Issue
1
Tuesday
15 February 2022

FLIGHT DAILYNEWS

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ATR

SINGAPORE AIRSHOW 2022
WHERE AVIATION'S FINEST MEET · 15–18 Feb

Hard sell

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BillyPix

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He adds that he was "expecting trouble" with the jet's folding wingtips – designed to give the 777X the same gate fit as the 777-300ER – but that the 777X's signature design feature has been "really good".

Boeing maintains that it is still on track for a first delivery of its twinjet in late 2023.

Yet, sales have been slow and certification challenges loom in the USA on the heels of the 737 Max saga.

On N779XW's fuselage the images of just eight airline tails signify customers who have committed to the 777X, of whom three are in the Asia-Pacific: All Nippon Airways, Cathay Pacific, and Singapore Airlines. These carriers account for 72 of the 777-9's 258 orders, while no Asian carrier has ordered the smaller 777-8, which has just 56 orders.

But there are serious question marks over the firmness of these commitments. ANA and SIA appear to be riding out the worst effects of the pandemic, but losses could continue for years. Cathay, meanwhile, is in the throes of an existential crisis as its passenger flights remain grounded. The region's other big carriers are generally in dire shape. Impressive as the 777-9 may be at Singapore this year, Asia-Pacific is not the best market at the moment in which to seek new customers for a large widebody aircraft.

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Scherer bullish on A350F

Airbus sales chief Christian Scherer believes Singapore Airlines' backing of the A350 Freighter will help the airframer capture additional sales for the new widebody variant.

Speaking on the eve of the Singapore air show, Scherer said it was extremely "satisfying" that SIA had tentatively selected the A350F to replace its fleet of Boeing 747-400 Freighters.

"It's a huge endorsement for us," he says, "but that's just the beginning."

SIA in December signed a letter of intent for seven units of the A350F. Scherer says the market is "very excited" about the new freighter, deliveries of which are due to commence in 2025.

Changes to the global freight market since the onset of the pandemic have seen logistics firms and forwarders investing in dedicated cargo aircraft, partly in response to the reduction of belly-hold capacity from fewer long-haul passenger flights.

Nonetheless, Scherer believes "that tendency will remain" in the longer term, even as international passenger travel recovers.

Meanwhile, Scherer says the airframer is "still hopeful of additional transactions in China", noting that its order backlog for Chinese carriers is "tapering".

Airbus kicked off the Singapore show by bolstering its firm order backlog with the firming of agreements for almost 50 narrowbody jets.

US lessor Aviation Capital Group has confirmed its December 2021 deal for 20 A220s, while Kuwaiti carrier Jazeera has ratified its purchase of 20 A320neos and 8 A321neos, a contract first disclosed in November.

Airbus also released its updated forecast for Asia-Pacific at the start of the show, predicting 17,600 aircraft will be needed by 2040.

Hard sell

Boeing goes on 777-9 offensive amid concern over fragility of Asian market

Greg Waldron

Boeing is mounting a spirited effort to drive interest in the 777-9 – which is making its Singapore debut. But tough Asian market conditions could delay big sales.

The GE Aviation GE9X-powered aircraft is performing a stunning aerial display here. Journalists were yesterday invited on board test aircraft N779XW for an update on the twinjet's test campaign.

Surrounded by an array of test gear in the aircraft's spartan cabin, the Boeing team was upbeat and confident. Brian Hermesmeyer, senior director of product marketing, says the test programme's four aircraft have completed 650 flights and accumulated some 1,900h.

This includes a 20h sortie from Seattle to Singapore. "We had 50 people aboard and still had plenty of gas," he says.

Van Chaney, chief test pilot for the 777/777X, shares Hermesmeyer's enthusiasm: "It's been a really, really good programme so far. The engines have been wonderful and the systems have been good – usually we spend a lot of time on systems."

He adds that he was "expecting trouble" with the jet's folding wingtips – designed to give the 777X the same gate fit as the 777-300ER – but that the 777X's signature design feature has been "really good".

