues “was a bit tough” as flight operations restarted following the lifting of travel restrictions: parts ordered by the AirAsia-linked MRO provider for maintenance services could take up to 180 days to arrive.

“The lead time to get parked aircraft back in the air is taking longer. A check which would be done in two weeks in the past now takes up to four weeks,” Kumar notes.

He adds: “We want things to move quicker but on a positive side I will say [the situation] is really improving compared with nine or 10 months ago.”

Various excuses

However, Cebu Pacific engineering and fleet management senior advisor Shevantha Weerasekera is blunter in his assessment: “The supply chain issues are global, and the suppliers and vendors are giving everybody various excuses [for delays].”

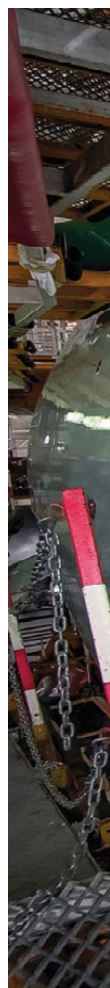
Weerasekera contends that major markets – save for China – have already dropped pandemic restrictions, and that the Ukraine crisis began more than six months ago, which should have given suppliers enough time to plan for a production ramp-up or to source raw materials from alternative providers.

“They didn’t plan for the capacity. They didn’t plan for the ramp up. They were taken by surprise,” he tells FlightGlobal.

“It is a domino effect, but because the head of the process failed to

“The lead time to get parked aircraft back in the air is taking longer. A check which would be done in two weeks in the past now takes up to four weeks”

Mahesh Kumar Chief executive, Asia Digital Engineering





HAECO is working to bring young people into industry

HAECO

plan and failed to take some mitigating actions... they're just [kicking] the bucket all the way to the end, and [hoping that] the airline [will] either absorb the problem or pay up to try to fix it," he says.

"[There] is a need for the front end, the shops, to actually get their act together and work on supply chain," Weerasekera adds. He believes such issues should be resolved by the first-quarter of 2023.

But once the supply chain has been dealt with, other issues, notably around manpower, will still need dealing with.

Kendall says labour "remains our biggest challenge", particularly in Hong Kong and the USA, where it also has MRO presence.

While HAECO did not lay off any of its workforce during the two years of the pandemic, Kendall says "it doesn't mean that we've retained everybody", noting that workers have left the company either through retirement or leaving the industry entirely.

"We're having to work quite hard to bring young people into the industry. We're competing with maybe more exciting-sounding

careers, like IT, to encourage people to become an aircraft mechanic," Kendall adds.

Duan highlights the importance of trained staff: "MRO skillsets are very specific and highly dependent on product training. It typically takes up to six months to train a competent technician. Likewise, retaining skilled labour is crucial in ensuring a sustainable growth for our MRO operations."

Skilled labour

Weerasekera says a key priority for Cebu Pacific is in retaining skilled labour, some of whom join the airline before leaving to operators or providers in other regions after a few years.

But the airline has been "doing a lot" to retain staff, he says: "[We] are doing a lot to educate staff, give them career opportunities, give them training, and make the work atmosphere a lot more fun."

Despite the challenges, Mahesh is bullish about ADE's prospects, noting that its new 14-line hangar in Kuala Lumpur will be ready by early 2024, allowing a rapid expansion in maintenance capacity.

The MRO provider is also "exploring opportunities" in passenger-to-freighter conversions. Mahesh says that with the expanded hangar capacity, "we can allocate some of the lines to concentrate on freighter conversions".

"My immediate priority now is to ramp up the business... to do more checks. We are getting a lot of serious requests from third-party airlines," he says. At present, nearly 90% of ADE's business comes from AirAsia Group carriers.

Kendall says engine maintenance and component repair are two key areas of focus for HAECO in the near term. But further out, the firm is also keen to explore the opportunities presented by advanced air mobility, particularly in mainland China.

"We're working with an operator there to help them achieve airworthiness certification for their aircraft and looking to develop a maintenance programme," he says.

"It's certainly an exciting aspect of the market in the future, and one that the [MRO providers] will have to be involved with as well," Kendall adds. ▀

Don and dusted

Decision to close Doncaster Sheffield airport followed years of financial losses as airport struggled to build critical mass

David Kaminski-Morrow London

New UK prime minister Liz Truss will need more than assurances that regional connectivity is vital to economic growth to avoid Doncaster Sheffield following Sheffield City airport into Yorkshire aviation obscurity.

Doncaster Sheffield's financial performance hardly helps its case. It has never made a full-year operating profit since commercial operations began in April 2005.

While its near-2,900m (9,500ft) runway – more than twice the length of Sheffield City's, which closed in 2008 – was considered an advantage for attracting airlines, Doncaster Sheffield struggled to build a critical mass of activity in the face of macro-economic hurdles.

Even as it opened, with operations from leisure company TUI, as well as Thomas Cook and Ryanair, the airport's operator cautioned that commercial aviation was a "tough" market. The prevalence of low-cost services would mean aeronautical returns were "minimal", it said, which meant relying on non-aeronautical revenues.

But it managed to attract long-haul interest – with holiday flights to destinations including Mexico, the Caribbean, and Florida – as well as budget carriers Wizz Air and Flybe. Passenger volume climbed steadily and peaked at more than 1 million in the 2007-2008 financial year, although the airport was heavily dependent on TUI, which accounted for 60% of passenger business.

Terminal capacity remained "considerably greater" than utilisation, the airport operator acknowledged in its statement for the year, and it attributed a persistent loss-making position to the "challenging market comprising our catchment area".

Located in the north of England, Doncaster Sheffield was able to handle aircraft the size of Boeing 747s – a legacy of its beginnings as RAF Finningley – but scheduled cargo services proved elusive and freight activity was intermittent.

The global economic downturn in 2008-2009 caused substantial problems in both the passenger and freight sectors.

Capacity reductions

TUI's merger with holiday firm First Choice resulted in reductions in capacity, while Ryanair began rethinking routes as a consequence of Irish taxation.

Passenger numbers began to decline, and while the airport operator claimed carriers saw the benefits of Doncaster Sheffield, it said strategic decision-making in response to market forces – rather than lack of consumer demand – was affecting the level of activity.

With better access to the airport promised through a link road project, the operator sought to develop the airport as a major low-cost carrier base. EasyJet and Aer Lingus Regional established new operations but slow economic recovery and political instability in holiday markets caused passenger numbers to slide to fewer than 700,000 by 2014.

Although passenger numbers started to rise again in 2015 – with a growth rate claimed as the fastest outside of London – the airport was hampered by high operating costs, and its financial performance was affected by impairments.

The airport restored passenger numbers to the 1 million mark during 2016-2017, after nearly a decade, and with the link road nearing completion and additional airline services emerging – including a Flybe base and scheduled freighter operations – the operator was optimistic, even as it cautioned about the "major challenge" to air transport arising from Brexit.

But as the airport recorded its highest annual passenger levels, 1.29 million, in March 2020, the onset of the coronavirus pandemic threatened to unravel the business. After Flybe had ceased operations, Wizz Air stepped in to set up its own base in October 2020, but when Wizz reconsidered its strategy and opted to close its Doncaster Sheffield base – leaving only TUI as a based company – the airport's owner, Peel Group, lost patience.

Peel Group initiated a review of the airport's business case, but could not identify proposals which could deal with its "fundamental lack of financial viability", given the high fixed costs and slump in the air transport market. Absent of a rescue, the provision of aviation services at Doncaster Sheffield began winding down from the end of October. ▀



Annual passenger levels peaked at 1.29 million in March 2020

Airline's inclusion will take membership to 19 carriers



Virgin adds to SkyTeam's ranks

Air France-KLM alliance adds first new member in eight years with invitation to UK carrier

David Kaminski-Morrow London

SkyTeam has added its first new member in over eight years with an invitation extended to the UK's Virgin Atlantic Airways.

Virgin has long been associated with SkyTeam through its strong ties with alliance members Air France-KLM and Delta Air Lines, with the latter holding a 49% stake in the UK carrier.

But at an event in London on 27 September Virgin disclosed it would finally formally join the alliance.

Virgin Atlantic chief executive Shai Weiss says the membership was the "next extension" of its relationship with SkyTeam partners following its inclusion in the transatlantic joint venture.

While the prospect of SkyTeam membership has been floated for several years, Weiss says the pandemic "taught us that the strength of partnerships is profound".

He says the carrier had been "ferociously" independent until the joint venture tie-up, adding: "We're proud of our independence, but proud to be part of a partnership."

SkyTeam chief Kristin Colville says the alliance has been "shooting" for Virgin's inclusion from the beginning of next year, but indicates that a precise date beyond "early January" has yet to be firmed.

"We didn't want to commit [to a date] at this point," she says.

Colville says Virgin will become the first UK SkyTeam member, adding that it will benefit from increased opportunities to expand its network.

"Customers will have more ways to earn and burn miles while enjoying the service for which Virgin Atlantic is renowned," she says.

Virgin Atlantic operates to 12 US destinations in co-operation with Delta and Air France-KLM, and is expanding to Tampa in November.

It also serves cities in the Caribbean, China, India, Israel, Nigeria, Pakistan, and South Africa.

SkyTeam's inclusion of Virgin will take membership to 19 carriers, but the alliance is not prioritising further expansion.

"The focus is not on growing SkyTeam," Colville says. "It's not something we're looking at."

Colville says the alliance is concentrating on digital technology simplification to smooth passenger connections between its members and ensure the "disparate" systems of the various airlines are able to communicate.

This programme is starting to roll out, says Colville, and she expects all the SkyTeam carriers to be connected within six months.

"It's not to say that, once we have Virgin Atlantic on board, that we won't be open to new members if

Current SkyTeam members

Carrier	Country
Aerolineas Argentinas	Argentina
Aeromexico	Mexico
Air Europa	Spain
Air France	France
China Airlines	Taiwan
China Eastern	China
Czech Airlines	Czech Republic
Delta Air Lines	USA
Garuda Indonesia	Indonesia
ITA Airways	Italy
Kenya Airways	Kenya
Korean Air	South Korea
KLM	The Netherlands
Middle East Airlines	Lebanon
Saudia	Saudi Arabia
Tarom	Romania
Vietnam Airlines	Vietnam
Xiamen Air	China
Source: SkyTeam	

they bring value to existing members and customers," she states.

