

Issue

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Wednesday
21 February 2024

FLIGHT DAILY NEWS



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(l-r) Boeing's Brad McMullen, Thai Airways' Chai Eamsiri, GE Aerospace's Russell Stokes

Dreamliner start

on first day with mega 787 order from Thai Airways

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Thai subsequently selected Boeing at the end of 2023, he adds. Cirium fleets data shows the carrier operating nine 787s - a mixture of -8s and -9s - all powered by Rolls-Royce Trent 1000s. Royal Brunei, meanwhile, has signed for four more 787-9s as part of a widebody fleet renewal. The airline already operates five -8s, and was the first Southwest Asian carrier to fly the Dreamliner over a decade ago.

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(l-r) Boeing's Brad McMullen, Thai Airways' Chai Eamsiri, GE Aerospace's Russell Stokes

It's a Dream start

Boeing and GE get things flying on first day with mega 787 order from Thai Airways

Alfred Chua

Boeing secured a welcome boost on the opening day of the show by securing a major widebody deal as Thai Airways International revealed a firm order for 45 Boeing 787-9 aircraft, plus 35 options, while Royal Brunei Airlines added another four -9s.

To be powered by GE Aerospace

GEEnx engines, the Dreamliners are set to begin arriving from 2027 and deliveries will run for 10 years.

Under the deal, Thai has the ability to switch its commitments to the in-development 777X.

Thai first announced it had entered into an agreement with Boeing and GE Aerospace for the acquisition of medium- to long-haul aircraft on 14 February. The airline issued a request for proposals in early 2023 for new

widebody aircraft.

"The seamless interchangeability between these Dreamliner models and the 777X offers Thai strategic advantages in optimising routes, capacity and operational efficiency," the Star Alliance carrier states.

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Airbus to set up Seletar tech hub

Airbus yesterday announced at the show a memorandum of understanding with the Singapore Economic Development Board to establish a Sustainable Aviation Hub that the European airframer says will focus on technology, research, and innovation.

It will be based in Airbus's existing campus at the Seletar Aerospace Park, and will enlist local companies, universities, and research institutions in a "collaborative environment... aimed at building a robust and environmentally sustainable aviation ecosystem," says the manufacturer.

Spirit has fresh designs on Malaysia

Spirit Aerosystems is expanding its presence in Malaysia, as it opens an engineering design centre to meet a rise in customer demand.

The centre is located at Spirit's Subang facility, and has been expanded through two renovation projects to include new engineering functions, including 24h engineering support to other Spirit factories around the world.

The Malaysia unit is a partner in the Airbus A350 programme, as well as the wing for the A220. It is also involved in several Boeing programmes, including the 737 Max.

Announcing the centre's opening at the Singapore air show, Spirit says the move comes amid "growing customer demand as air travel continues to recover to pre-pandemic levels and higher".

Company senior vice-president Sean Black says: "Expanding engineering services in Malaysia gives Spirit the ability for around-the-clock support for our global manufacturing locations and development programmes, improving engineering turn-around time, so we can provide service to meet our growing customer demand."

Black, who is also Spirit's chief engineer, adds that the expansion of engineering capability in Malaysia "will enhance supply chain communications in the Asia-Pacific region".

Aviation leaders see clearer skies ahead

Tony Harrington

Aviation leaders representing airlines, aircraft leasing, and engine manufacturing each signalled significant and rapid new growth in air travel during an opening day panel at the Singapore air show.

"We see 2024 as a real return to normal," says Steven Townend, chief executive of Singapore-based lessor BOC Aviation. "The airline market has come back and the leasing market has come back. But a lot of financial and capital markets haven't quite come back to aviation."

Karl Sheldon, executive vice-president of engine maker CFM International, also tells a strong story of recovery. "For the most part, traffic is up and demand is up, but the supply chain is still a bit of a challenge. The skills are still renewing."

Peter Bellew, chief operating officer of Saudi Arabian start-up Riyadh Air, says the carrier is rapidly progressing towards take-off next year.

"We're in the process of



Panel (l-r) FlightGlobal head of content Graham Dunn (moderator), BOC Aviation's Steven Townend, CFM International's Karl Sheldon, Riyadh Air's Peter Bellew and Zipair's Yasuhiro Fukada

getting our AOC at the moment," he says, ahead of test flights of its first Boeing 787 in the third quarter of this year, and increased aircraft deliveries next year ahead of its launch.

"We can get people, because they want to be involved in a project as exciting as setting up a major new

airline in a rapidly growing market," he says.

Yasuhiro Fukada, co-founder and executive officer of Japan Airlines' low-cost subsidiary Zipair, says his long-haul carrier is increasing 787-8 services from Tokyo to major Asian and North American hubs.

Despite Covid's heavy im-

pact on Japan, he says a key market for his airline was Generation Z, which is keen to travel, "but very sensitive about sustainability".

The Aviation CEO forum was co-organised by FlightGlobal with Singapore Airshow organiser Experia and sponsored by CFM International.

P&W expects F100 engine to power on



Pratt & Whitney expects to support the venerable F100 fighter engine for another half-century, as the 1970s-era powerplant continues in service on both new and old platforms.

The F100 is among the world's most prolific fighter engines, powering both the Boeing F-15 and Lockheed Martin F-16 since they first

flew in the early 1970s.

Josh Goodman (pictured left), senior director of the F100 programme at Pratt & Whitney, lists a number of milestones for the engine, such as 30 million hours flown, 7,300 engines produced, and 3,500 engines still in service. Including the US Air Force, 23 operators use the F100.

"When we think about the F100 today, we still have an active production line, and we are pumping out engines for [F-16] Block 72 aircraft," says Goodman.

"And we are positioning this enterprise for another fifty years of support, not only for the engine's traditional uses, but for the way the F100 continues to

reinvent itself in applications such as Hermes."

In December 2022, hypersonic aircraft start-up Hermeus selected the F100 to act as the turbine portion of Chimera II, its combined cycle engine. Goodman believes the F100 is also well-placed to power future unmanned platforms.

In the meantime, the company continues to focus on meeting the needs of existing customers, in particular through performance-based logistics (PBL) contracts.

"Availability is really what sustainment is all about, and that's really where the PBL construct comes into play," he says, arguing that they allow P&W to better anticipate customer needs.

South Korea recently awarded the manufacturer a \$355 million PBL contract to maintain F100 engines that power Republic of Korea Air Force (ROKAF) F-15s and F-16s.

"The motto that we have there is 'one team, one family', and that is something that the ROKAF and Pratt & Whitney teams really cherish," says Aaron Austin (right), P&W's country director in South Korea.

Cebu Pacific sticks with P&W power

Pratt & Whitney has been selected by Cebu Pacific Air to provide PW1100G geared turbofan (GTF) engines to power an additional 10 A321neo and five A320neo aircraft.

Cebu Pacific ordered all 15 Neos in a 2019 deal that included 10 examples of the long-range A321XLR.

"Pratt & Whitney has been providing GTF power to Cebu Pacific since 2019," says Rick Deurloo, president of commercial engines at Pratt & Whitney.

"With deliveries for this most recent order starting in 2025, the GTF engine will provide even more fuel and carbon emissions savings."

P&W will also provide Cebu Pacific with GTF engine maintenance through an EngineWise service agreement.

Cebu Pacific currently has 33 GTF-powered A320neo-family aircraft in service. In November, the carrier said it expected to ground up to 20 PW1100G-equipped jets this year for engine inspections to deal with a manufacturing fault.

Comac and Tibet Airlines officials signed orders for C919s and ARJ21s



Tibet Airlines takes C919 to new heights

Alfred Chua

Comac has marked its return to the Singapore air show after a four-year break by securing fresh orders for its C919 and ARJ21 aircraft from Tibet Airlines. Tibet Airlines yesterday placed firm commitments for 40 examples of the high-altitude variant of the C919, alongside 10 ARJ21

regional jets, becoming Comac's newest airline customer, and the variant's launch customer.

The high-altitude variant of the C919 features a shortened fuselage and other modifications. It can seat between 140 and 160 passengers, says the Shanghai-based airframer.

The order builds on a co-operation agreement signed in December by the pair covering the joint devel-

opment of the high-altitude model.

Separately, Comac also announced orders for six ARJ21s from Chinese state-owned investment firm Henan Civil Aviation Development and Investment Group. The six examples include fire-fighting and emergency medical services variants.

Comac declines to disclose the value of either commitment. The company has a significant presence at this

year's Singapore air show, with both C919 and ARJ21 aircraft participating at the event for the first time.

The C919 was certified by Chinese regulators in 2022, and entered commercial service with launch customer China Eastern in May 2023.

Since then, Comac has clinched orders from Hainan Airlines group carriers Suparna Airlines and Urumqi Air, with China Eastern also increasing its commitment.



Airbus keeps focus on A220 ramp-up

Airbus sees no need for a fundamental reshaping of the industrial set up supporting its A220 programme to cope with the ongoing issues experienced by wing supplier Spirit AeroSystems.

Spirit has been seeking improved contract terms from Airbus for the work it performs on the A220 and A350 widebody. This has led some observers to question whether the airframer would instead consider bringing that aero-structures work in-house, mirroring the integrated industrial set-up on its A320neo programme.

But Christian Scherer (pictured), chief executive of the airframer's commercial aircraft business, says the immediate focus is "addressing the weaker links" in its A220 supply chain as it seeks to ramp output to 14 aircraft per month by 2026.

Solving the issues in the supply chain "is what is driving us more than a strategic redesign of the set-up of the A220," he said, briefing journalists at the show yesterday. "Now is not the time to do that."

Although Airbus "does not rule out" any solutions "in how we address the tactical issues we are facing in the supply chain", it is "not on a mission right now to re-organise our industrial set-up", he adds.

Additionally, a potential stretch of the A220 - dubbed the -500 - is also "not at the forefront of our to-do list right now," he adds.

Instead, the focus is maintaining the "trajectory" of the A220 programme towards the 14-per-month output across its two production lines in Mirabel in Canada and Mobile in the USA. While noting the ramp-up is "pretty steep" Scherer is confident the twinjet is on track to hit its goal by 2026.

Last year, the airframer handed over 68 A220s, an average rate of 5.6 aircraft per month.

Elsewhere, the airframer continues to battle multiple pinch-points across its wider supplier base. "We have weak links at pretty much every level of the supply chain," he says.

US Navy keeps faith in Osprey

Ryan Finnerty

The US Navy's head of logistics in the Western Pacific says the service remains optimistic about the strategic benefits of the CMV-22 variant of the Bell-Boeing Osprey tiltrotor and has no plans to phase out the troubled type.

The tiltrotor, which is operated by three branches of the US military, and Japan, is absent from this year's Singapore air show in contrast to previous editions of the event thanks to a fleet-wide grounding.

A fatal crash of a US Air Force (USAF) MV-22 off the coast of Japan in December which killed eight service members saw the Pentagon pause flight operations for all three of its Osprey variants while the incident is investigated.

While the US Marine Corps is the largest Osprey customer, it is arguably the US Navy (USN) which has experienced the most significant impact of the grounding.

The service is in the process of retiring its ageing Northrop Grumman C-2A Greyhound turboprops, used for carrier resupply missions, to be replaced by the Osprey.