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BillyPix

Astral to launch A320P2F

Nairobi-based cargo operator Astral Aviation will be the launch operator of the Airbus A320 passenger-to-freighter aircraft, taking its first example in the second quarter of the year.

The African carrier will be sub-leasing two examples from Middle Eastern lessor Vaayu Group, which announced on the eve of the show that it had firmed up plans to lease five A320P2Fs from ST Engineering.

ST Engineering, which is working on the conversion programme with Airbus joint venture EFW, will place the first converted freighter on lease in the second quarter, and adds that the remaining four aircraft will be converted and leased "progressively".

Last November, Vaayu announced its intentions to lease A320P2Fs from ST Engineering's leasing unit ST Engineering Aerospace Resources.

The A320P2F is EFW's second narrowbody freighter conversion programme, after the A321P2F.

Boeing on $70 billion Asia-Pacific mission

Garrett Reim

Boeing Defense, Space & Security believes it can generate up to $70 billion in revenue from sales to militaries in the Asia-Pacific region over the next five years.

The company sees a number of modernisation programmes powering the surge in revenue in the region, says Randy Rotte, Boeing Defense's senior director of business development for Asia-Pacific and India.

Driving the buying spree in Asia-Pacific is a requirement to replace or upgrade ageing fleets as well as a need to protect economic interests, says Rotte.

"You can't get away from the world's shipping lanes," he says. "That is so vital to economies, to the people of the region, to people in the world."

In particular, sales and upgrades of the F-15 are poised to take off, says Rotte. Most recently, on 10 February, the US State Department approved Indonesia to buy 36 examples of the F-15ID for an estimated cost of $13.9 billion. In December, Boeing secured a contract to start work upgrading initial aircraft in what Japan plans to be a 70-example modernisation of its F-15J fighters into a "Japan Super Interceptor" configuration.

South Korea is in talks with Boeing to upgrade its F-15K fleet in a configuration similar to Japan's, says Rotte. The manufacturer is also pitching the F-15EX, the most-modern version of the fighter that was recently adopted by the US Air Force, for the Indian air force's requirement for 110 fighters.

And, Boeing is submitting its F/A-18E/F Super Hornet for the Indian navy's 57-aircraft requirement.

Boeing believes sales and upgrades of F-15 are poised to take off

BillyPix

Rotorcraft are also likely to do well, says Rotte. He points out that Australia selected the AH-64E Apache Guardian to fulfil its Armed Reconnaissance Helicopter requirement for 29 aircraft. Rotte also expects South Korea to issue a request for information stating a need to replace 18 of its CH-47D Chinook cargo helicopters. Boeing is preparing to respond with a proposal to sell the country new-build CH-47Fs.

One aircraft for which Boeing is not likely to receive an order anytime soon is the Bell Boeing V-22 Osprey. Indonesia expressed interest in buying eight MV-22s in 2020, but pandemic-related fiscal pressures on Jakarta's budget has put that project on hold, says Rotte.

Boeing is also eyeing more sales of its commercial derivate aircraft: the KC-46A Pegasus in-flight refuelling tanker and the P-8A Poseidon maritime patrol aircraft. Rotte notes that Japan's national security strategy calls for two squadrons of the KC-46A, yet it has only ordered four examples of the type.

If Boeing were to bring in $70 billion over the next five years it would likely boost Defense, Space & Security's topline significantly and tilt the company's backlog toward international sales. In 2021, the division generated $26.5 billion in revenue. The division's backlog at the end of 2021 was $60 billion, with about 33% of that total from international customers.

Rotte acknowledges to hit that $70 billion mark over the next five years it would require Boeing "to almost run the table", but says it's not outside the realm of the possible.

In brief...

S3 makes light work

S3 AeroDefense has been selected by Honeywell Aerospace to serve as its exclusive distributor for all fixed wing and rotary military lighting products, further expanding the longstanding partnership between the two companies. The seven-year exclusive distribution agreement sees S3 responsible for supporting customers worldwide, apart from Japan.