SkyTeam has undergone recent changes including the replacement of Alitalia by successor carrier ITA Airways, while Russian carrier Aeroflot's membership is currently suspended. **D**

AirTeamImages

H2 Clipper launches funding round

Start-up sees opportunity for hydrogen-powered transport in the near future, with 300m-long airship at heart of its plans

Dominic Perry London

US start-up H2 Clipper will shortly launch a Series A funding round, advancing plans to build a prototype of a revolutionary hydrogen transport and delivery system based around a 304m (1,000ft)-long airship.

Using gaseous hydrogen for lift and liquid hydrogen to run fuel cells powering five electric motors – two on each flank and one on the stern – H2 Clipper claims the airship will be able to transport a payload of up to 252t of cryogenic hydrogen. Range is projected to be 5,200nm (9,650km) or more.

Speeds of 130-260kt (240-480km/h) should be achievable thanks to the low-drag design of the fuselage, which is also shaped to generate lift, says founder and chief executive Rinaldo Brutoco.

Brutoco, who has a finance rather than aviation background, sees a huge opportunity from the growth in green hydrogen production in the coming decades.

He says the industry's ability to increase hydrogen output will not be the limiting factor to its future use, but "how to get that supply from where it's produced to market; the bottleneck is transportation".

H2 Clipper's airship is the solution to that problem, he argues, claiming the high speed and vertical take-off performance cannot be matched by other modes, particularly sea freight.

"We deliver the payload more efficiently: we can pick it up at a factory and deliver it direct," Brutoco says.

Construction of subsystems for a 40%-scale prototype should begin in around nine months, with final assembly of the prototype starting in 2024 at an undisclosed location in the USA, says chief financial officer Joe Massaquoi.

Capital needed

H2 Clipper is in the process of finalising that site, which features pre-existing hangars, with the company ready to move in next year. A greenfield location will then be selected for the eventual production facility, also in the USA, he adds.

Massaquoi says H2 Clipper will seek a maximum of \$50 million from the Series A funding round, and estimates a total requirement of \$250 million to complete development of the prototype aircraft, with "significant capital needed" to scale up for production.

On top of the equity investments, the company will seek finance from

a variety of sources, including colateralisation of assets, state and federal government grants or other incentives, plus customer deposits.

While the operating concept is revolutionary, Massaquoi sees nothing in the airship's construction or fuel cell-based propulsion system that will require costly additional development; meanwhile, talks are ongoing as H2 Clipper begins to firm up its supply chain, he adds.

First flight of the prototype airship should be in 2025, leading to customer deliveries of the full-scale vehicle by 2029. That schedule aligns with when planned green hydrogen production plants are due to come on stream, Brutoco says.

In addition to the transportation of hydrogen, the airship also has capacity for 45 20ft ISO freight containers, opening up another revenue stream for operators. H2 Clipper claims its airship will offer twice the payload capacity and up to 10 times more cargo volume than conventional freighter aircraft.

Brutoco is confident that the airship will offer the market a genuinely disruptive solution: "We spend all this time talking about what we put in the fuel tank, but to some extent the question is whether we have the right aircraft rather than the right fuel." ▀



Airship is expected to have a top speed of 260kt

H2 Clipper



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Omani low-cost carrier SalamAir placed a firm order for six Embraer E195-E2s, plus six options, for delivery from the end of 2023

Embraer

Best of the rest

We showcase some of the other notable events covered by the FlightGlobal team between issues

A Sikorsky CH-53 helicopter was loaded onto an Airbus A300-600ST Beluga using a new 35t-capacity outsize cargo loading system



Airbus

Paramount Group



Paramount Aerospace Industries delivered its first Mwari light aircraft, revealing orders for nine units from "multiple air forces"



Frontier Airlines took its first of 158 Airbus A321neo narrowbodies, naming the 240-seater "Frederick the Bald Eagle"

Frontier Airlines



Korean Air signed a memorandum of understanding to obtain sustainable aviation fuel from Shell for five years, starting in 2026

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Air Lease began supplying Poland's LOT with another six Boeing 737 Max 8s, to join its five already operational examples

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On the level?

Pilot mental health was thrust into the headlines by tragedies such as the Germanwings and MH370 losses, but many factors surrounding the issue can still cause flightcrew to stay silent

Pilar Wolfsteller Las Vegas

When pilot Alan Smith took an anti-depressant medication after a stressful relocation to a new city, he had no idea what lay in store: a months-long odyssey that almost derailed his future career prospects and cost thousands of dollars in unexpected expenses.

Smith was feeling a little on edge and he hoped a selective serotonin reuptake inhibitor, one of the most commonly prescribed anti-depressants, would help him settle. "I took one pill. I didn't like how it made me feel, so I stopped," Smith says.

He had already started flight training and, like all pilots, needed a medical certification before he would be permitted to fly solo or sit for exams. So he went to an aviation medical examiner (AME) who came highly recommended by the local pilot community.

But that is when Smith's nightmare began.

"Things got really weird. He asked me all sorts of questions that have nothing to do with my fitness to fly, like about my tattoos, and a drunk driving event I had 20 years ago," Smith says. "I wanted to be truthful, so I told him that I had taken a pill six weeks before. At the end of the appointment, he gave me a deferral and told me to expect a letter from the FAA. That wasn't the outcome I expected."

Application denied

A deferral, in the language of the Federal Aviation Administration, means the medical certificate application is denied. It thrusts the candidate into a burdensome, costly and time-consuming battery of psychological and neurological tests that many medical professionals consider outdated, archaic and irrelevant. It is the terrifying situation every pilot desperately tries to avoid.

"There was very little information online, but what I did find was, this was the worst case scenario, it's going to cost an obscene amount of money, and I might as well not expect [a certificate] at all," Smith says.

Pilots have strong opinions about mental health assessments. Ask a question about the topic in any pilot forum and reactions will range from anger to frustration and helplessness.

"I wanted to be truthful, so I told him that I had taken a pill six weeks before. At the end of the appointment, he gave me a deferral and told me to expect a letter from the FAA. That wasn't the outcome I expected"

Alan Smith Pilot

Pilot mental health – both in general aviation and commercial contexts – is a massive white elephant in the cockpit, say aviation medical professionals worldwide. That is because regulators hold all the power, and some say the system forces pilots to make unwise choices to avoid losing their permission to fly.

No pilot would shun medical treatment for a physical ailment – say, a fractured bone or stomach flu. However, a fractured psyche, even a few weeks of high stress, no matter the reason – is a much more delicate matter.

"Mental health assessments differ from physical evaluations due to limitations in objectively assessing mental health status at a specific point in time," says Ansa Jordaan, chief of the aviation medicine section at ICAO.

Jordaan founded and chairs the organisation's mental health working group, which is focussed on removing the social stigma associated with mental



Many pilots feel a cloud hangs over mental health assessments

health and enhancing trust between aviation licence holders and medical examiners.

"Mental health assessments are often subjective, with few tools that could provide an immediate objective indication of health status," she adds.

In other words, there are no blood tests or X-rays, and doctors typically diagnose based on discussions with patients. For that reason, people with mental health conditions might go years without a proper diagnosis, while others can be misdiagnosed.

"The interpretation of clinical observations, collateral information and reports is a complex process in reaching a decision to determine the risk to flight safety."

Strings attached

An admission of any kind of problem, or treatment, comes with many strings attached.

"One problem is that licence holders may not disclose psychological conditions or medications for fear of stigmatisation, loss of licence or loss of employment," says Jordaan. "Even worse would be to stop using a medication in an effort to maintain a licence or flight status, as this could pose an even greater risk to flight safety."

Brent Blue is a senior AME, based in Idaho. He calls the current assessment system "onerous and arcane".

"The FAA relies on a significant amount of testing that is not relevant for mental health," Blue says. **J**

▶ In the USA, pilots who take (or have taken) antidepressants – as did Smith – or those with a history of mental health issues are likely to be sent through the so-called Human Interventional Motivational Study (HIMS). The Airline Pilots Association, airlines and the FAA established HIMS decades ago to help identify and treat pilots with substance abuse problems.

“They threw the mental health section into that, and that’s caused a lot of major issues,” Blue says.

In a recent unscientific online survey, Blue asked pilots if they had ever used an anti-depressant medication and not reported it to the FAA. Almost half of the respondents answered in the affirmative. He then asked if they ever had mental health issues for which they did not receive professional help due to fear of losing their medical certification. Yes, said 63%.

The final question, “Do you think the FAA handles pilot mental health issues appropriately?” was met with resounding rejection, with 96% of respondents saying no.

“Most pilots who have been in that situation have lied,” Blue says. “They just don’t tell their AME or admit on the application forms that they have ever had depression or been on medicine because they don’t want the FAA to know that.”

“You can have a board-certified psychiatrist say, ‘This pilot is absolutely okay to fly’, and the FAA will say, ‘Well, he’s got to have this test, and this test, and this test’”

Brent Blue Senior aviation medical examiner

The upshot, he adds, is that many more pilots than the FAA knows take anti-depressants, and many who should be taking medication are not.

“This may be a hard pill to swallow, but the FAA’s psychiatric and psychological evaluation process is antiquated,” Blue says. “You can have a board-certified psychiatrist say, ‘This pilot is absolutely okay to fly’, and the FAA will say, ‘Well, he’s got to have this test, and this test, and this test, and spend literally thousands of dollars to try to get his medical back,’” Blue says. “It’s just crazy.”

The FAA meanwhile, maintains it has “made significant strides” in the mental health arena, and is asking the aviation community to “help change the narrative”.

“We can’t afford to lose even one more life that could be saved with early treatment that helps that individual successfully recover from their mental health condition,” Federal Air Surgeon Sarah Northrup wrote in a June 2022 medical bulletin. “Early treatment is a win-win: the person gets help more quickly; typically the symptoms are less severe; and obtaining a special issuance is more likely to be successful.”

Before issuing a medical certificate, the FAA requires that pilots report “any health professional visits during the previous three years, all medications being taken and other medical history... [including] questions about mental health”.

Blue thinks that requirement is ridiculous.

“Do you remember every medical or mental health visit you had in the last three years? Do you remember every supplement you’ve taken? I mean, come on! And more importantly – how significant is that? They’ve created this impossible system,” he adds. “Either by intent or inadvertent omission, the [pilot-submitted documents] are rarely correct.”