That transition is nearly complete, with only a single squadron of 15 Greyhounds still in service. The CMV-22 naval variant of the Osprey is set to fully take over that role, providing greater range, a larger cargo bay and the increased flexibility of vertical take-off and landing (VTOL) capability.

A total of 27 examples are currently in service from an eventual 44-strong-fleet, according to Cirium data, all of which are currently grounded.

While the USAF is undertaking what the service calls a "comprehensive review" of the Osprey's position within its ranks, the navy remains committed to the tiltrotor.

"I think we're keen to get it back on the flight-deck as soon as we can," says Rear Admiral Mark Melson, head of logistics in the Western Pacific.

Melson, previously a flight officer on the Lockheed P-3 Orion and an amphibious assault ship

commander, is unequivocal in his support for the Osprey.

"I operated with them on my ship, the USS *Macon Island* for three years," he says. "I have complete confidence in the airplane."

Melson says the navy is working to understand the cause of the recent mishaps and fix whatever problems are to blame.

Senior aviation leaders in the USN in 2023 expressed strong support for the CMV-22 as a logistics platform, despite a troubled history of accidents.

The US military has logged repeated V-22 crashes in recent years, including fatal incidents in Norway, Australia and California involving USMC aircraft.

Melson touts the CMV-22 as a significant improvement over the Cold War-era Greyhound, not just for carrier resupply, but also to offer logistics support to remote sites on land.

"The ability to take off and land vertically, not just on the carrier, but in austere locations, is a game changer," the one-star admiral says.



Washington pledges to stand with regional allies

The USA is promising to remain actively engaged in the Asia-Pacific, both with treaty allies like Japan and South Korea, and with regional partners such as Singapore.

Washington's official representative to the island city state, Ambassador Jonathan Kaplan (pictured), pledged that the USA will maintain a robust presence in Asia, despite active conflicts in Europe and the Middle East pulling diplomatic and military

resources to those regions.

Speaking at the opening of the show yesterday, Kaplan said Washington seeks to be a steady hand in Asia amid what he called a "complicated time in history".

"We will continue to support our friends and our allies, we will continue to be a reliable partner to Singapore and we will continue to be a stabilising force in this region," Kaplan says.

The ambassador specifically notes security challenges

in the South China Sea - an area of contention between the USA and China owing to Beijing's sweeping territorial claims in the region.

Although the USA and Singapore do not share a mutual defence pact, the two governments regularly partner on joint military exercises.

The strategically located Southeast Asian country is also an approved buyer for some the USA's most advanced and sensitive

defence articles - notably the Lockheed Martin F-35 stealth fighter.

F-35 manufacturer Lockheed says it plans to deliver the first of Singapore's 12 planned jets in 2026. The Republic of Singapore Air Force plans to acquire the short take-off and vertical landing F-35B variant.

Singapore also operates a substantial fleet of legacy US combat aircraft, including Boeing AH-64D attack helicopters, F-15SG fighters

and Lockheed F-16C/Ds.

Kaplan says US defence firms are seeing "considerable growth and opportunity" in Singapore, which the entrepreneur-turned-diplomat predicts will "develop resilience for both of our nations".

Non-defence trade is also flowing freely between Singapore and the USA. Kaplan says that \$120 billion of bilateral trade was exchanged between the two countries in 2023.

Let bets on L-410NG



Bill Pix

Greg Waldron

Czech Republic-based manufacturer Let Aircraft Industries is showing its L-410NG at the Singapore air show for the first time, pitching the twin-turboprop for parapublic missions.

The updated version of the legacy type features a

Garmin G3000 glass cockpit similar to those found in private jets, and is powered by two GE Aerospace H8-200s.

Let test pilot Roman Mikel says the aircraft is particularly well suited to maritime surveillance or search and rescue missions, pointing to its low approach speed of 80kt (148km/h).

Other potential missions

include smuggling prevention, immigration monitoring, and environmental surveillance. The stop at the Singapore show is part of a broader tour in the region.

In a passenger configuration, the L-410NG can seat 19 people, plus two pilots.

Let is owned by Czech Republic group Omnipol, which bought the company from Russia's UGMK in 2022.

AMSL goes further with fuel cells

Australian hydrogen-electric aircraft developer AMSL Aero is taking a long-range view of potential use cases for its in-development Vertiia aircraft, targeting intra-city operations rather than urban air taxi services.

Company chair Chris Smallhorn tells FlightGlobal that Vertiia's range and endurance will ultimately set it apart from a crowded electric vertical take-off and landing (eVTOL) market.

"Why emphasise range and endurance? Australia's big," he says. "If we could only move around that 150km range, the reality in Australia is that you are locked into city operations. We will be pursuing particularly the regional and emergency medical services at the beginning."

The start-up's proposed Vertiia aircraft will have a maximum range of 540nm (1,000km) and

a payload of 500kg (1,100lb). "That brings you to a very comfortable four passengers, or for EMS a stretcher and two medics, plus medical equipment," Smallhorn says.

Last year, AMSL conducted about 40 tethered hover flights with a purely battery-powered prototype at its flight-test facilities in New South Wales, focusing on vertical take-offs and landings. It plans to progress to forward flight this year and then begin assembling an advanced prototype of its civil variant, which will feature a hydrogen fuel cell. The company is currently assembling a prototype of its military variant.

While the start-up has been flying relatively under the radar to date, that will change as the aircraft's design matures, Smallhorn says: "When we know we've got it right, we'll tell our story louder and louder."



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Boeing highlights 777X appeal

Greg Waldron

As it gears up for the arrival of its new widebody, Boeing is displaying a full-sized immersive mock-up of the 777X to highlight the interior options available to airlines.

Boeing is still working to gain certification for the 777-9, the largest version of the twinjet.

The big twin, which has suffered a series of delays, is key to the strategy of Singapore Airlines. The carrier's cabin overhaul effort is effectively on hold pending the arrival of the 777-9, which it expects in 2025.

To fill the gap created by delays in the 777-9 programme, SIA will retain some 777-300ERs longer than planned.



Laura Fitzgerald, Boeing regional director, cabin marketing showcases interior options

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Clark is Phil-ing up nicely

Clark airport developer Berthaphil is hoping to attract more global aerospace companies – such as MRO providers and cargo and logistics operators – to the site as part of a wider effort by the government of the Philippines to bring in investment from the sector.

The company is part of the Philippine Aviation pavilion at this year's Singapore air show, together with the Philippine Department of Transportation, the Civil Aviation Authority of the Philippines, and Clark International Airport Corporation.

Clark, located about 50 miles (80km) from downtown Manila, is already home to MRO companies such as SIA Engineering Philippines, and is a gateway for logistics giants UPS, DHL and FedEx.

Berthaphil is offering a vacant 10ha airfield site with primary runway access to aerospace firms.

Company chair Michael Herman says that the air-

port has several advantages, including that it is not as congested as Manila's airport.

Clark is served by over 15 domestic and international carriers, and its passenger terminal – the country's newest – can handle 80 million people annually.

Herman says that there is also a "big push" from the Philippine government to boost Clark's profile as a viable secondary airport to Manila, including improving its connectivity with the capital city. Notably, work is underway to build a new passenger and cargo rail link between the two.

That government agencies are also participating at the show illustrates "their commitment" to boosting the country's aerospace sector, including Clark, he says.

Herman adds that the Philippines has a large pool of skilled engineers and mechanics who are proficient in English, a boon in attracting international aerospace firms.



A total of 23 HA-420s are operated in Asia

Honda Aircraft hopes for pre-owned boost in region

Seeking to capitalise on the potential market for light business jets in Asia, Honda Aircraft is bringing its certified pre-owned (CPO) programme to the region.

"The number of high net-worth individuals is growing extremely fast," Amod Kelkar, Honda Aircraft's chief commercial officer says. "We see a great potential here because... this market is so much smaller in size compared to the potential the region has."

First launched in June 2023, the CPO programme involves a rigorous inspection and maintenance process "even before we take the aircraft from somebody else", Kelkar says.

The CPO programme expansion comes as Honda Aircraft undertakes a "continuous effort

to enhance its presence in Asia". More specifically, Kelkar says its very light HA-420 HondaJet business jet is perfectly suited for relatively short-haul regional flights out of Singapore.

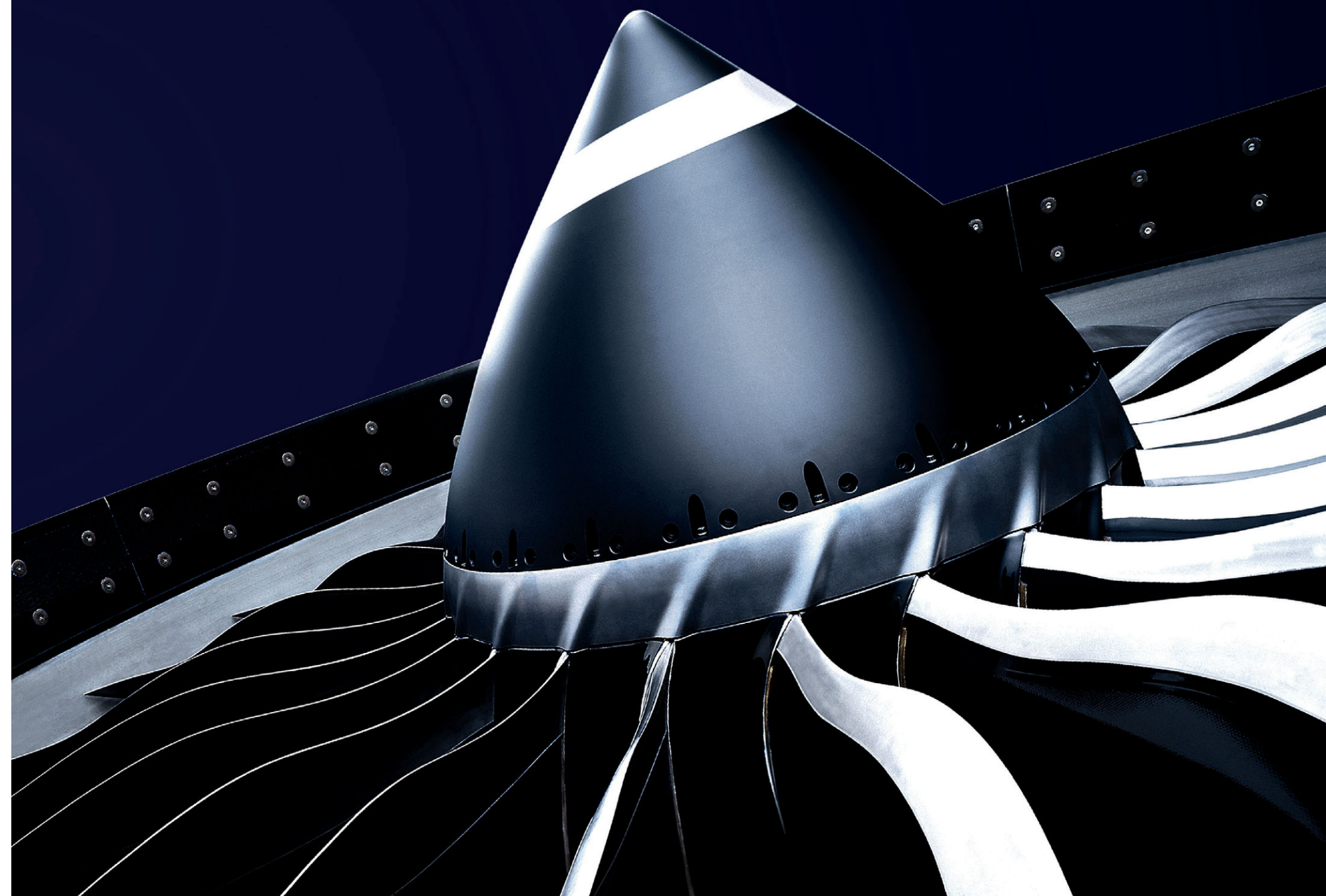
"Our aircraft with five passengers usually has a comfortable range of 1,200nm, or about two hours and 10 minutes," he says. "The biggest route from Singapore is to Jakarta, and that's about 1 hour and 30 minutes, and the top five routes from Singapore are all under two hours."