BillyPix

Meijer (*left*) with Raul Villaron, vice-president, Asia Pacific of Embraer Commercial Aviation

Embraer gets teeth into show

Embraer has unveiled a new promotional "Tech Shark" livery for its E190-E2 regional jet at the Singapore Airshow, continuing its tradition of associating the E2 family with the powerful predators.

Arjan Meijer, president and chief executive of Embraer Commercial Aviation, explains that the profit hunter theme was created a few years ago to highlight the E2's trip costs – which he says are 25-30% lower than a narrowbody such as Boeing 737 Max or Airbus A320neo – and low seat costs – which he says are equivalent to a larger narrowbody.

So far the range has feature an eagle, tiger, shark, and a lion. The "Tech Shark" imagery, says Meijer, is a nod to Embraer's previous shark livery, but is also aimed at underlining the advanced technology of the E2 family.

Going to planet: Jupiter aerobatic team keeps display tight

Skies alive

Greg Waldron

The flying display at this year's show features two new aircraft as well as stalwarts from previous years.

The Hindustan Aeronautics Tejas Light Combat Aircraft is appearing for the first time in Singapore's skies.

Powered by a single GE Aviation F404 engine, the Tejas is starting to enter the Indian air force in significant numbers. In January 2021, New Delhi ordered 83 MK-1A fighters, following a previous deal for 40 MK-1s.

The aircraft appearing in the show is in the Mk-1 configuration. The follow-on Mk-1A will feature improved avionics and weapons.

Another newcomer to the flying display is the Boeing 777-9. Singapore Airlines (SIA) is set to be Asia's biggest operator of the type, with 31 aircraft on order.

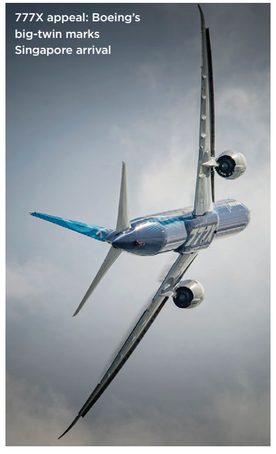
Not to be outdone, Airbus is putting on a demonstration flight with the A350-1000, which last appeared at the show in 2018, but in the static park.

The smaller variant of the A350, the A350-900, is a workhorse for SIA, which has 58 examples in service, with one appearing in the static park.

Its fleet of the Airbus widebody will further expand thanks to a December 2021 order for seven A350Fs to replace its 747-400 Freighters.

The US Marine Corps will again show off the capabilities of the Lockheed Martin F-35B. As with the 777-9, the fifth-generation fighter will one day be a common sight in Singapore's skies. The city state has US government clearance to buy 12 examples, and Singapore committed to four units in January 2019, with the jets to be delivered in 2026. This will make Singapore the first Southeast Asian country to possess stealth fighters.

The highlight of the F-35B display features the aircraft hovering over the sea off Changi, held aloft by its thrust nozzle and lift fan.



777X appeal: Boeing's big-twin marks Singapore arrival

Longer term, F-35s could eventually replace Singapore's large fleet of F-16s. The B-model short take-off and vertical landing variant is well-suited to Singapore's densely packed urban terrain, which leaves precious little space for sprawling air bases.

Still, Singapore's F-16s have significant life left in them, with a Republic of Singapore Air Force (RSAF) example putting on a high octane performance for the show crowd, highlighting the type's tight turn radius and superb handling. Singapore is the process of upgrading 60 examples to the updated F-16V variant.

In addition, a pair of RSAF AH-64D Apache attack helicopters will highlight the iconic helicopter's low-level flight characteristics.