Urgent attention

Blue says the subject resurfaced after two aviation students committed suicide last year. “[They] had mental health issues, and they thought their careers were over,” he says. “That finally got the FAA’s attention.”

The FAA declined to make Northrup or any other medical expert available for an interview.

There are no easy answers on how to get pilots to open up about mental health. The stigma, shame and fear of permanent repercussions to their livelihoods and their passion – into which many have invested large sums of money for training – remains.

In Europe, pilot mental health was on aviation regulators’ priority list even before a mentally ill pilot flew an Airbus A320 into a French mountainside in March 2015, killing all 144 passengers and six crew.

Germanwings flight 9525 from Barcelona to Dusseldorf crashed after first officer Andreas Lubitz, who had previously been treated for suicidal tendencies and declared “unfit to work” by his doctor, withheld that information from his employer. When the flight’s captain briefly left the cockpit, Lubitz locked the door from the inside and initiated a controlled descent that continued until the aircraft crashed into the ground.

Former FAA administrator Steve Dickson recently called the Germanwings disaster “a wake-up call about pilot mental health”. Still, substantial problems – especially relating to trust – persist.



Stigma around mental health remains a factor for flightcrew

Germanwings disaster killed
150 people in March 2015



Arnold Jerocki/EPA-EFE/Shutterstock

“When it comes to mental health, we see that pilots are reluctant to self-report,” says Cristian Panait, a medical expert in the aircrew and medical department of the European Union Aviation Safety Agency (EASA). “After Germanwings we put a lot of effort into enhancing the system of trust between the AMEs and the pilots, to encourage them to speak up.”

EASA has implemented several changes in response to the accident. The regulator introduced a comprehensive mental health assessment at the beginning of pilots’ careers – before they invest in training – to detect certain pathologies that could develop into more-complex conditions.

In addition, most airlines now have peer support groups, which Panait says can encourage employees to talk about issues they face.

“The peer support groups are fully confidential. If the pilot cannot open up to the AME, at least a well-trained peer can recognise some signs and, if need be, refer the case to medical specialists, or just suggest to the airline that the pilot needs time off,” he says.

A third tactic is allowing pilots with certain diagnoses to fly as long as they receive treatment.

“It is better to know and to monitor, including any potential side effects, than not knowing, and the pilots hiding these things from us,” he says.

However, Panait admits, “It’s a very, very difficult balance” – and one of the hardest processes to improve. Mental health assessments remain an inexact science.

“It’s one of the areas of medicine about which is least known, and we don’t have enough tools to do a proper screening,” he adds. “We have several layers [now]. None of them is perfect, and we hope that

approach will allow a minimal number of people to slip through. The holes in the Swiss cheese are smaller.”

In May, EASA announced it is investing in research to modernise its approach to diagnosing and treating mental health conditions for aircrew.

“We’re trying to find better screening methods that would be safer, and would have less false negative and false positive results,” he says. “Either way is not good. If you have false positives, the pilot’s career is affected, and if you have false negatives then it’s the lives and the safety of the passengers which are affected.” That research is expected to be complete in mid-2024.

External factors

“Mental health covers a wide spectrum of psychological well-being,” Jordaan says. “All of us experience changes in our psychological well-being, even within short time periods. A person with no history of mental health problems might experience severe anxiety or stress due to external factors, and... should make the decision not to fly or work until they are better.”

A minor, short-term issue can thereby be prevented from escalating into a serious or chronic problem.

“Conversely, a person diagnosed with a mental condition could still be able to function safely while using aviation-approved treatment and being followed up regularly by a health professional,” she adds.

“Obviously, there are people who shouldn’t be flying,” aviation doctor Blue says. Those include individuals diagnosed with serious mental illnesses such as schizophrenia, personality disorders or at risk of uncontrolled seizures.

“But the most important thing to remember is, if I certify you today, every day that you get [in] that



Pilot of Malaysia Airlines flight MH370 is thought to have deliberately crashed 777

airplane, as long as the medical certification is valid, you are self-certifying that you're safe to fly."

Yet tragedies still happen. In October 2021, University of North Dakota student pilot John Hauser deliberately crashed his plane because he was afraid that his depression was likely to disqualify him from ever flying again.

A flight instructor based in Las Vegas took his own life in June 2022 for a similar reason. And in late July, a pilot jumped out of a twin-engined Airbus Defence & Space C212-200 in North Carolina after a hard landing attempt and subsequent go-around seemingly triggered a mental breakdown.

It also has been surmised that the crash of a China Eastern Airlines Boeing 737 in March 2022 that killed 132 was also intentional – an act by one of the pilots.

\$10,000

Potential cost to pilots of gaining a FAA-approved medical certificate to fly after treatment for mental health issues

Likewise, investigators think the 2013 crash in Namibia of a LAM Mozambique Airlines Embraer 190, which killed 33 people, was due to deliberate pilot action.

The US National Transportation Safety Board determined that a pilot deliberately crashed an Egyptair 767-300ER into the Atlantic Ocean in 1999, killing 217 people, although Egyptian authorities have disputed that finding.

And one of the biggest aviation mysteries in history, the disappearance of Malaysia Airlines flight MH370 in March 2014 with 239 people aboard, has been ascribed – but never actually confirmed – to a murder-suicide plot by one of the pilots of the 777-200 (9M-MRO).

Making the topic even more complicated is the fact that mental illness remains a taboo subject in many cultures, and within certain career groups.

Depression and anxiety among flightcrew are almost certainly just as common as in the population as a whole. Data shows that one in five people report

"symptoms consistent with depressive disorder", and nearly one in three have symptoms of anxiety. But in aviation, these are often interpreted as signs of weakness, causing embarrassment or shame. That means such conditions can go unrecognised, unacknowledged and misinterpreted.

Jordaan says, though, that awareness around mental health disorders is growing. With that awareness, differentiation is essential.

"This increased mental health literacy has become an ingrained part of society and people are more forthcoming about their mental health than before," she says. "The specific roles and responsibilities of aviation organisations for mental health are relatively new, however, and still evolving."

Sleepless nights

For Smith, who is pursuing a career as a cargo pilot, the decision to divulge having once taken a single anti-depressant pill cost him \$5,000 and too many sleepless nights to count. His quest to get a medical certificate sent him to three FAA-approved specialists and took almost six months.

For some candidates, the process can cost upwards of \$10,000 and take years, in part because of a shortage of FAA-approved professionals. It is not unheard-of for candidates to have to wait several months for an appointment and then to have to drive eight hours or more, perhaps to another state, to see that doctor.

Smith considers himself lucky, but his odyssey through the FAA's mental health maze is yet incomplete. He has now been flagged and it is still unclear what effect the episode will have on his long-term career prospects.

Knowing what he knows now, Smith says, if he had to do it all over, he would lie. "I'd just be quiet about it all to avoid undue hassle," he says.

He is frustrated that being truthful landed him in the FAA's HIMS programme, and angry that his experience is not unique.

"Aviation is my passion and my goal – why would I do anything to jeopardise that? Why would I purposely do something to risk a major goal in my life?

"If my story can help one other person not have to go through what I did, I'd be glad," he adds. "There has got to be a better way". ▀

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Loganair first officer James Bushe had to battle prejudice and outdated regulations to achieve his ambition of becoming a professional pilot, after going public about his HIV diagnosis

Positive thinking

Robin Evans London

“I didn’t realise until the day I was diagnosed with HIV how much I desperately wanted to become an airline pilot,” says Loganair first officer James Bushe. “That was absolutely it and I could not let the diagnosis stop that.”

Diagnosed in 2014, he challenged outdated rules to become the UK’s first HIV-positive, newly-licensed commercial pilot in January 2020. He then pushed for further change, announced by the Civil Aviation Authority (CAA) this summer.

“Ultimately, this all stems back to ICAO research of the early 1990s that has neither been challenged nor changed,” he says.

Bushe’s first hurdle was that the CAA permitted existing pilots who had contracted HIV to fly, but excluded aspiring ones. Supported by the charity HIV Scotland, he began telling his story under the pseudonym Pilot Anthony, gaining support from Members of Parliament. “My university background was law, and this was the first time I found a use for it,” he says.

The CAA relented, permitting HIV for initial medicals in 2018, with Bushe publicly declaring his status immediately after finishing line training. “I had that boyhood dream, overcame that barrier and got the job, but to tell that story I wanted to do it as me,” he says. “To continue as Pilot Anthony would have perpetuated all the fear, stigma and prejudices even I once had about HIV.”

Loganair chief executive Jonathan Hinkles backed his latest employee. “Before James completed his training we had 270 excellent pilots. We now have 271. HIV is not a bar to employment in other

industries and there is no reason why it should be so in aviation,” he says.

Public stigma remains rooted in a series of AIDS awareness advertisements of the 1980s in the UK, where a tombstone was a visual metaphor. Unlike society, HIV does not discriminate, affecting all demographics. Late heterosexual diagnosis remains stubbornly high in the UK – over half of diagnoses in this group are late, compared with 29% in the gay and bisexual community. By then, HIV is already compromising the immune system and increasing the probability of long-term health complications.

Caught promptly, a daily retroviral pill can suppress viral load to undetectable levels, meaning the virus becomes untransmittable: known as U=U. For people on stable treatment, HIV is now no bar to a normal life expectancy or starting a family.

Neurocognitive assessment

Until this year, the CAA still required pilots with HIV to keep an operating multi-crew limitation (OML) and undergo biennial neurocognitive assessment: several hours of traumatic testing to failure, attempting to define a baseline to detect cognitive decline. Now working in aviation, Bushe found an ally.

‘Pilot B’ was already flying when diagnosed in 2009. Concerned by a lack of guidelines, and how the regulator might treat him, he concealed his status. Continuing to pass simulator assessments, he became concerned about the increasing digitalisation of medical records. The pandemic presented the opportunity to resolve this dilemma and join forces with Bushe.

“When I put that uniform on I was just concentrating on flying, but privately it was very different,” says Pilot B. “I separated the two worlds. Probably very



Bushe became the UK's first HIV-positive, newly-licensed commercial pilot in 2020

“Before James completed his training we had 270 excellent pilots. We now have 271. HIV is not a bar to employment in other industries and there is no reason why it should be so in aviation”

Jonathan Hinkles Chief executive, Loganair

unhealthily, my process was to delineate my emotions completely. My treatment was working, my flying was working and keeping the two separate was manageable, but when they collided it became difficult.”