There are 23 HondaJets in operation throughout Asia. Earlier this month, HondaJet delivered the 250th HA-420, a major milestone since the type was certificated about eight years ago.



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Airbus aims to climb higher with A330-900



David Kaminski-Morrow

Airbus is to introduce an operational low-speed performance enhancement to the A330-900 towards the end of next year which will increase lift and reduce drag during climb. The improvement is achieved through a combination of faster landing-gear retraction and the use of intermediate take-off flap settings. Present at the Singapore show is an example operat-

ed by StarLUX, one of four in the Taiwanese carrier's fleet. Elsewhere in the region, customers for the A330-900, which is exclusively powered by Rolls-Royce Trent 7000 engines, include AirAsia X, Cebu Pacific, Garuda Indonesia and Lion Air. Airbus is to implement the enhancements on the variant - through a package called 'Step 4' - in the fourth quarter of 2025. With better A330-900 climb performance, the airframer says operators of the twinjet could achieve an additional uplift of 2.6t,

and perhaps as much as 4t, in take-off weight at certain airports as a result of the flap configuration and landing-gear changes. The A330-900 has five flap settings from fully-retracted to fully-deployed, but the airframer has been able to smooth the aerodynamic discontinuity between them by introducing four additional intermediate flap settings - giving nine in total. These four supplemental "bridging" settings, says Airbus, are designated 1B, 2B, 2C and 3B. They will be available for selection

through the multi-function control and display unit. Once the pilot moves the flap lever to the take-off position the aircraft's avionics will automatically extend the slats and flaps to the selected intermediate. Corresponding calculated take-off speeds will be available to the pilot through the electronic flightbag. Although no mechanical changes are needed for the flap lever or the aircraft's high-lift devices, certain avionics - such as the flight-management guidance and envelope comput-

er - will require hardware modifications. The additional take-off configurations will be complemented by a 0.8s reduction in landing-gear retraction time and a 0.2s quickening of gear door closure. Airbus says this has been achieved through installation of new main landing-gear actuators and hydraulic control equipment. It adds that a new automatic gear-door opening function also enables the shortened retraction sequence to begin "a couple of seconds earlier".

Supply chain pain could constrain recovery

Continued supply chain disruption affecting the delivery of new aircraft and maintenance upkeep times for the existing fleet is one of the biggest potential risks to expected growth this year among the region's airlines. Association of Asia-Pacific Airlines (AAPA) director general Subhas Menon says carriers in the region are expected to contribute around half the global industry's traffic growth this year, as they continue building back after a relatively late re-opening from Covid travel restrictions. Preliminary data for 2023 from AAPA shows international passenger numbers for carriers in the region jumped from 107 million in 2022 to almost 279 million - an increase of around 160%. "On average in 2023, in terms of demand, we were back to 72% [of 2019 levels] overall," Menon tells FlightGlobal. "In December it was 80%.

"It [the traffic recovery] would have been stronger if supply chain issues had not hampered the timely delivery of aircraft, spares and parts. It is an ongoing issue, not only in the Asia-Pacific region." Menon highlights the strong improvement in passenger load factor, which climbed nearly nine percentage points to 80.9%. "That is as strong as they were pre-Covid. So business as usual. If you look at 10 busiest routes, seven of them are in Asia," he says. However the pace of recovery across the region remains a mixed picture. "ASEAN is probably already at 80-85% [of 2019 levels]. But if you are talking about North Asia, maybe they are closer to two-thirds of where they were," says Menon. China was the last major market in the region to reopen after the pandemic, as restrictions

were fully lifted last May. "The Chinese recovery has been very muted, much less than expected," says Menon. "That's mainly because of economic factors. I would say they are about 50% of where they were before Covid." He notes that China's civil aviation authority anticipates that the country's passenger traffic will be back to 80% of pre-pandemic levels by end of the year. While air freight levels were down 3% across the year, they still remain higher than they were before the pandemic. Notably, after 18 months of decline, international air cargo traffic has picked up for carriers in the region since September. Menon adds: "There is a lot of cause for optimism and the airlines are working hard to ensure the profitability they are enjoying now continues well into the future."

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Whatever the scenario - combat teams entering a hostile area, fighter aircraft approaching their targets in contested airspace, or rescue teams urgently looking for survivors of a disastrous event - the ability to acquire the right information, in the correct context, and on time, is universally recognized as an essential factor in mission success. Paradoxically, intelligence information from radar, SIGINT, electro-optical and cyber intelligence systems has inundated today's platoon leader, tank commander, pilot, naval weapons system officer, and rescue coordinator with large volumes of data that actually make quick and effective decision making more difficult. Whereas in the past the acquisition of a specific high-quality intelligence item was an exceptional event, today's multitude of advanced sensors and systems provide an endless flow of raw intelligence material. Unless this data is quickly and effectively processed, key information may be obscured by the concurrent clutter and noise. At the same time, the battlefield has become more complex, hybrid and dynamic. Reacting to the sensor rich environment that has made modern combat deadlier than ever, adversaries are careful to lower their signature and increase mobility, endeavoring to present only fleeting targets that are more difficult to detect and identify. These issues are further exacerbated when extreme terrain and weather provide additional cover. To surmount these challenges every iota of relevant information from every available source must be exploited in the effort to create the clear and accurate intelligence picture required for decisive action.

Recognizing the need to better capitalize on the vast amounts of available multi-domain sensor data, IAI's subsidiary ELTA Systems, a division of IAI (IAI-ELTA), leveraged its five-decade heritage in intelligence and C4ISR applications to develop the battle proven ELS-8994 StarLight edata into useful, actionable intelligence, enabling decision makers to achieve information superiority and make effective decisions in real time. Utilizing the latest artificial intelligence and machine learning techniques, the highly automated StarLight system performs with minimal demands on human resources.

StarLight leverages an incredibly wide range of inputs: spaceborne, airborne, naval and ground sensors covering RADARINT, IMINT, COMINT, ELINT, GEoint, full motion video (FMV), launch detection systems (LDS), wide area motion imagery (WAMI), and even WEBINT & open source intelligence. An excellent example illustrating StarLight's real operational advantages is the detection and identifying ground based missile launchers. Utilizing a traditional approach, this crucial mission demands a huge intelligence effort involving multiple sensor platforms along with a large team of intelligence analysts to manually compare real time to historical data. Moreover, the intelligence team must elaborate their findings in a detailed intelligence report. The process can take many hours but on a dynamic battlefield, situations rapidly change and by the time this information is distributed the targets may have already moved or even disappeared.

In contrast, StarLight shortens the sensor to effector time to minutes and even seconds. Data



StarLight dramatically shortens the intelligence analysis process

interpretation is accomplished with the support of AI and machine learning, continuously improving efficiency and accuracy. Changes and anomalies are detected and investigated very quickly, with automated reports generated and distributed to give decision makers and stakeholders a cohesive, accurate intelligence picture that facilitates quick action. StarLight dramatically shortens the intelligence analysis process, facilitating timely, effective responses to battlefield events. It economizes human resource requirements. It improves accuracy. It deals with multiple events simultaneously - more than opponents can generate within a given geographical area and time window. It automatically directs sensors to investigate events. And it frees intelligence experts to focus their resources on higher order issues. StarLight is ready with the right concept, experience, sensors and technology to take a leading position in your intelligence revolution.



The ability to acquire the right information, in the correct context, and on time, is an essential factor in mission success

By investing in latest generation tactical transport, air forces in the region are recognising a need to support combat fleets and other missions across wider territories

Extending their reach

Greg Waldron

South East Asian air forces are gradually recapitalising their tactical transport capabilities, amid a growing requirement to move personnel and equipment across broad geographies.

The early 2020s have been pivotal for the future of tactical airlift among Southeast Asian countries, with air forces that have long relied on ageing Lockheed Martin C-130s taking steps to obtain new equipment.

The requirement for new tactical transports is real. Cirium fleets data indicates that Southeast Asian air forces have over 90 aircraft serving in the fixed-wing, utility transport mission. The average age of this fleet is 30.1 years.

Legacy C-130s dominate the region's tactical transport space, with 60 examples in service. The average age of this fleet is 41.7 years.

The region's two oldest C-130s are operated by the country considered to have Southeast Asia's most modern air force: Singapore. The Republic of Singapore Air Force has one KC-130B that is 64.4 years old and a slightly younger sibling at 63.7 years.

The second most prominent transport in the region is the Airbus Defence & Space C295. The region's air forces operate 21 examples, with an average age of 7.5 years.

Indonesia was among the first regional air forces to place major commitments for new transports.

In September 2021 the long-time C-130 operator ordered five new C-130Js during a visit by officials to the USA. Four examples have been delivered.

Shortly after the C-130J commitment, Jakarta disclosed a long-awaited order for two Airbus Defence & Space A400Ms, a transaction that was finalised in December 2022. The aircraft will be delivered from 2026.

In addition to the new C-130Js, Indonesia operates a trio of C-130Bs with an average age of 63.1 years, with these aircraft set to be retired. It also has 11 C-130Hs, some of which formerly served with the Royal Australian Air Force, and a single KC-130B tanker.

Local MRO firm GMF AeroAsia is conducting a major modernisation programme for eight of the C-130Hs, which includes replacing the centre wingbox and other improvements. The work adds 20 years to the C-130H's service life.

Indonesia also operates nine



South Korea will field three C-390 transports via a contract with Embraer

C295s, two of which were produced locally by Indonesian Aerospace, also known as PTDI. Moreover, Jakarta has expressed interest in the A330 Multi-Role Tanker Transport (MRTT).

In October 2023, the Philippines also moved to update its transport capabilities, with Manila greenlighting the acquisition of three new C-130Js. Deliveries will run from July 2026.

The new aircraft will significantly boost Manila's lift capability. They join four elderly C-130s, the oldest of which is a B-model example that is 62.3 years old. The Philippine air force also operates six C295s.

Another big regional C-130 operator is Thailand, operating 12 C-130Hs with an average age of 36 years. The Royal Thai Air



A Royal Malaysian Air Force A400M at Malaysia's LIMA show in May 2023

certain to participate in any upgrade programme.

Malaysia also moved early to bolster its airlift fleet, with four A400Ms delivered between 2015 and 2017. The large four-engined type is well suited to rapidly moving personnel and equipment across the South China Sea, which divides peninsular Malaysia from the country's Sabah and Sarawak provinces on the island of Borneo.