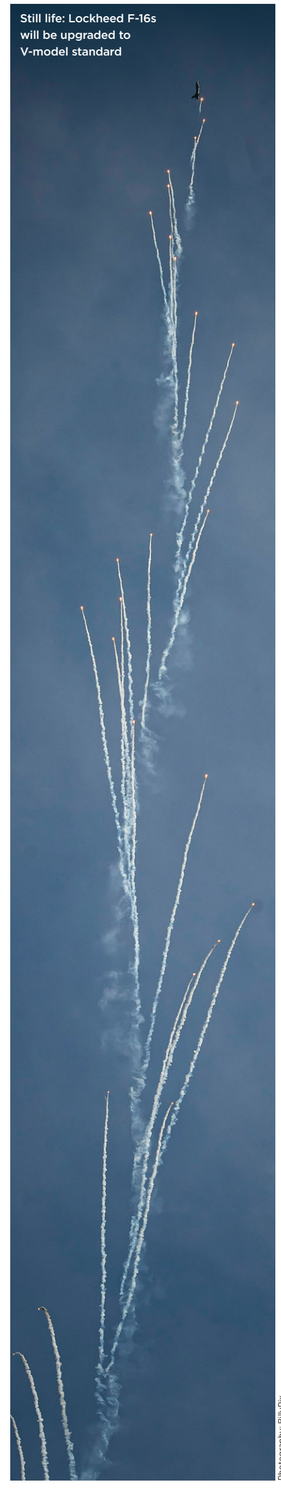
Indonesia's Jupiter aerobatic team is also appearing in the flying display with six Korea Aerospace Industries KT-1B basic trainers.

First timer: Tejas makes show debut

Hover and out: US Marine Corps F-35B shows vertical landing capability

Grand ambition: Airbus widebody returns to Changi

Give it a whirl: Singapore's AH-64D Apaches



Still life: Lockheed F-16s will be upgraded to V-model standard

Photography: BillyPix

Drone deliveries for ships

ST Engineering has partnered with Skyports and Sumitomo Corporation in a nine-month trial to explore using unmanned aircraft for shore-to-ship delivery of parcels.

The pilot, which comes after two years of research efforts, will see the consortium work towards establishing an unmanned aircraft delivery network.

ST Engineering says it will provide unmanned aircraft technology using its DroNet solution, and will work with Skyports to conduct beyond visual line of sight flight operations to deliver parcels weighing less than 7kg (15lb).

Sumitomo, meanwhile, will provide go-to-market support, which includes the Japanese conglomerate's own fleet of vessels.

"All three partners in the consortium will undertake business development activities by leveraging their existing maritime network," states ST Engineering.

The Singapore company says using drones to deliver parcels can "significantly slash response times and speed up turnaround", compared with delivery by boat.

"Replacing launch boat delivery with unmanned aircraft also helps to reduce carbon emissions and contribute to the maritime industry's overall efforts to operate sustainably," the company adds.

Sikorsky senses S-70 Asia-Pac opportunities

Sikorsky

The helicopter can be tailored to a nation's requirements

Garrett Reim

Sikorsky sees an opportunity to sell its UH-60M Black Hawk and S-70i/M utility helicopters to replace aging military helicopter fleets in Asia Pacific.

The company has received commitments and orders for more than 100 examples of its utility helicopters in the past three years. That could push up its historic sales in the region by approximately 20% to more than 600 aircraft, says Jon Rudy, Sikorsky regional executive for Asia.

"Since the 1970s, many operators in the region have been flying Vietnam War-era helicopters both in military and civil variants," he says. "These aircraft are at the end of their lives and are experiencing low availability. They were also designed to perform more specific missions, and yet our world has moved on."

Now, military, parapublic and civil operators want a multi-mission helicopter, says Rudy.

"The Philippine Air Force is an excellent example," he says. "The Philippines is an archipelagic nation requiring a modernised utility helicopter fleet that can provide greater payload and lift capability and range to distant locations than its fleet of Huey derivatives aircraft can. During the recent relief efforts to bring aid to the areas affected by Typhoon Odette, the PAF was able to reach an inhabited island by helicopter for the first time ever."