Conversely, Bushe's employer-approved disclosure integrated his pilot and protestor roles: “There was no bigger motivation than go to work every day, to speak about HIV and to advocate,” he says.

Both share an inner fire to effect change. “I've got this ally who feels the same – this great injustice we've got to try and right,” says Pilot B. “Initially it was very traumatic colliding my two worlds, but actually it's therapy. Connecting made us both laser focused.”

He describes a major turning point: “James and I put our uniforms on, went to Parliament and talked to the all-party group on HIV.” Their story shocked MPs, leading to an approach to the Secretary of State for Transport. “That put it on steroids, telling them we weren't messing around. I think that's when they started listening,” he says.

They began challenging the justification for the OML classification and neurocognitive assessments. “I knew that if anybody else wanted to do this, there were no guidelines for them to clearly find out how to make it happen,” says Bushe. Months of collaboration with the CAA and doctors produced a pathway: cognitive ability is now tested by simulator like any other pilot, with neurocognitive assessment only performed when decided by an individual's HIV specialist.

“Bigger than that, anyone can come forward until December and declare their status without fear of consequence,” adds Pilot B. “The CAA has shown a huge amount of humanity and now has a process that is the most progressive in the world. Anyone who felt they're just a process-driven organisation will see

in the new guidelines that they've become a more compassionate regulator."

The CAA announcement came 40 years after the death of Terry Higgins, the UK's first named person to die of an AIDS-related illness. Formed the same year, his namesake Terrence Higgins Trust (THT) assisted Bushe and Pilot B. Through initiatives like opt-out testing, the THT is targeting the end of new HIV cases by 2030.

A campaigning role is rare in pilots; though trained as rule-followers, they do so while considering risk and proposing alternatives. The THT suggests it is more common for professionals to challenge regulators today, with this case being particularly notable. "These are amazing individuals who think this is not right and that policy needs to change. They are not doing it for themselves, but those following after," the THT says.

Bushe's cause was bolstered by the recent BBC series *Sky High Club* about Loganair, where he describes reframing what a person with HIV looks like as a 'special' experience. "Doing that on national TV is huge. It motivates me to do both as well as I possibly can and particularly in uniform, change hearts and minds about what it means to live with HIV today," he says.

Updated science

Independently, the UK armed forces also recently removed their HIV-positive service ban, a move only equalled in South Africa. Royal Navy Lieutenant Commander Oliver Brown was diagnosed by opt-out testing in 2019. Naval medics declared him 'limited deployable', bringing restrictions on working aboard ship. Collaborating with the THT, Brown set out the updated science underpinning his case.

"As a modern and inclusive employer, it is only right that we recognise and act on the latest scientific evidence," the Ministry of Defence says.

In 2020, the European Union Aviation Safety Agency (EASA) published a review on certifying pilot HIV, which is available online. It said at the time: "The literature review did not reveal any risk that is not mitigated by the currently applicable implementing rules and associated acceptable means of compliance [AMC]."

When asked if there had been any subsequent update, particularly after the CAA announcement, EASA says: "More research would be necessary to justify any change to the AMC. Future research would need to focus more closely on the specific circumstances



"I'd hope this starts a movement now across the world for anybody with HIV who wants to work in this industry, as a pilot or air traffic controller"

James Bushe First officer, Loganair

of medically certified pilots so as to assess the impact of HIV-positive status, and of the side effects of combined antiretroviral treatment, on their fitness to fly and their general health and wellbeing."

Post-Covid society is familiar with concepts like viral load, testing and restricted freedoms. "Vaccination and track and trace were about a mechanism to prove people were safe to enter a country," says Bushe. "Successful HIV treatment is the same, where I'm safe and cannot pass the virus on to others. There's never been a better time to have that conversation while the connection between a virus and travel is fresh in minds."

Critically for commercial pilots, one in four countries impose movement restrictions on HIV status. "This naturally feels like the next step," says Bushe, noting that some countries conflate HIV and LGBTQ+ when these are separate, overlapping biases.

Any bar to a flying career also raises a question of "post-Germanwings" culture. If individuals aspire to the profession earlier than they would likely contract HIV, and with mental support increasingly important, how could regulators balance their safety case while supporting applicants? Bushe says: "The situation was discriminatory and devastating to someone whose wish since childhood was to become an airline pilot."

He adds: "I'd hope this starts a movement now across the world for anybody with HIV who wants to work in this industry, as a pilot or air traffic controller. We've given them a model to take to their regulator and say: 'all the work has been done'."

Now individuals worldwide, at different stages of their own journeys, are getting in touch. "Challenges are starting to be made," says Bushe. "There was a young person in India recently who applied for a medical, was told no in the same way I was, and is now having a medical with a restriction." ■

Additional reporting by Karen Speight

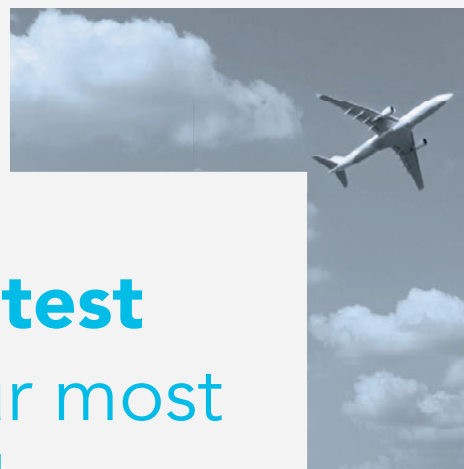
Loganair chief executive Jonathan Hinkles (left) has supported Bushe's activism





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The post-pandemic US pilot shortage has caused carriers to cut services, prompting initiatives intended to smooth new recruits' path to the cockpit – but barriers remain

Seats to fill

Pilar Wolfsteller Las Vegas

As US airlines climb out of pandemic-induced slumps and the financial pain of a two-year Covid-19-driven downturn eases, they are now facing a tough new task: the mad scramble to find pilots.

Thousands of senior flightdeck professionals left the industry in the past two years, retiring early or never returning from long-term leaves that airlines offered early in the pandemic to stem costs.

A dash for warm bodies – especially at the lower-paying regional carriers – has now resulted, with passenger demand exploding in the past months beyond what many industry experts had predicted. Numerous carriers have had to slim their fleets and cut their networks, leaving smaller cities across the country without vital air service connectivity – all because they did not have enough qualified staff.

The US pilot shortage is real – and a growing problem, say airlines.

The National Air Carriers Association, which represents low-cost carriers as well as cargo airlines that conduct both scheduled and charter services, says it expects the USA to experience a shortage of 28,000 flightdeck personnel over the next decade.

Pilot consultancy Future and Active Pilot Advisors says that this year alone, the country's 12 major airlines are projected to hire more than 13,000 pilots, setting a new record.

However, according to airlines, not enough people are entering the career field, and the barriers – especially financial – are high. Therefore, it is logical that stakeholders across the industry are looking at how they can rapidly increase the pilot supply by tweaking the way pilots are trained.

In response to the looming pilot shortage crisis, US airlines have increasingly begun to offer “pathway programmes” and partnerships with flight schools to assist potential pilot candidates in achieving their career aspirations.

Promised path

United Airlines' Aviate – which purchased a flight school in Arizona two years ago, Delta Air Lines' Propel, Alaska Airlines' Ascend, and Southwest Airlines' Destination 225 are among the most high-profile of these pathway, or ab initio, training programmes. Candidates interested in an aviation career can apply with no flight experience and be promised a route to the commercial flightdeck.

In some ways, these new courses mirror cadet programmes in other countries. However, rigid aeronautical experience rules in the USA continue to make it more difficult for candidates to attain an air transport pilot qualification. That begins with the massive price tag.

While some scholarships and limited financial aid including low-interest loans do exist, many pilot candidates must still shoulder that financial burden alone. About 25% of Aviate's candidates are on the hook for the more than \$70,000 in training costs from

Republic Airways established
its own Lift Academy in 2018



Marcus Painton/Lift Academy

zero through 250 hours – the point at which a trainee is eligible for a commercial pilot certificate. At other flight schools, and depending on the aircraft used for training, that fee can run well into six figures.

Those six figures, though, are just the beginning. Most US pilot candidates still need to document 1,500h of total flight experience before they can even begin to think about earning a living wage as an airline pilot. The Federal Aviation Administration (FAA)-mandated flight hour requirement has some exceptions for military-trained pilots (who need 750h total time), or candidates that achieved their ratings through a university-based programme (who may join an airline with 1,000h or 1,250h).

How pilots get those hours, and in what aircraft, is up to them. Many become flight instructors and teach for one to two years until they hit the magic 1,500h.

“We have to understand that not all pilot hours are created equal. How we operate in the cockpit is dramatically different than even 10 years ago”

Randy Babbitt Former FAA administrator

Others take jobs as agricultural, ferry, banner-towing or parachute jump pilots.

That 1,500h requirement, introduced in 2013 after a fatal accident involving a Colgan Air De Havilland Canada Dash 8-400 near Buffalo in 2009 that was attributed in part to the crew's lack of aeronautical experience, exists in no other country. Critics say it is an arbitrary number, and needs to be revisited. Proponents say that it is crucial in maintaining safety.

The only thing they agree on is that it is at the core of the increasingly contentious dispute about the future of pilot training in the USA.

Quality time

“There's a difference between simply accruing flight time and accruing quality flight time,” says former FAA administrator Randy Babbitt. “We have to understand that not all pilot hours are created equal. How we operate in the cockpit is dramatically different than even 10 years ago.”

Improvements in technology have made learning on simulators far more effective and cost-efficient, say some experts. Virtual reality, artificial intelligence, as well as high-quality computer-based training components also cut down on aviation emissions – a topic currently top-of-mind for the industry.

That is leading to calls for changes to the 1,500h rule in favour of more targeted and specialised training methods. And that, in turn, could open the door to more, and more effective, ab initio training offerings.

Some airlines have already integrated these new methods and equipment into their training



Alaska Airlines trains new pilots via its Ascend ab initio programme

programmes, but the FAA still bars pilot candidates from counting most simulator or computer-based-training hours as aeronautical experience.