Arguably the most intriguing opportunity for acquiring a new airlifter is Singapore, with four KC-30Bs, one KC-30H, and five C-130Hs. The average age of the 10-aircraft fleet is 50.7 years. While old, Singapore's C-130s have been extensively updated with glass cockpits and new avionics.

This force is backed up by six A330 MRTTs, which can carry passengers and cargo in addition to their tanking duties.

In 2022, chief of air force Major-General Kelvin Khong had this to say about Singapore's C-130s: "The C-130 transport aircraft is a valuable workhorse and we will continue to operate it for as long as it is operationally and economically feasible, whilst continuing to keep a look out for new capabilities that can better meet our future needs."

A clear path forward for Singapore is the C-130J, although the US government has not published a Foreign Military Sales case for Singapore regarding this platform. The C-130J would appeal to air force personnel who have long experience with the legacy C-130 and be in-line with neighbours and the city state's major defence partner, the USA.

Another possibility for Singapore is the Embraer C-390, which is coming to the Singapore air show. The type has traction in Asia: late 2023 saw the twin-jet type emerge as the surprise winner of South Korea's Large Transport Aircraft II acquisition for three aircraft. This marked the type's first sale in Asia and was an important victory over the C-130J in a country that has long operated C-130s.

The type's payload and speed could be of utility to Singapore's military given that it frequently trains in far-flung locations such as Australia, New Zealand, and the USA.

The last decade has seen significant progress in Southeast Asia's tactical airlift front. As legacy C-130s continue to age, manufacturers such as Airbus, Embraer, and Lockheed will compete hard for emerging fleet replacement and growth opportunities. ▀

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RAFAEL

Han Kok Juan is director-general of the Civil Aviation Authority of Singapore (CAAS). He explains how the aviation authority is ensuring the island state remains a global pace-setter in air transport



Singapore has the ability to work as a coordinated aviation entity

Dmitry Dvorny/Shutterstock

Q Can you describe how Singapore's aviation sector has done over the last two years amid the country's emergence from the pandemic?

A Covid-19 decimated the Singapore air hub. Flights were cancelled. Planes were grounded. The terminals were empty. Air passenger volume at Changi Airport was less than 3% of pre-Covid levels for over 18 months. There was much fear and uncertainty as to when and whether we would recover. CAAS worked closely with our companies and unions to preserve core connectivity and capabilities and to support our workers and save jobs.

When borders reopened in 2022, we worked together to ramp up manpower and operations safely and smoothly, without major safety incidents, system failures or congestions at the airport. Our ability to do so is testament to the strong tripartite partnership in Singapore and our ability to work as 'One Aviation'.

For the whole of 2023, Changi Airport saw 58.9 million passengers, which is 86% of pre-pandemic traffic levels. The sector's workforce has surpassed 95% of pre-Covid numbers. We expect full recovery of both Changi's passenger traffic and workforce numbers to pre-pandemic levels this year.

Q Singapore has taken a leadership role with trajectory-based operations, which promise more efficient flight paths. What is the status of this work and why is it important?

A Air traffic is expected to rise robustly and projected to

double by 2040, offering better connectivity, growth, and jobs. To seize opportunities, we need to build capacity not only in airports and runways on the ground but in the skies also.

Trajectory-based operations (TBO) is key to building capacity in the skies. We now need to take practical steps to bring concept into operations.

In 2020, CAAS participated in the Multi-Regional Trajectory Based Operations (MR TBO) project, with the air navigation service providers (ANSPs) of Canada, Japan, Thailand, and the USA. This culminated in June 2023 with a live demonstration flight between Seattle, Tokyo, Bangkok, and Singapore.

In October 2023, the ANSPs of China, Indonesia, Japan, New Zealand, the Philippines, Singapore, Thailand, and the USA, the Civil Air Navigation Services

Organisation, and the International Air Transport Association came together to launch the Asia Pacific TBO Pathfinder project. This is a challenging goal, but we are determined to work together to get it done.

Q The passenger electric vertical take-off and landing (eVTOL) sector is steadily moving toward certification and implementation. Given Singapore's excellent transport infrastructure and small size, is there a market for eVTOL here, and what are the plans for eVTOL deployment?

A The eVTOL market will add a new dimension to the aviation industry and has the potential to be a new engine of growth for our economy. In November 2023, CAAS initiated the inaugural meeting of Asia-Pacific regulators on advanced air mobility (AAM) and unmanned aircraft systems (UAS). This is aimed at fostering collaborations among regulators, and between regulators and industry, to leverage AAM and UAS safely and effectively. The regulators identified eight areas of priority and will develop a set of reference materials that regulators can consider, adapt, and use to facilitate commercial operations of AAM and implementation of complex UAS operations.

Q What is the Singapore government doing to promote the production and employment of sustainable aviation fuel?

A Singapore has taken concrete steps towards growing the sustainable aviation fuel (SAF) ecosystem. As a first step in this SAF journey, CAAS partnered with stakeholders to conduct a 20-month SAF pilot at Changi Airport starting from February 2022. This is a significant first step in validating Changi's supply chain readiness for SAF and understanding demand for SAF credits in Singapore. The pilot found that Singapore is operationally ready to supply SAF, but more is needed to support adoption.

In addition to the SAF pilot, CAAS is also advancing the recommendations by the International Advisory Panel (IAP) on Sustainable Air Hub. This includes developing initiatives to drive long-term SAF adoption in Singapore, as well as working with stakeholders to create a long-term secured SAF supply ecosystem.

Q Apart from SAF, what are Singapore's efforts in areas such as hydrogen and battery technology?

A While the near-term focus is on the wider adoption of SAF in aircraft operations, hydrogen is a potential energy fuel in the longer term that could completely abate CO2 emissions and thereby complement decarbonisation of aircraft operations.

CAAS signed a cooperation agreement in February 2022 with Airbus, airport operator CAG, and energy supplier Linde, for a two-year technical feasibility study on hydrogen adoption and its infrastructure requirements for aviation. The study has been completed, and there is a need to continue monitoring the developments of liquid hydrogen technology and supply chain for safe adoption into aviation operations. ▀



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DASSAULT AVIATION

The private aviation sector in APAC is growing again, reflected in the confidence of the OEMs, who are at the show in force and have been investing heavily in aftermarket services

Back in business



Bombardier's Global 7500 on the static

Murdo Morrison

Business aviation across Asia-Pacific (APAC) is finally waking from a pandemic-induced slumber, and the seven manufacturers displaying aircraft at the show are feeling upbeat. With traffic back at or above 2019 levels, they are anticipating growing sales – including the longer-range, larger-cabin types that are especially popular in this market – as well as demand for maintenance, repair and overhaul (MRO) services, something reflected in a recent slew of investments in infrastructure.

“With the continued resumption of trade and business activities, our expectations remain positive for the overall growth in Asia-Pacific,” consultancy Asian Sky Group reported in its latest market survey of the region. It found that the number of business jet flights departing Asia-Pacific increased by almost 43% in the third quarter of 2023, compared with the same period a year earlier. Anecdotal evidence supports this optimism.

“Business aviation has seen a marked improvement beyond pre-Covid levels, and we continue to see potential for growth in the region,”

says Joe Reckling, senior vice-president regional operations APAC at Swiss business aviation services provider Jet Aviation. With around 1,000 employees in the region, the General Dynamics-owned company is one of APAC's most important players, helped by its 2018 acquisition of local heavyweight Hawker Pacific.

Simon Banbridge, commercial director, Asia, at Tag Aviation,

concur: “The last 12 months have been much better than the previous 36 months. Asia-Pacific really suffered through the pandemic with closed borders and travel restrictions. The fleet in China shrank, and we saw a contraction in our [managed] fleet,” he says. “However, during the past 12 months we've seen a stabilisation, and we are starting to see an increase.”

All big-five business aviation manufacturers are represented on the static, alongside light jet specialists Honda Aircraft and Pilatus. Bombardier – which claims to have the largest share of the APAC market for light jets and above, with 291 aircraft in service – is displaying its flagship Global 7500, which it describes as “an ideal choice for customers in the region” with 21 of the type in service across APAC.

Dassault has the Falcon 6X on the static, along with its 200LXS, as part of a regional road show for its latest certificated type. “We have strong expectations for our newest aircraft in Asia,” says the French airframer. Gulfstream is exhibiting its G600 alongside its ultra-large-cabin G700, certification of which is expected this quarter. “The long-range advantage of [these aircraft] is incredibly important to customers in Asia-Pacific,” says Scott Neal, senior vice-president, worldwide sales.

Embraer is showcasing its super-midsize Praetor 600, a type it delivered for the first time into South Korea in December. It singles out India as a key growth market for its smaller Phenom 300 and 100. “While India's GDP is almost twice the size of Brazil's, its business



Dassault's 6X is its newest Falcon



The CJ4 Gen 2 is part of the Textron Aviation exhibit

jet fleet is five times smaller,” says the Brazilian airframer. “It has the seventh largest demand for commercial flights, 80% of which are domestic. Some of these missions could be replaced and better served by a Phenom family aircraft.”

Textron Aviation has the biggest display of aircraft among the business and general aviation manufacturers, with a midsize Cessna Citation Latitude, and two light jets: a CJ4 Gen 2 and an M2 Gen 2. Textron – which says it was responsible for seven in 10 “competitive” turbine aircraft deliveries in the region during 2023 and has 400 jets and more than 1,000 turboprops in APAC – is also showing a Beechcraft King Air 360 and Cessna Grand Caravan EX with special mission floats.

Despite its Japanese ownership, Honda Aircraft, which is returning to the show after an absence of several years, builds its HondaJet in Greensboro, North Carolina, and North America is its largest market. However, there are 20 HondaJets in operation in APAC and “that number continues to rise”. Honda Aircraft also has authorised service centres in China, Japan, and Malaysia. Swiss manufacturer Pilatus, which is exhibiting its PC-24, completes the business aviation contingent.

While the OEMs will be talking up their latest hardware, much of their focus in the region in recent years has been beefing up their MRO operations, seen as a highly profitable part of the business, and a good way of retaining customers in the brand. Bombardier's regional flagship is its Singapore Seletar facility, which it opened 10 years ago and has since expanded from around 6,500sq m (70,000sq ft) to almost 27,000sq m.

The hangar – a “full turnkey solution MRO” with paint, battery, and landing gear shops – has seen a 30% growth in visits year-on-year to around 1,300 in 2023, says Paul Sislian, executive vice-president of aftermarket services and strategy. Bombardier complements Singapore in the region with smaller service centres in Tianjin, China, inaugurated in 2017, and Melbourne, Australia, which came on line two years ago.



Embraer is showing its Praetor 600 super-midsize jet

The manufacturer is looking at further possible openings in Sydney and Perth, as well as in India, as it begins to penetrate that market. “We're not finished yet,” says Sislian. “We're seeing a huge growth trajectory in APAC, and that's why we are investing. We want to make sure we are close as possible to the customer. We are also expanding existing facilities, including

Singapore, because the market here is skewing to super-midsize and large aircraft and we need to be able to accommodate them.”