In 2019, the Philippine air force ordered 16 S-70i Black Hawk aircraft, which were delivered in 2020 and 2021. The Philippine Department of National Defense also recently expressed interest in ordering 32 additional S-70i aircraft for the air force.

Other recent deals include an order by the South Korean navy for 12 MH-60R Seahawk aircraft and Australia's stated intent to order up to 40 UH-60M Black Hawk and 12 MH-60R Seahawk helicopters.

Operators have a choice between the UH-60M and S-70i/M, helicopters that have 90% part commonality, but which are built on separate production lines.

The UH-60M is built in Stratford, Connecticut and sold via the US Army through the Foreign Military Sales process. It comes with specific US Army mission radio and avionics equipment

The S-70i/M is manufactured by PZL Mielec, a Lockheed Martin company in Poland. It can be tailored to a country's specific mission requirements, says Rudy. The type also comes with additional safety features, such as ADS-B Out, Terrain Awareness Warning System and a Traffic Alert and Collision Avoidance System.

Collins expands in two cities

Collins Aerospace will be investing more than $27 million in expanding its MRO presence in two Asian cities, as it eyes growth in a key market.

The company will be nearly doubling the size of MRO operations in Xiamen, China, moving existing works to a new 7,430sq m (80,000 sq ft) facility. The new site will provide MRO services for Collins products including fuel control systems, avionics, evacuation slides, as well as engine vane actuators.

The Xiamen unit will service Chinese indigenous aircraft programmes, including Comac's ARJ21 regional jet and C919 narrowbody.

It will also support Boeing 787s, as well as Airbus A350 and A330neo aircraft, in addition to general aviation and rotary-wing aircraft.

Collins also announced it will be significantly expanding its MRO facility in Selangor in Malaysia from the current 3,700sq m facility to 14,900sq m.

Separately, Collins has signed long-term contracts with China Airlines and Tigerair Taiwan for engine accessory repair services under its FlightSense programme.

Collins Aerospace

The company is growing its MRO presence

The contract — which Collins says is "the most comprehensive MRO agreement with the airlines to date" — covers China Airlines fleet of 25 A321neos, as well as Tigerair Taiwan's 15 A320neos.

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Neste will supply the SAF to be blended by ExxonMobil with refined jet fuel for the Changi project

Neste

SIA plays it SAF

Mark Pilling

From the third quarter of 2022, all Singapore Airlines (SIA) and Scoot flights at Changi Airport will use a blend of sustainable aviation fuel (SAF) in a pilot project fronted by the airline, the Civil Aviation Authority of Singapore (CAAS) and Temasek. The timing of the announcement was opportune just prior to the air show which has a strong focus on aviation sustainability.

Under this pilot, SIA, with support from CAAS and Temasek (Singapore's global investment company), will buy blended SAF from ExxonMobil, which has been selected to supply and deliver the SAF at Changi following a request for proposals in November 2021.

The fuel supplied will comprise 1.25 million litres of neat SAF supplied by Neste and produced from cooking oil and waste animal fats and blended with refined jet fuel at ExxonMobil's plant in Singapore. This blended fuel will be delivered to Changi Airport via the airport's existing fuel hydrant system by July 2022.

"SAF is a key and available solution to helping aviation achieve its emission reduction targets," says Thorsten Lange, executive vice-president renewable aviation of Neste.

"With our Singapore refinery expansion coming on stream in early 2023, we are able to produce up to 1 million tonnes of SAF per annum to serve aviation markets in the Asia-Pacific region and globally."

Only way is hub for Singapore

The head of the Civil Aviation Authority Singapore (CAAS) believes 2022 will be a year of rebuilding Singapore's position as a leading international hub.

Speaking to FlightGlobal ahead of the show, Han Kok Juan notes that air travel is essential for Singapore, which thrives on connectivity with other countries. He notes that the coronavirus pandemic has "severely impacted" this connectivity.