Simulator time, says former FAA acting administrator Dan Elwell, should, under certain circumstances, count for “twice or three times” a regular flight hour in a single-engined aircraft. The devices, he says, allow pilots to experience first-hand a host of real-world situations – including emergencies – they might encounter in a commercial jet.

Currently, the FAA allows just a fraction of simulator hours to be credited towards the 1,500h.

“We are all focused on one issue: safety,” says Babbitt. “Could we make aviation even safer with alternative training means? I think the answer is yes.”

United’s Aviate and Republic Airways’ own Lift Academy, established in 2018, are leading the field when it comes to introducing young aviators to airline-sanctioned cockpit operations, practiced in simulators, as part of their ab initio programmes.

Ed Bagden, director of operations and academic programmes at Lift Academy, says candidates are introduced to advanced skills, competencies and knowledge much earlier in their training, and more consistently. That helps create a safer professional later.

“It’s not just the airplanes, or the flying skills, but it’s being immersed in an airline-grade safety culture where that’s the only thing you know,” he says. “Preparing that pilot with advanced skills, knowledge and competency as early as possible leads to the best outcomes for us and for our industry.”

But despite the fact that these pilots-in-training are held to higher standards than at hundreds of smaller flight schools across the USA, the inflexibility of the 1,500h rule continues to be a blockade for these students.

“The data is crystal clear that we can get competent pilots at less than 1,500 hours,” says Republic chief executive Bryan Bedford. “The fact that no other country has followed us on the 1,500 hour rule is telling.”

Republic recently submitted a plan to the FAA that would have halved the number of required hours (to 750) for pilot candidates at its Lift Academy. The carrier aimed to create an alternative to “punching 1,000 hours’ worth of holes in the sky”, as Bedford calls it.

Selection criteria

The airline argued that its rigorous selection criteria and training regime is comparable to military pilot training programmes, and should therefore receive the same kind of credit.

It was the first request by any US airline for an exemption. In September, the FAA shot down the plan, saying it was not in the public’s interest and did not support its safety mission.

Another regional carrier, Mesa Airlines, has decided to go a different, but similarly unconventional route. It is purchasing up to 104 low-cost Pipistrel Alpha Trainer 2 light sport aircraft for its pilot candidates to fly to gain their required 1,500h.

“What we’re going to tell young pilots who are looking to build time is ‘Look, come into our programme and we’ll bill you \$25 a flight hour but we won’t charge you – we’ll put it in an interest-free loan,’” Mesa chief executive Jonathan Ornstein says.

“When you come to work at Mesa, you’ll pay it back over two or three years with our new \$100 [per hour] pay rate.”

In other countries, pilot training looks very different. Flightdeck crew who complete an airline-specific education are often certified to fly commercial

aircraft with far less aeronautical experience. That could include steering a jet with passengers on board into busy US airspace and airports – while US rules prevent domestic pilots from doing the same thing.

In 2006, ICAO introduced the so-called multi-crew pilot license (MPL), which was swiftly adopted in many countries. The MPL is a bespoke, efficient and effective way to train pilots on a specific type of aircraft, in a multi-crew setting for a specific airline, says Richard Morris, director of global safety, quality assurance and compliance at Canadian training specialist CAE.

“I have flown with pilots who went through a traditional ab initio training programme, and those who went through an MPL programme. The difference is that the MPL person is far more capable and understood the aircraft better,” he says.

“The reality of these programmes is they are designed to be able to create a pilot that is going to have a skill set, and competencies developed around utilisation of that particular category of aircraft.”

Junior pilots are also often paired with experienced flightdeck professionals, and benefit from a mentorship system that has proven effective in training.

While the MPL path gets a pilot to the commercial cockpit faster than the traditional US route, the FAA is having none of it. A change would require new rules and a lot of bureaucratic red tape.

“There seems to be a lot of resistance to going through the rulemaking [process],” says FedEx senior



Marcus Panton/Lift Academy

“Preparing that pilot with advanced skills, knowledge and competency as early as

possible leads to the best outcomes for us and for our industry”

Ed Bagden Director of operations and academic programmes, Lift Academy

vice-president for flight operations Don Dillman. “We need to take the certificate structure we have now and create a defined path, make it purpose-driven, and then work backwards so you get the advantages of [enhanced training] without the rulemaking and changing the certification.”

No organisation has yet cracked the code and been successful in convincing the FAA to budge from the pilot training system it has had in place for decades. Unions such as the Air Line Pilots Association, International lobbied hard against modifying the system, and some professional pilots, too, resist proposed change. Many view ab initio



Marcus Panton/Lift Academy

programmes like Aviate or an accelerated MPL certification sceptically.

Ron Rapp, a corporate pilot and flight instructor based in California, credits the USA’s strong general aviation tradition for producing safe and resilient airline pilots.

“If I was running an airline, I would want ab initio pilots,” says Rapp. “I would take someone off the street, train them exactly the way I want from zero time, and have them learn exactly the kinds of things that I want them to know to fly for that airline.”

However, he says, that kind of training neglects the stick-and-rudder skills that set US general aviation pilots apart from their ab initio brethren.

“All of these crap jobs that people work early on in their career – banner-towing, crop-dusting, instructing – they don’t pay well in terms of money, but you gain tremendous experience that pays off in other ways. Those first jobs are so good in helping you learn how to make decisions, be the pilot-in-command and interact with air traffic controllers, customers and employers and just figure out the art of flying.

“It’s not about whether or not ab initio airline pilots can fly safely. Of course they can. But there are going to be holes in their training and experience,” he says. “Just because they don’t crash doesn’t mean they’re necessarily great pilots.”

Overriding goal

All aviation stakeholders agree that producing the next generation of competent, safe pilots is the overriding goal. But as they continue to bicker about the best way to achieve that, the student pilots whose careers are at stake are stuck pounding the traffic pattern.

Airline-managed ab initio pilot pathway programmes have given candidates more options, but barring a change or modification of the rules, even these will not get them on a fast track into a commercial cockpit.

“There are many, many, many enhancements in our training that go above and beyond the minimum standards that were established by the FAA,” emphasises Bagden.

“I hope we get to a point where we can get simulator time credited. But regardless, we’re going to procure those devices, and we’re going to use them because they make training better, they make pilots better, they transfer knowledge more efficiently and ultimately lead to safer outcomes.” ■

With the transitional licensing window for EASA-validated personnel working in the UK expiring at year-end, the clock is running down to secure new post-Brexit approvals

Crews on countdown

David Kaminski-Morrow London

When the UK opted to leave the EU, the complex process of 'Brexit' disentanglement included controversially unhitching its aviation regulatory functions from the European Union Aviation Safety Agency (EASA) and re-establishing the Civil Aviation Authority (CAA) as a separate oversight organisation.

Under the trade agreement negotiated between the UK and EU, UK-licensed pilots and engineers ceased to be qualified on EU-registered aircraft on 1 January 2021, immediately after the UK's full EU withdrawal.

Some airlines – among them EasyJet, Ryanair and Wizz Air – operating in both the UK and EU opted to split their fleets, establishing either UK- or EU-based operations under local registries in order to maintain flexibility and retain traffic rights.

Regulatory approval

Regulatory approval of personnel was initially one-sided. All the EASA licences and certificates for operations and maintenance that were valid at the end of 2020 have remained recognised by the CAA for a two-year period.

This temporary recognition window was put in place in order to “maximise stability” for the aviation sector, says the CAA, and avoid operational disruption for passengers.

If there were hopes that the UK-EU trade agreement would be broadened within a short time to encompass areas such as aircraft maintenance, they appear to have been without foundation. The CAA says there are “no signs” of such expansion.

As a result, the licensing recognition will expire not only for EASA-approved pilots, instructors and examiners on UK-registered aircraft, but also engineers, maintenance companies, and continuing airworthiness organisations.

The window is set to close at the end of 2022, and last year – about halfway through the grace period – the CAA embarked on an effort to raise awareness of the approaching deadline.

Licences issued by the UK during its time as an EASA member are still UK licences, and will remain valid after the deadline. But EASA licences issued by

8,000

Number of aviation personnel transferring out of the UK's licensing system as it withdrew from EASA membership

other EU countries will not, and EASA authorisation will no longer be accepted for working, operating and training in the UK.

The CAA had already initiated a simplified application process for EASA-licensed personnel to obtain a UK licence, and enable those who had previously held UK licences to regain them.

This streamlined procedure is not being extended once the deadline expires, however, and the CAA is now warning that EU-licensed pilots will subsequently be required to undertake “the full

The CAA believes awareness of new requirements is strong within airlines



Bradley Caslin/Shutterstock

conversion process, including examinations” in order to be qualified in the UK.

CAA flight operations manager Barry Mooney, speaking in May, referred to a “massive bow wave” of applicants who were seeking to secure continuity of licence approvals in the last two or three months of 2020, as pilots realised that the UK was withdrawing from EASA.

Some 8,000 personnel ultimately transferred out of the UK system as EASA membership ended. Those who initially opted to transfer but subsequently cancelled remain UK licence holders. Mooney expresses concern that a similar situation will develop this year as the recognition window begins to shut.

“We do have suspicion of human nature that people will be optimistic and leave things to the very last minute in the expectation that things will change,” he says. “The deadline will not change.”

Organisational awareness

Larger entities, with which the authorities have routine contact, are likely to be organised in time and the CAA believes awareness within airlines is strong. Difficulties emerge at the lower end of the scale, with individual pilot or engineering approvals.

The CAA says it will aim to process all applications which were submitted in a “reasonable time” before the end of this year, but it is not guaranteeing that late submissions – anything after 1 September – will result in a UK licence being issued by 1 January next year.

Among the complications with dealing with the influx of applications to obtain a UK licence is the need for the CAA to verify information contained on EASA licences issued by the respective national authority, which introduces uncertainty into the timescale

“We do have suspicion of human nature that people will be optimistic and leave things to the very last minute in the expectation that things will change. The deadline will not change.”

Barry Mooney

Flight operations manager, UK Civil Aviation Authority

– particularly if the authority concerned does not have sufficient resources.

“A key area is making sure individual pilot licence holders who left the UK system ahead of EU exit are aware that regaining a UK licence after the end of this year will be more complex,” says the CAA. “We have been contacting pilots directly to make them aware of this. We have also offered a phased payment option to make it easier to apply. The decision of whether to regain a UK licence is a personal choice by each pilot, so it is impossible to say how many will apply.”