Dassault Aviation-owned ExecuJet MRO Services' new 14,000sq m facility in Kuala Lumpur, Malaysia is due to open in the third quarter and is designed for the largest Falcons, including the 10X, says the French manufacturer. Gulfstream,

meanwhile, last July added three authorised warranty facilities in China – in Beijing, Shenzhen, and Tianjin – one of the US airframer's most important markets. Sister company Jet Aviation operates its own centres in Hong Kong and Singapore.

Jet Aviation has had an MRO footprint in the region since setting up a Singapore facility in 1995, long before its acquisition by General Dynamics. Its acquisition of Australian MRO and services provider Hawker Pacific took that presence to another level. Despite its links to Gulfstream through its shared parent, the company remains brand agnostic, and is authorised to carry out maintenance and repairs on more than 40 aircraft types.

With 8% of the business aviation fleet based in the region and aircraft use growing strongly since the pandemic, Jet Aviation's Reckling says the MRO opportunity – alongside that for its other charter, aircraft management, and fixed-base operation businesses – is significant, “reinforcing our confidence in this part of the world”. He adds: “Singapore in particular saw an increase in demand for MRO services in 2023.”

Another major player is ExecuJet Haite, which, despite its name, is owned by Tianjin Haite Aircraft Engineering, and uses the ExecuJet brand under licence. The firm's 10,000sq m Tianjin hangar has Aruba, Bermuda, Cayman, Chinese, Hong Kong, and Macao approvals, and is a service provider for Bombardier, Dassault, Embraer, and now Gulfstream aircraft. In December, the business signed an agreement to operate a second, 5,000sq m MRO facility at Beijing.

“Our MRO business has grown steadily since Covid, although things were difficult for three years when it was difficult to travel because of the extended lockdown,” says general manager Paul Desgrosseilliers. The business has traditionally attracted 40% of its customers from overseas, and while this proportion reduced during the pandemic, it is coming back, particularly from Southeast Asia, with travel into China for foreign nationals now much easier, he says. ■



A Gulfstream G650 at ExecuJet Haite in Tianjin



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A General Dynamics Company

Francisco Gomes Neto is the chief executive of Embraer. He outlines how, having recovered from being spurned by Boeing in 2020, the Brazilian manufacturer is competing strongly on three fronts – commercial aircraft, business jets, and defence

Q You are shortly to celebrate your fifth anniversary. Circumstances for Embraer today look very different to 2019, when a divestment of the commercial aviation business to Boeing was underway. When Boeing pulled out in 2020, you had to suddenly come up with a new strategy for Embraer. How close are you to achieving the transformation you set out, and will you achieve your target of \$8 billion revenues by 2027?

A It has been a fantastic journey. I'm very proud of everything that we have achieved so far, especially for the commitment of the Embraer team in overcoming such a challenging period that was maximised by the effects of the pandemic.

The turnaround of our business is complete, and we are confident that now is the harvesting time for everything that we have done in recent years. We are on the right track to sustainable growth delivering more robust financial results and paving the way for profitable growth in this and future years. In this regard, we are firm with our plan to reach a potential of \$10 billion in revenues by 2030.

Embraer products are going through a very positive momentum, with several ongoing sales campaigns and production slots practically filled until 2025. Our growth strategy since 2020 has been based on financial discipline, enterprise efficiency, increased sales of our current portfolio, innovation and ESG. The results so far show that we are on the right path.

Q Can Embraer achieve its goals without a strategic partner or at least significant investment from a player outside Brazil?

A We are constantly evaluating new opportunities to establish strategic partnerships as long as they make sense for the business – for instance, a partnership that will help us increase our sales, open new markets or even new developments.

It is important to mention that Embraer has a unique portfolio of leading products in every segment where we compete and, as I said before, we are experiencing a positive sales momentum and we are set to grow.

Q After some wobbles – a reduced commitment from the domestic customer – the C-390 has been winning significant export customers. How important is it to sell that aircraft outside Brazil?

A The C-390 will be the major driver of growth for our defence business in the next few years, so obviously it is extremely important



Embraer

Back fighting

to sell the aircraft globally. We put a lot of effort to expand our sales in the international market and we have recently announced some important achievements in the APAC region as well. The C-390 has been selected by Brazil, Portugal, Hungary, The Netherlands, Austria, Czech Republic and most recently South Korea.

The C-390 Millennium, which is at the show, is the best aircraft currently operating in this category – a multi-mission jet by design that offers greater performance and better productivity with low operational costs. That's why so many other nations have shown an increasing interest in this aircraft.

Q C-390 aside, how are you developing Embraer's defence business?

A As a major player in the industry, Embraer Defense & Security is growing its business across air, sea,

space, and land applications.

Our broad portfolio includes different aircraft models, modernisation and upgrade programmes, large geostationary satellites and nanosatellites, radars, border surveillance systems, air traffic management systems, integration of complex systems as well as submarine technologies, light frigates, and cyber security. Our solutions are currently in operation in more than 60 countries.

Q Why did you decide to spin off your electric vertical take-off and landing start-up Eve as an autonomous entity, albeit still majority owned by Embraer? Is the intention to divest that business entirely?

A We decided to spin off Eve to put dedicated resources and speed up the project with clear focus, bring new investors and partners interested to invest

specifically in the eVTOL market and secure specific funds for the eVTOL development.

Embraer sees a significant value in the eVTOL market and has no intention to divest that business. Of course, as we open for new investors it is natural to expect that our participation will gradually decline overtime but without losing control.

Q With the E175-E2 programme on pause and sales of the other E2 variants still quite sluggish, how do you achieve a breakthrough in your regional aviation business, particularly in crucial Asian markets such as India and China?

A India and China are examples of markets where we see a good fit for the E2s. There are different challenges, of course, but we believe we can offer better solutions for the operators in these markets to complement the operations of larger narrowbodies. The E190-E2 and the E195-E2 received its type certification in China opening the door to more operators in the country. We currently have 90 aircraft in the country flying across 150 cities. In India, the E-Jets and ERJ fleet are flying across 20 cities in the country and the E-Jets and E-Jets E2 are ideal platforms to operate between large and secondary cities, likewise among smaller cities – the next frontier of growth for airlines in the country.

The E2 has challenged the paradigm and we see growing interest globally and in Asia. With a range in excess of six hours, and a seating capacity of up to 146 seats, the E195-E2 has economics that are on par with the larger narrowbodies that are prevalent in the region.

This year, we look forward to Scoot's beginning of E190-E2 operations and we have been working hand in hand with them as we all prepare for the entry into service of the aircraft.

Q One of Embraer's many success stories in the past 20 years has been its emergence as a major player in executive aviation. Where do you see future opportunities?

A Embraer has a brand-new portfolio of state-of-the-art innovative and disruptive products. We continue looking into new opportunities to improve our products portfolio, as well as into new products so that we keep our current leadership position.

That being said, we potentially see opportunities to develop a new product in the future both up the mid-size category or down the line within the light jet segment – however, we have no commitment to launching a new product at this time. ▀

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I Gusti Ngurah Rai International Airport

Lee Seow Hiang, chief executive of Changi Airport Group (CAG), talks innovation, traffic recovery, and expansion plans at one of the world's most enticing and important aviation crossroads

Q What were the key traffic trends that Changi Airport observed in 2023 with the emergence from the pandemic?

A Last year was one of strong growth, driven by so-called revenge travel and the easing of border restrictions by more countries. Business and MICE [meetings, incentives, conferences and exhibitions] travel also resumed in a bigger way last year, generating greater demand for air travel. Changi Airport's 2023 passenger traffic recovered to almost 90% of pre-Covid level, registering 58.9 million passenger movements in total.

We saw strong recovery for all regions compared to the previous year, with North Asia in the lead largely due to a significant increase in travel between China and Singapore. During the year, China regained its position in Changi's top five country markets, with Indonesia holding the top spot. Compared with 2019, North America has witnessed the strongest rebound, surpassing pre-Covid levels by more than 25%. Europe, Southwest Pacific and South Asia are close to full recovery, at over 90%.

Q Can you describe the upgrade work that went into Terminal 2?

A We fully re-opened Terminal 2 ahead of schedule on 1 November 2023, after three-and-a half years of engineering and expansion works. T2's completion is timely as it restores Changi to its four-terminal operations, and provides the capacity needed to meet an anticipated growth in demand, towards full recovery in 2024.

The T2 expansion project has added five million passengers per annum to Changi Airport's handling capacity, bringing the total to 90 million. It has also increased the terminal building by more than 21,000sq m to include new systems and additional retail offerings.

With a central common-use Fast and Seamless Travel (FAST) zone, we have almost doubled the number of automated check-in kiosks and bag drop machines in the terminal. The immigration halls have also been expanded to support additional automated immigration lanes, allowing more passengers to be served.

Q Sustainability has emerged as a major objective for airlines. What are Changi Airport's contributions in this area?

A Sustainable aviation fuel (SAF) is one of the most critical levers in the decarbonisation of air travel. CAG has been collaborating closely with industry and regulatory partners, facilitating trials and engaging stakeholders to encourage the adoption of SAF.

Making the connections



Changi Airport Group

To date, several airlines such as Singapore Airlines, Scoot, Japan Airlines and China Airlines have conducted SAF uplift trials at Changi Airport. The expansion of Neste's refinery in Singapore will allow the production of up to one million tonnes of SAF annually, enabling Changi Airport's airline partners to achieve their sustainability goals.

While it will take time for SAF production to scale globally, we see the importance of raising advocacy and awareness on sustainable air travel among our passengers. As such, CAG has launched a Changi Carbon Offsets programme in partnership with Carbon Clicks, a New Zealand-based carbon offset company.

The programme, which supports projects such as forest conservation in Indonesia and wind power generation in India, provides passengers a convenient way to offset the carbon emissions from their air travel, regardless of the airline that they are flying with. Airside, CAG has also installed over 100 electric vehicle (EV) charging points to support our all-electric baggage tractor fleet and to reduce carbon emissions.

From 2025, all new airside light vehicles, tractors, and forklifts will need to be electric, and all airside vehicles are to be fuelled by cleaner energy by 2040. We will be tripling our EV charging network in the coming years to support our airport partners' electrification efforts.

Q New longer-range aircraft are allowing for more point-to-point connections, bypassing big hub airports. How does Changi aim to stay relevant in this environment?

A While direct flights save time for passengers, many also prefer to break up their long flights with a stopover point, to give themselves a chance to stretch their legs and take a breath of fresh air. At Changi, we are constantly looking at providing a first-class transit experience to all passengers.

From ensuring sufficient spaces for rest and relaxation through comfortable seating and themed gardens to curating shopping



Last year saw a strong traffic recovery at the airport

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and dining offerings, we strive to anticipate passengers' needs and give them a pleasant and memorable experience at Changi. The recent upgrades done at Terminal 2 is an example of how we have brought new surprises to passengers for an enhanced travel experience.

New attractions were introduced, including the Wonderfall, a mesmerising giant digital waterfall located in the middle of the departure hall, and Dreamscape, an immersive indoor garden featuring an ever-changing digital sky mimicking real-time weather conditions in the transit area.

More importantly, while newer aircraft can fly longer distances, connectivity is ultimately the key consideration for travellers, as well as businesses. This point has gained importance in recent times, as a myriad of reasons such as geopolitical developments or new pandemics could disrupt air and sea routes any time. Changi Airport is currently connected to 150 cities in about 50 countries, served by almost 100 airlines from across the world. Our goal is to connect travellers to even more destinations, be it for leisure or business, with the best airport experiences.