"The survival and continued success of our air hub is existential to Singapore, an island state which relies on our connectivity to the world for people-to-people exchanges, the flow of goods, capital and talent, and our position as an international financial and business centre," he says.

"Therefore, government assistance in the last two years has been critical in helping to retain Singapore's connectivity with the world and in helping companies and workers retain core capabilities built up over many years."

Han notes that air travel sectors in both Europe and North America have staged strong recoveries, and that this demonstrates the resilience of air travel demand, and how quickly things bounce back when restrictions are removed. Asia, however, will likely trail behind the rest of the world, with the risk of new coronavirus variants

There are some positive signs, however. Singapore's Vaccinated Travel Lane programme – whereby vaccinated travellers can forgo quarantine – helped boost passenger volumes to 15% of pre-pandemic levels in December 2021, up from 3% in December 2020.

"I am hopeful that 2022 will be a year of recovery and reclaiming and rebuilding Singapore's position as an international air hub with global connectivity," he says.

But in line with IATA's view, he expects a full air travel recovery only in 2026.

Show numbers down on 2020

As the show begins, organisers admit that there will be fewer attendees this time than in 2020, which took place amid the early warning signs of what was to become the global pandemic.

Experia Events says it expects around 13,000 trade visitors this year, a significant drop on the 30,000 in 2020. In a first, there will also be no public days in this year's edition, as part of pandemic prevention measures.

The number of exhibitors has also fallen by a third — around 600 this year, compared to 900 in the 2020 show.

At a media briefing on 13 February, Experia Events managing director Leck Chet Lam said the fall in numbers "in this current environment" was to be expected.

"[As] far as quality is concerned, I'm not worried about that, because here we have assembled a high quality set of exhibitors, more than 70% of the top 20 global aerospace companies are here. We also got high quality trade visitors...the congregation of the right people are here...[and] the conversations will be as good, if not better," adds Leck.

BillyPix

Leck: The right people are here

Kallman still flying the flag

Mark Pilling

This year's Singapore air show is a special one for Tom Kallman, marking his firm and the USA's twentieth appearance at the event organising a strong representation of American aerospace firms in the USA Pavilion.

Kallman Associates, founded in 1963 by Tom's father Jerry, has been managing USA Pavilions at overseas trade shows since 1979. "My dad was requested by the US Department of Commerce to organise the pavilion for American companies in 1984 at the first Singapore Airshow," Kallman tells FlightGlobal. "It was our first foray into the aerospace business. It was a big success," he says.

Tom Kallman joined his father in the business in 1989 after a career in the US Air Force flying Lockheed T-33 Shooting Stars and McDonnell Douglas F-15s. The third Kallman generation is here with Tom joined at the show by his son Jake, who works as a travel logistics specialist for the company.

"Since 1984, and every year after that, the US representation has been the largest foreign participation at the show," says Kallman. "This demonstrates the longevity, consistency and true partnership that the US has with Singapore and with this event," he says.

Tom Kallman with son Jake

BillyPix

Although the space taken by US firms is down by around 30% compared to the 2020 show, which is like the downsizing of other country pavilions, the American representation is the single largest of any other country at around 40% of the exhibition, says Kallman. "We call it a Team USA approach," he notes.

Kallman is convinced the show will rebound strongly in coming years. "Singapore has always been America's go to portal for its presence and exposure into the region," he says.

There have been many memorable moments over the years here in Singapore for Kallman. Watching the aircraft he flew, the F-15, perform at the show in the early 1990s was a highlight. "But it's not always the sexy F-15s or F-35s that catch the eye, there are always so many impressive advances in technology," he says, pointing to night vision goggles, thermal and infrared cameras, secure communications and unmanned aerial vehicles from firms like Litton Industries (now part of Northrop Grumman), FLIR (now Teledyne FLIR), General Atomics, and Harris that have been shown at the exhibition over the years.

Another highlight for Kallman, but one that also posed logistical issues, was the debut of the Boeing C-17 in 2014. The main issue with this heavy military transport were concerns that it might sink into the asphalt at the show's static display area.