Although the CAA has not given its latest figures, it indicated during a May briefing, hosted by law firm Bird & Bird, that it had issued up to 2,500 licences with another 1,000 being processed – most of which were for professional pilots.

Airlines such as Wizz Air have opted to split their fleets between the UK and EU



InsectWorld/Shutterstock

» The CAA believes that the UK licence is a “marketable” commodity and it stresses that pilots who hold EASA licences can also simultaneously hold a UK licence.

“There is no need to surrender your EASA privileges in order to obtain your UK licence, regardless of whether a licence has been held with the UK CAA previously,” it states. Personnel also will receive full credit on their UK licence, which will enable access to employment. The CAA adds that there is no need to demonstrate currency or recency on the EASA licence prior to conversion, although a UK medical certificate is required.

It adds that the level of confidence in the UK training market is high, as demonstrated by the number of training organisations outside of the UK which are looking to gain – or have already obtained – UK approval, in order to support pilots in the country. This is further illustrated by a surge in the number of simulators and training devices available.

2,500

UK licences issued by the CAA as of May this year – with another 1,000 in process – mostly for professional pilots



AirTeamImages

Recognition could also expire for maintenance personnel

“There is no need to surrender your EASA privileges in order to obtain your UK licence, regardless of whether a licence has been held with the UK CAA previously”

UK Civil Aviation Authority

Further burdening the withdrawal from the EU and EASA has been the need to re-authorise airlines that have been operating to the UK from third countries.

Under EASA membership, third-country carriers flying to the UK needed a Part-TCO authorisation, which involved an assessment and evaluation of technical and safety information.

EASA would validate the foreign air operator’s certificate and issue approval to the third-country carrier, which would then remain subject to continuous monitoring.

Time limited

But as with the EASA-issued personnel licences, the UK CAA only recognised the Part-TCO approval for a two-year period.

Third-country operators have needed to apply to the CAA in order to continue operating to the UK beyond 2022.

While this process should be “straightforward”, in theory, the CAA insists the exercise is “not just a rubber stamp” for carriers that had previously been approved under the EASA scheme – pointing out that UK regulators need to conduct their own record-gathering and decision-making.

This has meant implementing a priority system, with scheduled airlines, medical transport operators, and air taxi providers all having to be contacted in order. The CAA has been aiming to contact organisations that have operated to the UK over the past three years, but others will need to be more proactive. ■



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PROFILE

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Services by Aircraft type	Location	Type Rating	Difference Course	LVO	PBN	TRI/SFI
Airbus A320	CDG	✓	✓	✓	✓	✓
Airbus A330/340/350	CDG	✓	✓	✓	✓	✓
ATR 42-300/500	JNB	✓	✓	✓	✓	✓
ATR 72-200	JNB	✓	✓	✓	✓	✓
ATR 72-500	CDG/JNB	✓	✓			✓
ATR 72-600	CDG	✓	✓			✓
Beech 1900D	JNB	✓		✓		✓
Boeing 737 (-300 to -900)	CDG	✓	✓	✓	✓	✓
Boeing 757/767	CDG	✓	✓	✓	✓	✓
Boeing 777/787	CDG	✓	✓			✓
DHC Dash 8	JNB	✓	✓	✓	✓	✓
Embraer ERJ145	JNB	✓				✓
McDonnell Douglas MD-80	DNR/JNB	✓	✓	✓		✓



Centre stage

Bahrain is a small country with strategic importance and big ambitions, including as a global air freight hub. The Gulf kingdom will be setting out its stall when its biennial air show returns in November

Murdo Morrison Bahrain

With 1.7 million inhabitants, it is the least populated nation in the Gulf Cooperation Council (GCC). Its land mass is less than a fifth that of the smallest US state, Rhode Island. Yet, thanks to its close ties with Saudi Arabia as well as the USA and Europe, tiny Bahrain wields an influence way beyond its size – in commercial aviation and the broader services sector, as well as militarily.

One of the ways the kingdom has been raising its profile in aerospace has been with the Bahrain International Airshow, launched in 2010. After a pandemic-forced cancellation two years ago, the biennial event returns on 9-11 November at the Sakhir air base, a 45min drive from the capital Manama and next to the country's Formula 1 race circuit.

Significant player

In commercial aviation, Gulf Air is no longer the region's dominant airline. At one time, it was the flag-carrier for four nations, but by early this century Emirates, Etihad and Qatar Airways had overtaken the 73-year-old brand. Despite that, Gulf Air remains a significant player with a fleet of 36 aircraft – and growing – operating to Europe and the Asia-Pacific, as well as within the Middle East.

In addition to serving as Gulf Air's base, the airport – which opened a spacious, new terminal in early 2021 – is home to several air cargo companies. The most notable is freight giant DHL, for which it is

one of four global hubs, alongside Cincinnati, Singapore and Leipzig. Local firms MENA and Boeing 737 specialist Texel Air are also present.

Bahrain's appeal is down to both geography and its approach to business. A 24km causeway connects the island to the eastern region of Saudi Arabia, and a container terminal opened in 2008, with a bonded link to the airport. Bahrain's socially liberal laws and well-developed hospitality sector are behind its appeal as a leisure destination to Saudis, who flock over the border at weekends.

Economically, the kingdom has also always had an open approach to inward investment, with minimum red tape and a transparent legal system. Most professional Bahrainis are highly educated and fluent in English. This has helped persuade a host of international banks, financial services firms and information technology companies to set up there.

The kingdom has long been vital to the USA's military presence in the region, hosting both the Naval Forces Central Command and Fifth Fleet. The Royal Bahraini Air Force also packs a punch that belies the country's size, with a fleet of 21 Lockheed Martin F-16C/Ds and 16 V-model examples on order. Additionally, it has 30 Bell AH-1 Cobra attack helicopters – with a dozen new AH-1Zs on the way – and other assets including Bell 212/412 and Sikorsky UH-60M Black Hawk transport helicopters.

While Bahrain's future procurements are likely to be modest, the air show provides a platform for Western defence manufacturers to display hardware and meet military representatives from the wider region,



Gulf Air remains a significant player with a fleet of 36 aircraft

particularly Saudi Arabia, which has by far the biggest defence budget in the Arab world. BAE Systems, Lockheed and Raytheon are among the exhibitors.

Gulf Air became Bahrain's national airline after former shareholders Abu Dhabi, Oman and Qatar all established their own carriers and left the partnership two decades ago. Since then, the operator – with a tiny domestic market and forced to compete with three well-funded global connectors on its doorstep – has struggled at times to find its niche.

However, acting chief executive Captain Waleed AlAlawi says Gulf Air's "boutique strategy" sets it apart, with frequent at least twice-daily connections

within the region as well as to London and Istanbul, a modern fleet, and a strong offer to customers, particularly in premium. "We see ourselves as small, personal, and effective," he says.

The airline's route strategy, he says, is "about making the right choices". Gulf Air cannot compete with the network offered by Emirates, Etihad and Qatar Airways. As well as twice-daily flights to the largest cities of the UK and Turkey, it serves Bangkok, Manila and the Maldives daily, and Rome and Milan five times weekly. It recently added Malaga, Manchester, Singapore and Tel Aviv.

Selling point

A key selling point, says AlAlawi, is its schedule to Gulf capitals, with up to nine daily flights to Dubai, as well as Abu Dhabi, where it codeshares with Etihad. It also flies two or three times a day to Amman and Cairo. Business travellers on day trips are a crucial demographic, although three in five of Gulf Air's passengers connect through Bahrain.

A major gap in Gulf Air's network map is the USA, but it hopes to start services next summer depending on regulatory approval. AlAlawi will not disclose potential destinations, but says the airline would look to codeshare with a US major. No US airlines fly to Bahrain, but the leading European members of the three major alliances – British Airways, KLM and Lufthansa – do.

AlAlawi says the strategy has proved successful, based on traffic figures. After performing strongly in cargo during the pandemic, Gulf Air's passenger



Well-developed hospitality sector is a significant draw

BillyPix

traffic rebounded strongly from February this year, reaching a load factor of more than 85% during the summer. “People just wanted to travel again,” he says.

He is proud of the fact the airline did not stop during the pandemic, repatriating foreign citizens stranded when their original carrier stopped flying, and operating all-cargo and humanitarian services, including collecting personal protective equipment from China. “The repatriation flights put us on the map as an airline that looked after people. Countries thanked us,” says AlAlawi.

Gulf Air is also refreshing its fleet, having replaced its ageing Airbus A330s with 787-9s – it has seven in service with three on order – and its A320ceo family aircraft with CFM Leap 1A-powered A320neos and A321LRs. It currently has four A321LRs and six A320neos, with eight and 11 respectively to be delivered by 2027. It is phasing out its remaining 16 Ceos.

Business appeal

AlAlawi describes the A321LR as “an amazing product” with 16 full lie-flat seats in business that allow the airline to operate the narrowbody to Frankfurt, the Maldives, Milan, Nice, Paris and Rome.

Although Gulf Air adopted a new brand identity in 2018, one of the A321s and a 787 will retain a legacy livery to “connect us to our heritage”, says AlAlawi.

Gulf Air represents around two-thirds of traffic at Bahrain International Airport, but Bahrain Airport Company (BAC) is working hard to attract more airlines, says chief executive Mohamed Yousif Albinfalah. Those who have recently added or resumed services include Ethiopian Airlines, IndiGo and Wizz Air Abu Dhabi.

The new terminal went live in a “big bang” in January 2021, with the reduced traffic during the pandemic helping the overnight transition, despite the challenge of having to rely on smaller than usual trials using staff rather than members of the public in late 2020. “We thought this is an opportunity that is not going to repeat itself, so we might as well capitalise on it,” says Albinfalah.

The new building has massively increased capacity, with 12 direct-access gates that can each accommodate a widebody or two narrowbodies. This compares with just seven in the former, now-demolished

terminal, where passengers were bussed to remote stands during busy periods. BAC expects passenger numbers to reach 6.5 million this year, and hit 2019’s total of 9.7 million in 2023.

The airport is key to the government’s ambitions to develop Bahrain as an east-to-west logistics and e-commerce crossroads for air, land and sea freight. The Khalifa bin Salman container port is just 10min by truck from the airport, allowing forwarders to transfer the content of containers from Asia to aircraft. Cargo can also go by road via the causeway to Saudi Arabia.