Q How does Changi see the passenger's airport experience evolving over the 2020s?

A With rapid advancements in technology, we can most certainly expect to witness greater transformation in airport experiences in the decades to come. At Changi Airport, this would translate into a smoother and more seamless experience for passengers, from check-in to boarding.

It has always been in our DNA to continually raise the bar through innovation, be it in operations or passenger service and experience. Today, passengers at Changi are already enjoying the convenience and security accorded by biometric processes such as at flight and baggage check-in, and immigration. In the near-future passport-less travel will be trialled, making travel even more hassle-free.

As technology on the "single token" concept matures, there might come a day when passengers can walk through the airport without whipping out any identification documents, whether it is checking-in, making duty-free purchases, or even hailing a ride home, all using biometric technology.

As artificial intelligence becomes more pervasive, the technology can be used to offer passengers more personalised services - from recommending the perfect meal before their flight, to where they can shop and what they can do while waiting in transit. Last, but not least, enhanced automation and robotics are technological developments which will continue to revolutionise passengers' airport experience.

Automation has taken over repetitive tasks at many airports and at Changi, such as processing check-ins and baggage deposit, making airport operations more efficient and freeing up staff to focus on providing higher value-added services to passengers.

Q What are some key areas of innovation that Changi is focused on?

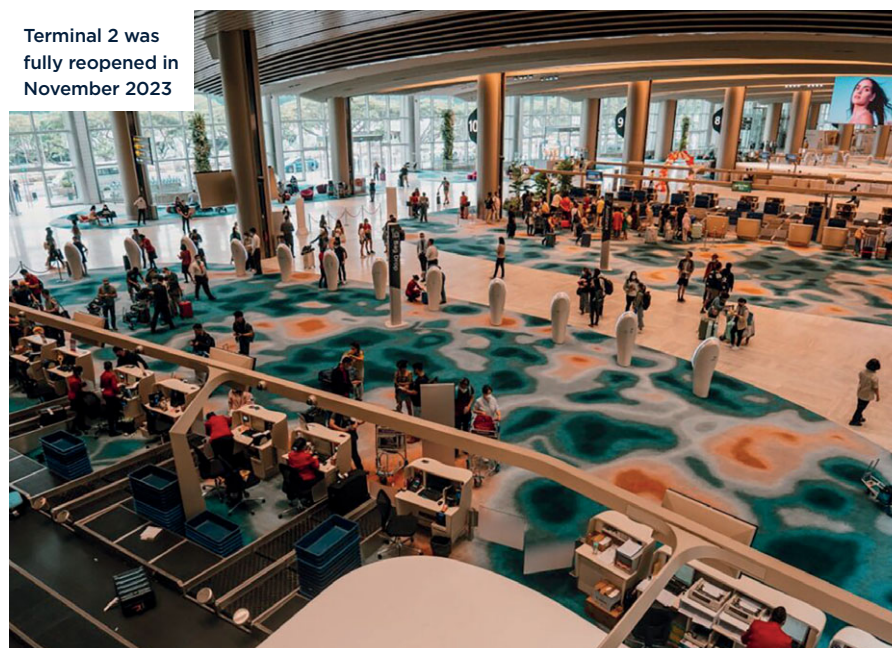
A One of the key focus areas for Changi Airport is ensuring a smooth travel journey for all our passengers. The Singapore Immigration & Checkpoints Authority has announced that passengers departing Changi Airport will be able to go through automated immigration clearance

using biometric data, with no passports needed, from the first half of 2024.

Using biometrics as a "single token of authentication" means that passengers do not need to produce their passport, ticket and boarding pass multiple times during the boarding process, smoothing the check-in process for all passengers. On the airside, Changi Airport has been investing resources to trial autonomous solutions at the airside to enhance operational efficiency and the safety of workers.

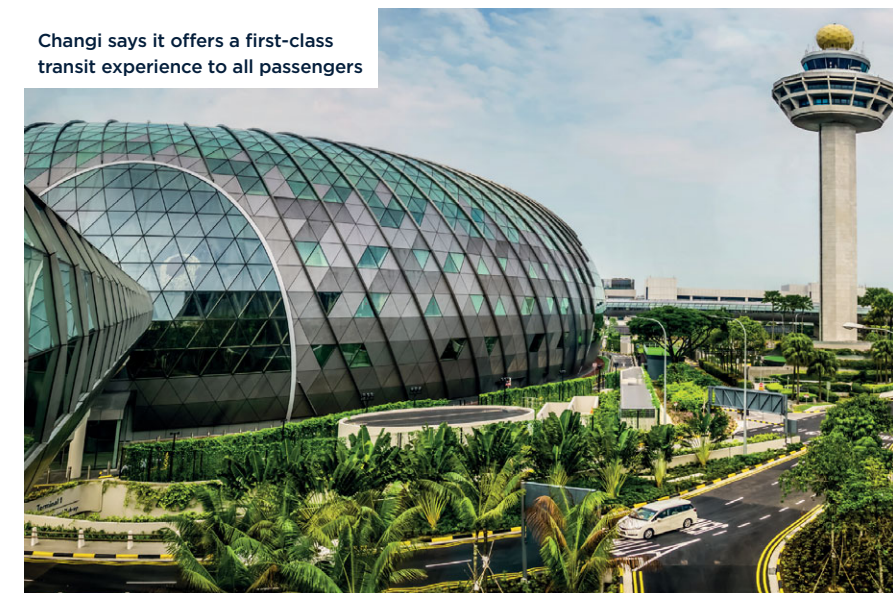
Two examples are the Autonomous Dolly and the Bulk Baggage Handling System, which automate the baggage transfer between the aircraft and baggage handling facilities. In August last year, we also launched a trial to automate the docking of the passenger loading bridge.

With some of these innovations, we can then look into redesigning and upgrading the jobs of our airside workers, enabling them to focus on other processes such as last mile operations, which are more complex and difficult to automate. We are featuring many of these technologies at our booth this week. ▶



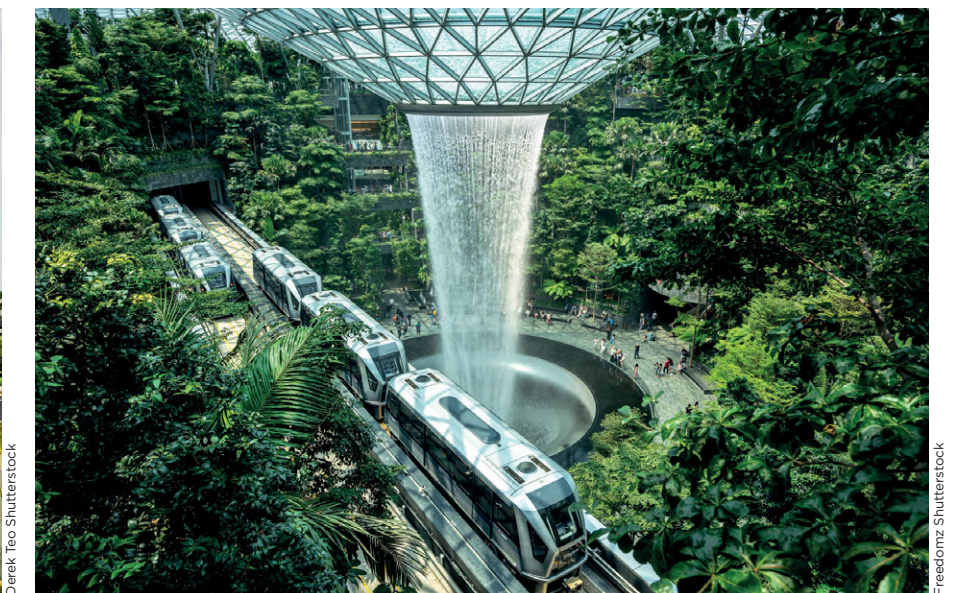
Terminal 2 was fully reopened in November 2023

Changi Airport



Changi says it offers a first-class transit experience to all passengers

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A few years ago, they seemed futuristic concepts. Now, with the prospect of service debuts for many eVTOL platforms, urban air mobility is fast becoming reality, and developers view Asia-Pacific as a key early-adopter market

Electric dreams



Volocopter had been targeting a commercial launch in Singapore this year

Murdo Morrison

By the next Singapore air show – and certainly the one in 2028 – urban air mobility (UAM) will be a reality, having made the switch from a gaggle of obscure start-ups working furiously to bring their concepts to production to an everyday method for millions to get from A to B. With some developers promising the launch of passenger flights as early as this year, arranging a ride in an electric vertical take-off and landing (eVTOL) air taxi could soon be as simple as booking an Uber.

That, at least, is the vision – but it remains somewhat fuzzy. China aside, regulators have still not certificated an eVTOL, and operational and safety conundrums remain. Generating and avoiding running out of cash is still a challenge. So too convincing the public of the wisdom of soaring above cities in these fragile-looking machines (something, of course, that could have been said a century

ago). But none of that is deterring the dozen or so developers looking to bring prototypes to production, several of which are at the show.

Even though Asia-Pacific has spawned only a handful of eVTOL pioneers, including China's EHang and Hyundai-owned Supernal, few parts of the world have embraced the UAM opportunity as enthusiastically. China, India, Indonesia, Japan, South Korea, and

Singapore are all vying to be at the vanguard of an eVTOL revolution, with the 24 months since the last air show seeing a flurry of partnership announcements throughout the region.

One of the most significant recent developments has been the certification last October by the Civil Aviation Administration of China of EHang's EH216-S, the first eVTOL aircraft to achieve this status,

and unique in that it is designed to be flown autonomously. EHang undertook more than 40,000 test flights of its two-seat "multicopter" to convince the authorities and has since conducted demonstration flights with members of the public in Guangzhou and Hefei.

EHang's initial market appears to be sightseeing flights, but the US stock market-listed firm has ambitions beyond being a novelty tourist gimmick. In 2022, Indonesian private jet charter firm Prestige Aviation agreed a "pre-order" for 100 EH216-S models. Indonesia's geography – it is a sprawling archipelago of more than 17,000 islands – mean eVTOLs are a potential gamechanger when it comes to affordable and sustainable regional mobility.

Another regionally based start-up is Japan's SkyDrive, which has set a 2026 certification target for its two-passenger, plus pilot aircraft. However, it hopes to have an airworthiness certificate by next year in time for it to operate demonstration flights at the Osaka



Vertical says Asia-Pacific represents almost a third of its orderbook

Expo. The company, which has an agreement with auto giant Suzuki to assemble its eVTOL aircraft at a Suzuki factory, said at the 2023 Paris air show that it had more than 100 "pre-orders" from companies in Asia and the USA.

Meanwhile, there have been setbacks. At the last Singapore air show, Germany's Volocopter announced that it was targeting a commercial launch in the city in 2024, starting with intra-city tourist flights. It released a "Singapore Roadmap", outlining its operational strategy for the island state. Three years previously, it conducted Asia's first crewed public urban test flight of an air taxi, over Marina Bay.