Kallman is welcoming 13 newcomers to the USA Pavilion including Metalsharkboats and Easy Aerial.

On Thursday on the USA Pavilion stage, the Kallman Foundation Mission will announce the Singaporean winners of the Astronaut Al Wolden Endeavour Scholarship. The winners, four students and a teacher, will attend the US Space and Rocketry Center's renowned Space Camp in Huntsville, Alabama this summer.

Airbus and Boeing both have new large-widebody freighters in development, with prestigious early customers. When it comes to supremacy in the segment, it is likely to be a close contest

Big beasts of burden

Jon Hemmerdinger & **David Kaminski-Morrow**

The next big freighter battle is firmly underway after Boeing in late January followed its rival Airbus by launching an all-cargo version of its flagship widebody. All eyes this week will be on whether either can secure further commitments for its 777-8F or A350F at the show. Singapore Airlines (SIA) has already confirmed its hand, signing a letter of intent in December to purchase seven A350Fs, with options for another five.

While Air France, lessor Air Lease and logistics operator CMA CGM are also lined up as either firm or provisional buyers of the Rolls-Royce Trent XWB-powered freighter, Boeing secured Qatar Airways as its launch customer with an order for 34 777-8Fs with 16 options. The Doha-based airline had been mooted as a potential A350F customer in early 2021. However, relations with Airbus soured badly after a spat over paint issues on its A350 passenger aircraft.

Of Qatar's 777-8F orders, 20 are conversions of Qatar's existing orders for passenger 777Xs, Boeing says. Qatar expects to receive its first 777-8F in 2027.

"The 777-8 Freighter will be the largest, longest-range and most-capable twin-engine freighter in the industry," Boeing says. "With payload capacity nearly identical to the 747-400 Freighter and a 25% improvement in fuel efficiency, emissions and operating costs, the 777-8 Freighter will enable a more-sustainable and -profitable business for operators."

Boeing Commercial Airplanes chief executive Stan Deal and Qatar chief executive Akbar Al Baker signed a deal on 31 January that also included commitments for 737 Max 10s during a ceremony at the White House.

The 777-8F component's value is $20 billion at list prices, making it "the largest freighter commitment in Boeing history by value", the airframer says.

The 777X Freighter will be based on the 777-8, which is smaller than the baseline 777-9 passenger aircraft.

Boeing's first 777X – the 777-9, a passenger jet – remains in the certification process, with the airframer aiming to deliver the first by late 2023. All 777X have GE Aviation GE9X powerplants.

The 777-8F will have 4,410nm (8,170km) of range, payload of 112,000kg (248,000lb), and a 365,000kg maximum take-off weight, Boeing says. It will have composite wings spanning 71.8m (236ft) and capacity to carry 31 cargo pallets on its main deck and 13 in its lower hold.

The launch deal for the 777-8F came at a time of increasing animosity between Qatar Airways and Toulouse. In 2021, Qatar grounded its fleet of A350 passenger aircraft, due to what it described as quality shortcomings involving the jets' paint – allegations Airbus has called inaccurate.

Airbus

Singapore Airlines signed an LoI in December to purchase seven A350Fs

Boeing

Boeing secured Qatar Airways as launch customer for the 777-8F

Qatar sued Airbus in a London court last December, and in January Airbus disclosed it had cancelled orders by Qatar for 50 A321neos.

The launch of the 777-8F marks a strategic shift for the 777X programme – one driven by the dual factors of booming air freight demand and the pandemic's ongoing impact on international air travel.

The company confirms it has delayed development of the 777-8 passenger variant until after developing the 777-8F.

Though the move creates more uncertainty about the baseline -8, prioritising a freighter gives Boeing a jet it can sell now – and an aircraft to counter the A350F.

"We remain committed to the 777-8 passenger airplane, which will follow the 777-8 Freighter," Boeing says. "Our customers have told us they need additional freighter capacity first, while long-haul passenger traffic continues to recover from the pandemic."