BAC began work on a 25,000sq m (270,000sq ft) Express Cargo Village on the north side of the runway in June, signing a 10-year agreement with FedEx



BillyPix

Captain Waleed AlAlawi Acting chief executive, Gulf Air

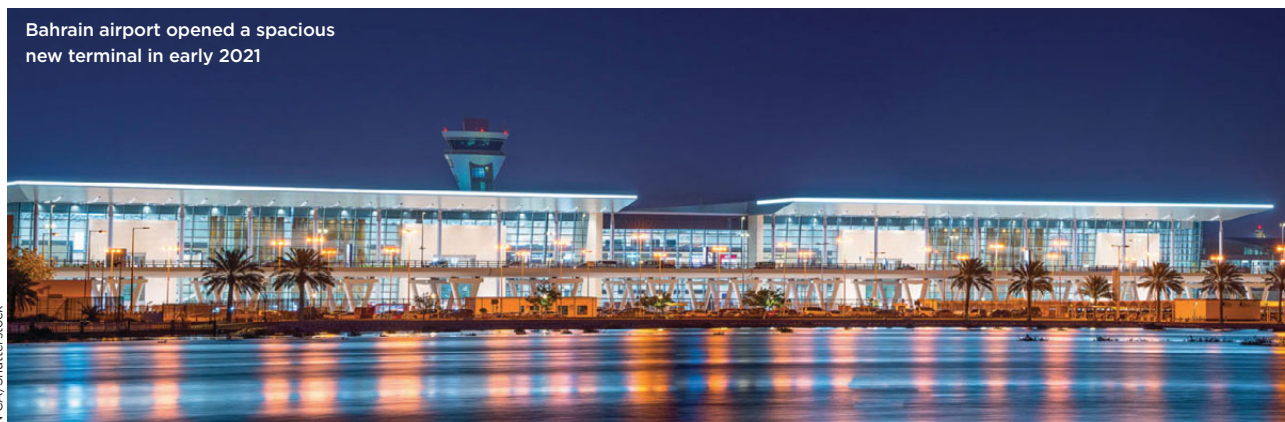
“[Flights during the pandemic] put us on the map as an airline that looked after people. Countries thanked us”

Express, which will move into a 9,000sq m area of the facility in the third quarter of 2023. Albinfalah says negotiations are underway with further potential tenants.

DHL has been operating aircraft from Bahrain for a quarter of a century, and has a fleet of 15 based at the airport. It has seven 767-300s and two 767-200s on its own local air operator’s certificate (AOC), and wet-leases another six: three 737s from fellow Bahrain operator Texel, two A300-600s from its German sister airline, and a 767-200 owned by Poland’s SkyTaxi. Three more 767-300s will join the AOC next year, two of them as 767-200 replacements.

“Our fleet has doubled in two years, and we are still outgrowing our aircraft,” says Richard Gale, vice-president aviation for DHL in Bahrain. “Six years ago, we were mostly intra-regional. Now we do Bahrain to Hong Kong three times a day. Our AOC allows us to serve most of Europe as well as the GCC.”

Bahrain airport opened a spacious new terminal in early 2021



N CA/Shutterstock



DHL has been operating from the Gulf kingdom for a quarter of a century

BillyPix

Accompanying the fleet expansion will be a redevelopment of its airside sorting facility, allowing the German-headquartered company to process 4,500 consignments per hour, compared with 1,500 today. In the longer term, Gale also wants to build a hangar, allowing DHL to carry out its own line maintenance. He describes Bahrain as the “perfect” location for a hub.

“Geographically, it is between Europe and Asia and also ideal for large e-commerce markets such as Saudi and the UAE,” he says. “Bahrainis are well educated, including in disciplines like IT, and aviation is getting stronger. From a regulatory point of view,

joined in September. In May, it placed orders for a further two for delivery in the first quarter of next year, which will take the company’s fleet to seven – it operates another 737-300. Three of the aircraft – the 737-300 and the two -800s – are on contract to DHL, flying scheduled services.

Texel is also keen to market its on-demand services, and will have a major presence at the air show, with one of the FlexCombi aircraft on the static. Post-pandemic, the company aims to “relaunch our platform and re-engage with the world”, says director George Chisholm, a British-New Zealander who has lived in Bahrain much of his life, and son of the firm’s founder.

9.7m

Bahrain Airport Company expects passenger numbers at upgraded airport to return to 2019’s figures in 2023

the government is highly supportive, and we don’t have weather problems.”

Texel is one of two other cargo operators with a Bahrain AOC. Set up in 2013, the carrier has marked two industry firsts. At the 2018 show, it debuted the 737-700 FlexCombi freighter from Pemco World Air Services. The converted airliner combines a cargo area with a flexible passenger cabin that be configured for 12 or 24 passengers. Texel added a second example last year.

In January this year, Texel took delivery of the Middle East’s first converted 737-800 freighter. A second

Specialist sectors

The FlexCombi gives Texel a key selling point, including in specialist sectors such as racehorse transport. “It’s a product we believe in,” says Chisholm. Texel can switch the configuration by moving the internal bulkhead in 48h. Like the two -800s, the FlexCombi is retrofitted with head-up display enhanced flight vision systems that “increase our window to operate”, says Chisholm.

MENA, a longstanding Bahrain aviation company with its own AOC, has set up various ventures in the past, including business jet management and maintenance operations. Its latest is a cargo carrier. Helmed by veteran airfreight entrepreneur Michael O’Brien, the airline plans to lease two 737-800 converted freighters early next year, adding four more in 2024 and 2025.

MENA’s emergence in the sector should boost the reputation of the kingdom’s airfreight cluster further. With online shopping growing and increasingly international supply chains, Bahrain believes it can be a vital staging post in the global flow of goods, like other city-states such as Singapore and Dubai. This aspiration will be a central theme of the air show. ▶

Sibling rivalry

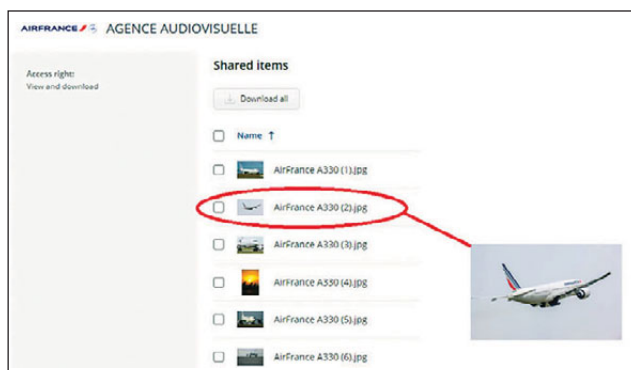
Sister airlines they may be under the parentage of IAG, but there seems little love lost between British Airways and Vueling, if a recent Twitter exchange is anything to go by.

Responding to a Vueling passenger's complaint on Twitter about a delay to the take-off of BA8073, and lack of communication from the airline, the Spanish airline posted: "Hello Robert, if the flight is operated by BA, please contact our colleagues directly."

Its sibling's curt correction, openly on the social media channel: "Hi Vueling, this flight isn't operated by BA. It's a codeshare operated by you."

It's all Boeing wrong

There is obviously not a Total Aviation Person in charge of Air France's official online fleet photo gallery. One of the "Airbus A330s" looks very much like a Boeing 777.



Sheffield shuts... again

As Oscar Wilde almost said, for a city to lose one airport may be regarded as misfortune; to lose two in the course of a few years looks like carelessness. Sheffield will achieve that dubious accolade when the loss-making airport it shares with nearby Doncaster winds down in the next weeks. DSA lasted 14 years, three more than the ill-fated Sheffield City, which opened in 1997 in an attempt to emulate the capital's Docklands business airport, and closed in 2008.

A big problem for DSA was that it is not that near Sheffield. Manchester, Leeds-Bradford and even East Midlands, all better served by airlines, are within 75min drive of the Yorkshire city.

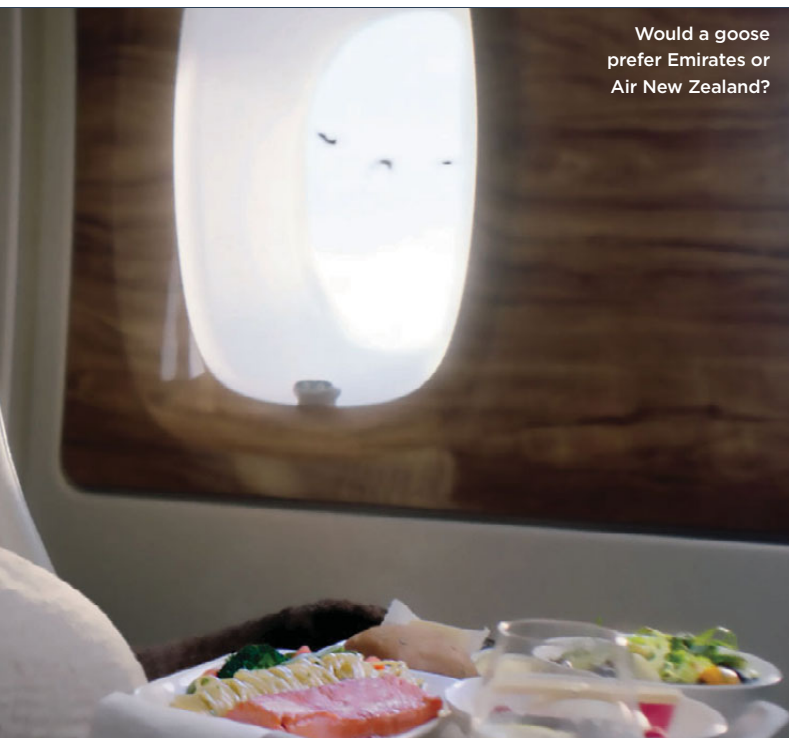
From the archive

1922 Shock and awe

As far as can be gathered, the report on the bombing operations by the Royal Air Force on the northern frontier of Iraq is highly satisfactory. Sir John Salmond's policy of restoring the original frontiers in the Mosul and Kirkuk districts by intense bombardment appears to have resulted in the retirement of the Turks, as the villagers refused to assist in maintaining the frontiers, and altogether it is now considered that aircraft have proved themselves capable of suppressing raiding parties in countries of this nature. Thus it would appear that already the taking over by the R.A.F. of the policing of Iraq is promising extremely well, and it is, perhaps, permissible to hope that the policy may be extended to other areas. A very good start has been made.