Since then, however, it has reined back its ambitions, admitting that it has not yet found local partners willing to share in the costs. In a statement late last year, it said: "Being the first to launch an air taxi service in a market is no easy feat. It requires strong political and regulatory support and is capital intensive. We are grateful for the robust support we have received from the Singapore government and incredibly proud of the progress we made in the Lion City over the last few years."

Speaking to FlightGlobal ahead of the show, chief operating officer Christian Bauer says the wider region still offers ample opportunities. "Asia-Pacific has the world's highest concentration of mega cities, but we do need the right ecosystem and the right partner to allow us to introduce operations," he adds. The company still plans to offer publicity flights for paying passengers at this summer's Paris Olympics and hopes that this will kickstart further conversations in Asia.

Japan remains a key target market for Volocopter, as it does for other eVTOL developers. As in Paris, the Bruchsal-based firm intends to launch commercial air taxi services on its four-seat VoloCity at the Osaka Expo. In December, it conducted a week-long flight test campaign in its 2X prototype there and in neighbouring Amagasaki to test aircraft operations in similar conditions to those expected during the expo, and "accelerate public awareness" of eVTOL aircraft in Japan.

Paradoxically, the country's highly developed ground transportation infrastructure is a help rather than hindrance, Bauer believes. "Japan is important because it has so many highly dense areas, where normal traffic modes cannot help," he says. "Japan is also a country that is very comfortable with high technology, so they are interested in being an early adopter of this new mode of transportation."

South Korea is another market that is enticing developers. Embraer spin-off Eve in November announced a "concept of operations white paper" for eVTOL flights on Jeju island, in partnership with low-cost airline Jeju Air. David Rottblatt, vice-president sales, marketing and government affairs at the Brazilian company, describes the move as "an important first step to establishing eVTOL operations in South Korea".

Eve says its has been "extremely active in the past year in the region" and that the high concentration of



Carmaker Toyota is a major investor in Joby



Lilium believes China could make up a quarter of the global eVTOL market



Archer views India as a major market for its eVTOL Midnight

heavily populated cities, such as Mumbai, Seoul, Tokyo, Beijing, and Jakarta, make Asia-Pacific a perfect launch pad for the concept. With road space and the potential to build new highways limited, "we can identify strong natural use cases where a new mode of transportation can bring tangible benefits to these densely populated urban centres", it says.

Because each city is different, Eve adds that it is "paramount that we identify committed local partners with whom we will work". It recently announced plans to launch operations in Bangalore with Hunch Mobility, which is partly owned by

New York-based helicopter ride-share platform Blade Air Mobility. The companies will strive "to ensure the appropriate infrastructure is in place to introduce eVTOL flight" and address "the bottleneck of road congestion in the country".

Eve has also signed agreements in Australia, including with helicopter operator HeliSpirit and charter provider Aviair, which provide tourist flights around Perth. At the last Singapore air show, the firms agreed to take up to 50 Eve aircraft with a view to launching services in 2026. At the same event, Eve inked a deal with another helicopter operator from the other side of the country,

with Melbourne-based Microflite agreeing to purchase up to 40 aircraft for operations starting in 2026.

Hyundai-owned but US-based Supernal, which has come later to the party than some of its competitors by unveiling its latest S-A2 air taxi at the Las Vegas Consumer Electronics Show in January, has a chalet in Singapore and is showing a one-fifth scale mock-up of the four-passenger, V-tail design. It intends to fly the demonstrator later this year, with a view to having an aircraft in service by 2028.

Supernal, which makes a big play of its Hyundai technological heritage, believes Asia-Pacific will lead the eVTOL revolution. "As a Korean company, the region is important to us," says head of business development Matt Sattler. He also highlights a distinction between government cultures: "In the US and Europe we are seeing initiatives coming from the companies, but in Asia-Pacific we see a more holistic approach, following the region's historically successful economic development models."

He says there is "a wide variety of use cases" for eVTOL aircraft in the region, including markets where helicopters currently provide VIP transport and medical evacuation services. He points out that in Seoul, for instance, buildings over a certain height must have a roof landing pad for emergencies. There is also a "strong sustainable case" in the tourism market, providing environmentally friendly transport options to the likes of island resorts.

Another Asian carmaker, Toyota, is putting its weight behind Joby – investing \$400 million in the Californian start up from 2020, and in 2023 also becoming a key supplier of powertrain and actuation components to the programme. Last year too, South Korea's telecommunications group SK Telecom invested a further \$100 million in a move that is tied to efforts to launch an eVTOL ride-



Wisk has teamed up with Japan Airlines

sharing initiative in that country.

In Japan, Joby announced a partnership with the parent of All Nippon Airways in 2022 to explore the creation of a ride-sharing service there, possibly by the 2025 World Expo in Osaka. In December last year, Nomura Real Estate was brought into the partnership as part of a study into the development of vertiports in Tokyo and other large cities. One of the options is for a floating landing port in Tokyo Bay.

Unlike some other developers who talk about the potential of their platform for longer-range regional transport operations, Joby sees its aircraft as primarily suited to the urban air taxi mission. "That's the market we are focused on," says head of product Eric Allison. The region's teeming conurbations will be fertile ground for eVTOL services, he believes. "There are mega cities everywhere that struggle with congestion, but some of the biggest ones are in Asia-Pacific."

Joby also sees its product as complementing, rather than competing with ground transportation, offering customers of ride-sharing apps another option, where they pay a premium for speed. Allison believes getting the infrastructure in place is crucial to the air taxi concept getting off the ground, although he says existing facilities could be adapted in the first instance - from helipads and fixed-base operations to the roofs of parking garages - before greenfield developments are required.

One of Joby's main US rivals, Archer, pinpoints India as its most promising market. It signed a memorandum of understanding in November with local travel and hospitality combine InterGlobe to launch services "across India" with up to 200 of Archer's Midnight aircraft from 2026. InterGlobe's subsidiaries include low-cost carrier IndiGo - another indication of how many airlines are looking to eVTOL aircraft to supplement their offering.

"Our partnership with InterGlobe is going full speed ahead. India will be a huge eVTOL market," says Nikhil Goel, chief commercial officer at the Californian start-up, who also lists Japan, Australia, and New Zealand as other likely UAM pioneers in the region. He predicts that at least 100 Midnight aircraft will be deployed across Asia-Pacific by 2030, with a potential eventual market in India alone in the "hundreds".

"You are talking about a region of 1.5 billion people with 20 of the largest metros in the world, and a willingness by people to pay to get from A to B," he says. While he does not see eVTOL as a "mass transit solution", Goel likens it to the equivalent of a premium Uber or other taxi ride, broadening a market that is currently restricted to a few hundred wealthy people a day who can afford to charter a helicopter.

The third major Californian-based eVTOL developer, Wisk, last year announced that it was enlisting the help of ANA's rival Japan Airlines to help with the certification process

for its aircraft there, with a view to eventually launching passenger services in the country. Along with Eve, the Mountain View-headquartered company differs from its peers in that it is part of a larger aerospace company, having been a wholly owned subsidiary of Boeing since 2023.

With Volocopter, Lilium is one of two German contenders in the eVTOL sector. At the Paris air show it signed a deal with Heli-Eastern, an operator in the Guangdong-Hong Kong-Macao area, for 100 Lilium Jets, and announced it was setting up its regional headquarters in Shenzhen. Lilium believes China could represent up to a quarter the overall eVTOL market, although senior vice-president Sebastian Borel sees opportunities throughout the region, including in Australia and the Philippines.

With a six-seat cabin that Lilium claims is the most spacious in the sector, and a 94nm (175km) range, the manufacturer maintains the aircraft is more suited to regional connectivity than ultra-short-hop taxi rides. That capacity could be crucial when it comes to operating economics over longer distances. "It looks like a jet and flies like a jet and has more capacity, so we are starting to get closer to €2 (\$2.16) per seat kilometre, which brings it closer to a taxi fare," he says.

Vertical Aerospace very much has Japan in its sights, with industrial trading group Marubeni last year making a pre-delivery payment

to secure 25 early production slots for the UK company's VX4 eVTOL aircraft. Like others, Vertical is looking to achieve Japanese certification and to launch operations with its local partner in time for the Osaka Expo. When it submitted its application in the middle of 2023, Vertical became the fourth eVTOL developer to seek type certification there.

"We have a pretty large orderbook in Asia-Pacific representing almost a third of the 1,500 aircraft on order," says Derek Cheng, head of commercial APAC for the Bristol-based business. He says Vertical has been creating a footprint in the region partly by establishing industrial partnerships, with the likes of Hanwha in South Korea. He also notes that its current four customers in Asia-Pacific comprise a mix of sectors, including an airline, an air taxi operator and a medevac specialist.

He also stresses that the eVTOL opportunity in the region varies vastly from country to country, and region to region. "People tend to look at Asia-Pacific as one block, but it is so different," he says. In Japan, for instance, the use case is about providing an alternative to already sophisticated ground transportation. In Singapore and its immediate neighbours, cross-border connections are the "holy grail", he believes, bringing sustainable and rapid mobility between nearby cities separated by water and a border to the mass market. ▀



Supernal aims to have its eVTOL aircraft in service by 2028



Eve sees South Korea's Jeju island as a potential launch pad for its operations

Jeffrey Lam, president of commercial aerospace at ST Engineering, outlines the thinking behind the business's latest expansion plans in Singapore, including ramping up capabilities in the newest CFM engine

Leap forward

Q ST Engineering has announced the construction of a new airframe MRO hangar in Singapore. Could you talk about why Singapore, and what the advantages were of expanding in Singapore?

A As a strategically located aviation hub with a well-established industry ecosystem, Singapore is an excellent location from which to capture the rising maintenance demand in the Asia Pacific region. The high competency of the aviation technician workforce in Singapore also allows us to tap into the local talent pool to deliver solutions with greater consistency and quality. More importantly, there is a demand for higher capacity in Singapore by our customers.

Q Where are some key priorities for ST Engineering's commercial aerospace business in 2024?

A In 2024, we will continue our investment in global capacity and growth for our MRO and freighter conversion business. Apart from Singapore, we are also constructing new airframe facilities in key global markets, including a greenfield facility in Ezhou, China, for a joint venture with SF Airlines, and two additional hangars in Pensacola, USA. In terms of MRO capabilities, we will be ramping up in CFM International Leap engines so that we can provide the full suite of solutions for Leap operators when that demand comes.

As for our manufacturing business, we will focus on delivering the nacelles for the Airbus A320neo programme and meeting the requirements of the aircraft OEM and operators. For our freighter conversion business, we will focus on flattening the learning curve at our newer conversion sites and continue to work on improving our turnaround time. In support of these growth plans, we will continue efforts in ensuring we have the necessary manpower capacity. These efforts include fortifying our talent pipeline through various training programmes, while further adopting smart technologies to enhance performance in a sustainable manner.

Q What are some key trends in the MRO sector that ST Engineering is keeping an eye on?

A We believe that the aviation landscape in 2024 will be just as dynamic as 2023. We are keeping an eye on key trends, especially in

digital innovation and sustainable practices. This is so that we can adopt the necessary tools and changes that allow us to seize opportunities for growth, even as we weather persistent challenges in supply chains and manpower constraints.

Among the digital innovations that we will focus on are AI, robotics, and additive manufacturing. We have already been implementing many of these technologies into our solutions and processes. What we will be doing is to look out for more potential use cases and adopt them in the best way that meet our and our customers' needs. At the same time, we will align more closely with industry efforts to reduce its carbon footprint through the implementation of green practices and innovations in our maintenance processes.