1947 Britain's air visitors

One-third of all visitors to Britain this year travelled by air. By the end of the year it is likely that we shall have had 350,000 visitors, and their total expenditure in this country, exclusive of passages, is estimated at £20,000,000. This tribute to the value of air travel in the "Come to Britain" movement was made by Lord Hacking, chairman of the British Travel Association, in a statement made in London on November 6th. In view of our domestic and transport problems, he said, only 250,000 had been expected, but by the end of September over 312,000 had come, and the occasion of the Royal wedding will raise considerably the total for the year. During the peak summer months the number was equal to 90 per cent of the equivalent traffic in 1938.



Would a goose
prefer Emirates or
Air New Zealand?

Goose kidding who?

Emirates' decision to use a Canada Goose as its brand ambassador is an eyebrow-raiser, given the species' notoriety in the annals of birdstrike history, but the Dubai-based airline is also being mercilessly ribbed over its advertising by fellow goose buff Air New Zealand.

If you take a gander at the Emirates promotion, you will see it shows a Canada Goose – apparently named Gerry – relaxing on board an Airbus A380 while the rest of the flock wearily follows in-trail.

But Air New Zealand has responded with its own advert, featuring its long-running 'Dave the Goose' character, who seems to be in a flap over Gerry's choice of conveyance.

"I have finally convinced my old mate Gerry to stop doing his own flying, like me," he says. "Only problem is, he got the wrong airline. What are you doing on Emirates, Gerry?"

Presumably the inclusion of geese rather than, say, the falcon or kiwi, is all to do with long-distance travel, but you have to wonder why neither airline went with the undisputed king of long-haul flight, the Arctic tern. If only because, in their tit-for-tat over bird-related advertising, they could claim that one good tern deserved another.

Meanwhile, Emirates is offering its regular customers "free tickets to the future" – a chance to win a trip that includes a visit to the city's new museum dedicated to "innovative and futuristic ideologies, services, and products".

It reminds us of the rather scathing apocryphal remark Australian pilots used to make when landing after a trans-Tasman flight: "Ladies and gentlemen, welcome to New Zealand. Please don't forget to put your watches back 20 years."

Ian Goold

We are saddened to report the passing of Ian Goold, a former air transport editor with *Flight International*. Beginning his career as a British Aircraft Corporation apprentice at Brooklands, he worked on the Vickers Super VC10 and BAC One-Eleven programmes, as well as Concorde.

He switched professions in 1973, joining this magazine, where he spent 20 years. Until shortly before his death from cancer, aged 74, he was writing for a number of aerospace journals, and had his last bylined piece in *Flight* earlier this year – a retrospective on the de Havilland Comet.

An award-winning journalist who was as passionate about accuracy in reporting as he was about aircraft, he will be much missed by colleagues in the aviation media and wider industry.

1972 Igor Sikorsky

Igor Sikorsky's death breaks one of the very few remaining aviation links with the era of the Wright Brothers. He built aircraft for the Tsar of Russia – the mighty Grand of 1913 and the 1914 Ilya Mourometz, the first successful multi-engined flying machines. And he lived to clasp the hand of the first man to walk on the Moon. Sikorsky personified the fantastic progress aviation has made within the mere three-score years and ten allotted to man. Active almost until his death, he was founder of the company whose name has become an international synonym for helicopters, and with which the British aircraft industry has long had the closest ties. Like all great engineers he combined a firm grasp of the technical and intellectual problems with simplicity and common sense.

1997 Boeing aims long

Boeing could obtain board approval to offer airlines a new ultra-long-range – more than 14,800km (8,000nm)-derivative of the 747 as early as May 1998, if it can attract sufficient market interest, particularly from key Asia-Pacific airlines including Cathay Pacific Airways, EVA Airways of Taiwan and Qantas. The derivative is being offered as an alternative to the planned 777-200X/300X growth twinjet in efforts to head off growing competition from the 378-seat, 13,900km-range Airbus A340-600. Boeing says that it "...will spend six months or so talking to customers and, at that point, we will be thinking about obtaining authority to offer". The "low-risk" study aircraft has been referred to as the 747-200X, but will ultimately be classed as a -400 derivative.

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Powering propaganda

Regarding your Comment article 'Putin's progress' (*Flight International*, October 2022): progress is a relative term. While I do not believe the Western media's extreme portrayals of Russia as totally ineffective, inept, and helpless, I find Putin's claims of total independence and "everything is going great!" even more specious pieces of propaganda.

The reality, on the other hand, is pretty clear: the probability that Russia has somehow come up with a way to totally secure a supply chain for volume production of airliners it could not produce even with access to Western supply chains, and at a speed that outpaces Airbus and Boeing, is laughable with any level of quality and safety of the product.

This "progress" is posturing and propaganda, that is all. But that is the purpose: everyone (including Putin) knows this will never happen, but that is not the point. Pride and propaganda is.

Basit Mustafa
Via Facebook

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Registered at the Post Office as a newspaper
Published by DVV Media International Ltd,
1st Floor, Chancery House, St Nicholas Way,
Sutton, Surrey, SM1 1JB, UK.

Newstrade distributed by Marketforce (UK),
2nd Floor, 5 Churchill Place, Canary Wharf,
London, E14 5HU, UK. Tel: +44 20 3787 9001

Classified advertising prepress by CCM.
Printed in Great Britain by William Gibbons
and Sons

Flight International published monthly 12
issues a year.

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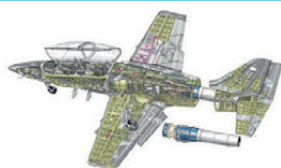
ISSN 0015-3710 (Print)
ISSN 2059-3864 (Online)



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A high school programme gave **Allison Bennett** her first experience of flying an aircraft, setting a course for the Ontario pilot to become the first woman to captain a CL-415 water bomber

Burning ambition

Howard Hardee Sacramento

Allison Bennett recalls rising above the lakes and forests of northeastern Ontario, Canada in July 2018 and seeing dozens of lightning-sparked wildfires on the horizon.

She was looking at a busy workday as a De Havilland Canada CL-415 water bomber pilot. One wildfire was particularly urgent. Fuelled by dry conditions and high winds, the blaze was moving rapidly toward Temagami – a town about 60 miles (100km) north of Bennett's hometown of North Bay.

"It was close to home for me and that made it much more of a challenge," Bennett says. "I had to make myself stay calm and not let it get personal and just do the job we've been trained to do."

All nine of Ontario's CL-415s were dispatched to the fire and, along with firefighters on the ground, helped prevent Temagami from being damaged or destroyed.

"I happened to be with a very experienced captain at the time," Bennett says. "It was very smoky and difficult to see, and I remember getting one [drop] into the head of the fire and thinking, 'That was the game-changer right there'."

Bennett, 44, has flown five seasons as a water bomber co-pilot for Ontario's Ministry of Natural Resources and Forestry. This past summer, she is believed to have become the first woman to captain the CL-415. Her former colleague Emily Crombez was the first woman to pilot the aircraft.

"As far as I know from people in the industry, there aren't any other women as captains of the -215 or -415 water bombers yet," Bennett says.

Early inspiration

Bennett grew up boating and camping on the area's abundant lakes. She was also thrilled by seeing a stealth bomber and demonstrations by the Royal Canadian Air Force's Snowbirds aerobatic display team at local air shows. With CFB North Bay, Canada's centre for air defence, in her backyard, she has always been immersed in aviation.

In high school, she enrolled in an aviation programme that put students through ground school and into an aircraft and a helicopter.

"I was very fortunate, as a kid, to have that opportunity," she says. "Taking off and looking around and seeing all the trees and lakes, the vastness of what was

"It's a tough job for anyone. But why can't we do it? We can do whatever we want. Whatever is required, I am able to do the job"



Ontario operates a fleet of nine CL-415 water bombers



Ministry of Natural Resources and Forestry

Bennett works 12h shifts during fire season – 10 days on, four off

outside the city, was what got me hooked on flying. It gives you the perspective that there's something bigger out there."

Her career as a pilot started in 2002, when she got a job as an instructor at an aviation school in North Bay. In 2005, she began flying as a wildfire detector and discovered the 'birddog' role – piloting aircraft that fly ahead of water bombers to describe fire conditions, scout for hazards and lead the way.

"If there's a specific spot you need to hit, the bird-dog leads the water bomber in," Bennett says. "You're low level and you pull up and point your tail to where the spot is, then you have to come around and show the air crew officer the drop. You end up doing a low-level manoeuvre that is just awesome; I thought it was a really cool job."

As a birddog pilot, she saw the CL-415 in action and knew she wanted to get in its cockpit. But she needed more time flying on floats before she could pilot the amphibious type. She went to the Maldives in the Indian Ocean, where she flew passengers in De Havilland Canada DHC-6 Twin Otters. She started as first officer and made captain after less than two years.

Her competency in the role was sometimes questioned; male passengers would occasionally offer to help her load luggage into the aircraft, "trying to be

gentlemen", Bennett says. "Eventually my captains would explain, 'No, it's okay – she's got it.'"

In 2012, she returned to Canada and started flying Twin Otters configured with water-bomber floats, which are only found in Ontario, Bennett says.

Huge scoop

That set the stage for her to fly the CL-415, which is designed to land on water and scoop water into its tanks. The scoops are open for about 11 seconds, with the CL-415's turboprop engines operating at full power to overcome drag. With an endurance of 4h, the aircraft can perform dozens of drops in a single mission.


"In Ontario, we're very fortunate that we have lots of lakes to choose from," Bennett says. "If we can find a lake that's close to the fire, we can be very effective and very efficient – sometimes scooping and dropping with a two-minute turnaround."

During fire season, Ontario's water bomber pilots work 12h per day – 10 days on, four days off. A single mission can be exhausting. But Bennett is always up to the challenge – and believes other women are, too.

"It's a tough industry," she says. "It's a tough job for anyone. But why can't we do it? We can do whatever we want. Whatever is required, I am able to do the job." ▶

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A woman with dark hair and safety glasses, wearing a light-colored sweater, is working on a large, dark-colored jet engine. She is holding a red and black power tool, possibly a torque wrench, and is looking up at the engine. The engine has a large white GE logo on its front. The background is dark and industrial.

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