As travel demand continues to grow in 2024, leading to more flight activity and MRO demand, deeper collaborations between airline and MRO providers will likely be a key trend as they seek to create synergies that streamline operations and reduce costs. As part of our growth strategy, we will also be keeping a lookout for potential partnerships to help drive our expansion in global footprint and solutions offerings.

Q Could you also comment on the competition in the MRO sector: how does ST Engineering position itself against its regional competitors, and where is the company's advantage?

A One of our key advantages lies in the breadth and depth of our aerospace solutions. The technical knowledge and engineering expertise that we have accumulated over close to 50 years in the industry has made us into a very effective one-stop shop with integrated lifecycle fleet solutions. Customers who partner with us will be able to

enjoy bespoke solutions that see exactly to their needs.

We also 'bundle' these solutions as customised packages to unlock even greater value for our customers - for example, operators in need of airframe maintenance services also stand to benefit from our engine repair and overhaul as well as component support services. With bundled solutions, customers can experience consistent service and streamlined communication and contracting arrangements through a single solution provider.

The scale of our operations also positions us well against our competitors. With facilities in Asia Pacific, Europe, and the USA, we are one of the largest, if not the largest

airframe MRO service provider in the world. We have the capacity and network to serve a global clientele of airline operators, and see to all their needs, regardless of where they are based.

Q On freighter conversion work, how is the outlook for the market? Is ST Engineering also concerned about the softening of the global cargo market potentially impacting demand?

A Despite short-term cargo demand perturbations, we anticipate freighter demand to continue at a measured pace year on year. Freight capacity planning by cargo operators is long term and rides over multiple economic cycles, in line with the long-term market trend which is driven by global GDP growth, fleet replacement needs and e-commerce growth. Our customers remain committed to their orders, indicating confidence in our freighter conversion solutions and the long-term prospects of the global cargo market.

Q Sustainability is one of the key themes to emerge of late. How is ST Engineering's commercial aerospace business contributing in this area?

A Across our MRO and manufacturing solutions, we have constantly leveraged our engineering expertise to build in features that contribute to environmental sustainability. These solutions range from our patented EcoPower aircraft engine wash system which is more water efficient compared to the traditional wash methods, to innovations in nacelle design that help to trim aircraft fuel consumption and carbon emissions.

At the same time, we are always exploring ways to reduce carbon footprint in our operations. For instance, we have been harnessing solar energy to reduce our dependency on fuels since 2018. We have solar systems installed at all our aerospace facilities in Singapore to generate enough solar energy annually to meet 30% of our needs. ▀



Mahesh Kumar is chief executive of Asia Digital Engineering, part of Capital A, the former AirAsia Group. He explains how he believes its offering sets it apart from other MROs

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Maintaining momentum

Q ADE has been expanding in 2023. What is the outlook for the company in 2024, and where are the priorities?

A ADE operates an extensive network of hangars, strategically positioned across key locations in Malaysia. These include a four-line hangar in Subang, a two-line hangar in Johor Bahru, and a single-line hangar at Kuala Lumpur International Airport (KLIA). This year, our new 14-line hangar in KLIA will be completed.

This groundbreaking, integrated MRO facility will see six lines operational by the first half of 2024, with the remaining eight ready by the second half. They will also include dedicated component workshops and a digital product development centre, positioning ADE as Malaysia's largest MRO provider and one of the most extensive in the region. Upon the inauguration of this hangar, we expect to perform 30% of checks for external airlines.

Once operating at maximum capacity, the facilities will provide extensive heavy MRO services concurrently for up to 16 commercial aircraft. This capability enables ADE to extend its services to additional airlines. In addition, ADE will be advancing line maintenance operations in Thailand, Indonesia, the Philippines, and Cambodia. Finally, we are pioneering innovations and launching diverse products within the ADE digital ecosystem, propelling ADE to technology leadership in the future of MRO.

Q Where does ADE see opportunities in the near-term?

A In the short term, I see significant opportunities within Aerotrade, an innovative aviation marketplace, which is the first of its kind in Asia. This platform is designed to alleviate the challenges faced by airlines in acquiring aircraft parts. Through the utilization of cutting-edge technologies, Aerotrade streamlines the buying and selling processes, ensuring

a seamless experience for stakeholders.

Given the current global shortage in aircraft parts, this is a prime opportunity for the market to sell its inventory through Aerotrade. Furthermore, with the upcoming operational status of the new hangar, we anticipate expanding our services substantially.

The strategic proximity of the hangar to the warehouse translates to enhanced efficiency and quicker turnaround times.

Notably, the new hangar houses workshops such as the seat shop, carpet shop, cabin shop and sheet metal and composite shop. Additionally, we will be extending maintenance services to include widebody aircraft, specifically Airbus A330s, with a long-term vision of offering services to Boeing aircraft as well.

Q What are the key trends in the MRO sector for 2024?

A At present, there is a notable surge in demand for MRO slots, reflecting a growing trend that is expected to persist over the next five years. Airlines

There is a surge in demand for MRO slots throughout the region



worldwide are actively seeking MRO services, prompting the industry to swiftly adapt and address the escalating demand. ADE is ready and eager to accommodate potential customers from across the globe during this surge and in the foreseeable future.

Q What are some key issues and challenges that are likely to come in 2024, and how is ADE gearing up for these?

A A significant challenge facing the MRO business in 2024 is the need for substantial capacity building. In addition to the investments outlined earlier, to fortify our commitment to future growth, ADE has secured the first right of refusal for a 2ha (five acre) piece of land adjacent to our upcoming KLIA facility, earmarked specifically for the construction

of additional hangars, positioning us for seamless expansion and sustained success in the years to come.

Q A key theme of this year's air show is sustainability. How do you see ADE - and the MRO sector at large - contributing in this area?

A ADE is dedicated to embracing sustainable practices, evident in our commitment to have our building certified as environmentally friendly and utilising clean energy. However, a key focus within the realm of sustainability for us is to increase repairs and reduce scrap rates. Numerous aircraft parts are designed for single use, leading to their disposal as scrap, contributing to environmental challenges.

We have actively advocated for a reconsideration of this practice, urging manufacturers to explore alternative solutions that are both safe and airworthy while aligning with a more sustainable approach. It is imperative to find innovative ways to minimise waste without compromising on safety and airworthiness standards.



The region is lagging behind on sustainable fuel take-up and infrastructure. But, with governments, industry and airlines at last getting behind the technology, change could be on the way

Tony Harrington

A refurbished refinery in Singapore is about to become one of the world's biggest sources of sustainable aviation fuel, with capacity to produce up to one million tonnes per year.

Finnish renewable energy giant Neste, the world's largest producer of the fuel, has completed a €1.6 billion (\$1.7 billion) expansion of its multi-purpose plant in the Asian city-state, enabling a tenfold boost in SAF output from the previous 100,000 tons.

For now, however, very little will flow to Asia Pacific airlines.

Although the plant is well positioned to supply them, many APAC carriers are waiting for their governments to introduce policies which incentivise SAF production and use by driving up demand while bringing prices down.

So most of the Singapore SAF will go to North America or Europe where demand is already high, buoyed by incentives to procure the fuel, escalating SAF-jet fuel blending mandates, or in-house decarbonisation targets of individual airlines.

"There's no shortcut jump to a desired future," says Sami Jauhiainen, the company's vice-president Asia Pacific, and acting executive vice-president of renewable aviation. "You have to start with the fundamentals and policies to create demand and de-risk investments."

And in many Asia-Pacific markets, he says, "we are still missing the ignition".

But change is coming across the region, collectively the world's biggest air transport market, sweeping south and east from the Indian subcontinent, through China, north and south Asia, Australia, New Zealand, and South Pacific island nations.

Although APAC countries lag others in embracing SAF, they are increasing their ambitions and committing to or indicating intent to accelerate decarbonisation of their skies.

From 2030, Japan will mandate 10% SAF content in aviation fuel. In addition to imports, local production



The Neste facility will have a capacity of one million tonnes of fuel a year

Asia-Pacific's SAF catch up

is progressing via multiple pathways, with strong support from the nation's biggest carriers, Japan Airlines (JAL) and ANA.

New Zealand is also getting active. Its recently defeated government flagged SAF mandates and partnered with Air New Zealand to commence trials with two US-based companies, waste-to-fuel start-up Fulcrum BioEnergy and alcohol-to-jet producer LanzaJet.

It is presumed the newly elected government will progress the SAF plans, as prime minister Christopher Luxon understands the issue better than most. He is a previous chief executive of Air New Zealand.

Singapore, Australia, South Korea, and India are openly contemplating mandates, incentives, or both.

In Singapore, a 20-month SAF trial has just concluded that the country is "operationally ready" to provide the fuel at its Changi hub.

The Civil Aviation Authority of Singapore is finalising a "sustainable air hub blueprint," and developing a "structural offtake mechanism" with options including blending mandates and incentives for production and use.

The Australian Government, in its new Aviation Green Paper, highlighted the potential use of locally sourced and converted feedstocks to produce SAF domestically, and foreshadowed a clear strategy in 2024 when it releases an Aviation White Paper to guide long-term aviation policy. And the 14-member Association of Asia Pacific Airlines (AAPA) has just endorsed a 5% SAF usage target by 2030.

Multiple carriers in the region have tested SAF, and increasingly are announcing one-off or longer deals to source and deploy it, while commercial partnerships are evolving to import and locally produce SAF variants, to help ensure fuel security while building self-sufficiency.

JAL operated Japan's first SAF flight back in 2009 using fuel distilled from camelina plants and has since trialled variants produced from feedstocks including woodchips,

microalgae, and even 250,000 items of recycled cotton clothing.

Together with carriers including Cathay Pacific, JAL is also an investor in Fulcrum BioEnergy, while Neste partners with Japanese industrial group Itochu to supply neat SAF for local blending and use on international flights from Tokyo.

JAL, Cathay, Qantas, and Malaysia Airlines participate in joint programmes driven by the Oneworld alliance to collectively buy and use SAF.

Korean Air has announced a five-year deal from 2026 to secure SAF from Shell at multiple APAC airports; from 2027, Malaysia Aviation Group will procure 230,000 tonnes from national oil company Petronas; and by 2028, Qantas says it will use up to 400,000 tonnes per year, part of which it wants produced in Australia.

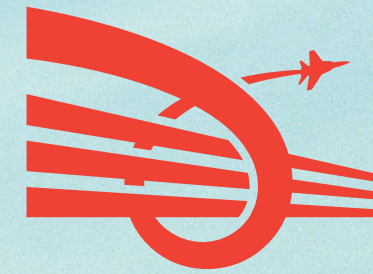
Earlier this year, Qantas also committed \$400 million to SAF research, called for a national SAF mandate, and warned of a lost opportunity.

"Creating markets for new fuels is a critical part of tackling climate change," said chief sustainability officer Andrew Parker, with a warning: "Without the right policy settings and signals we will see investment, projects and feedstocks move offshore to places with specific policy support." ▶



In Singapore, a 20-month SAF trial has just concluded that the country is operationally ready to provide the fuel at its Changi hub

Changi Airport



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