It adds: "We designed a freighter into the 777X family from the start, and this flexibility validates that approach."

The 777-8 passenger variant has never been a huge seller, with Boeing's order backlog for the type standing at 32, according to Cirium fleets data. The 777-8 passenger jet programme had stalled even before the pandemic. Uncertainty arose in 2019, as Boeing worked to keep its delayed 777-9 development programme on the rails. In August of that year, the company put 777-8 development on indefinite hold.

Covid-19 struck shortly after, eroding demand for the international long-haul flights for which Boeing designed the 777X. Meanwhile, Boeing executives hinted about a 777X Freighter.

The air freight market has swung wildly amid the pandemic. Air freight capacity sunk 23% year-on-year in 2020, largely because airlines grounded so many passenger widebody jets that had carried cargo in their bellies.

In 2021, air freight came roaring back, and with it demand for dedicated air freighters, with Boeing calling 2021 a "record year" for its freighter business.

The company landed orders for 84 new freighters last year, including for 767Fs, 747-8Fs and 777Fs. Also in 2021, Boeing took orders to convert more than 100 aircraft from passenger jets into cargo aircraft – "more than double" such order activity prior to the pandemic, it said.

In January, Boeing said it will increase 777 production this year from two to three jets monthly, due partly to more demand for cargo jets.

Boeing estimates airlines globally will need 2,610 additional air freighters through 2040, including 450 new widebodies, according to its 2021 Commercial Market Outlook.

George Dimitroff, head of valuations at Ascend by Cirium, views the 777-8F as satisfying a "niche" market. "It would not make sense as a standalone product, but makes perfect sense in tandem with passenger 777s," he says.

Singapore Airlines' commitment for the A350F, announced on 15 December, is the most prestigious so far for the new freighter. Deliveries are scheduled to begin in the fourth quarter of 2025 when SIA will become the first to operate the widebody.

Airbus has confirmed that the A350 freighter will be 3m shorter than the A350-1000 but 4m longer than the -900. The airframer puts the A350F's overall length at 70.8m compared with the 73.79m of the -1000, but the wingspan remains the same. Diagrams from Airbus indicate that the frame reduction is forward of the wing.

Airbus gives the range of the new freighter as 4,700nm and confirms the maximum payload at 109t.

Airbus will "strategically embed" production of the freighter into its A350 programme, to "ensure a smooth launch, entry into service, and ramp-up", it says.

The battle between the new-generation large freighters is likely to be tight, with Dimitroff suggesting that the aircraft will have comparable operating economics. "Given their similarity in technology, I would expect the operating cost per freight tonne kilometre to be broadly similar," he says.

Facing Beijing's growing military might and expansionist ambitions, Southeast Asian air forces are striving to match its quantity with equipment quality – in some instances with mixed results

Threat response

Boeing F-15SGs are the mainstay of the Republic of Singapore Air Force

US Air Force

Greg Waldron

It is hard to overstate the importance of Southeast Asia in the era of great power rivalry between China and the USA. The major economies of North Asia, including China, depend on the Straits of Malacca and sea lanes through the South China Sea for both energy and trade, and beneath the waters of the South China Sea – which Beijing largely claims as its own – are believed to lie significant untapped energy deposits.

The region, loosely knitted together in the Association of Southeast Asian Nations (ASEAN) political grouping, is home to nearly 700 million people, with a total GDP of nearly $3 trillion.

Apart from the great power aspect, there are simmering internal security issues, most notably in the southern islands of the Philippines.

Southeast Asia is also diverse, home to several ethnicities and cultures, as well as challenging geographies, characterised by vast oceanic frontiers, varied climates, and a range of terrains, from rugged mountains to endless palm oil plantations.

Relentless pressure

The region's air forces reflect this diversity. Capabilities and quality range from the advanced air power of Singapore, with an air force more akin to those operated by US allies in North Asia, to the Philippines, grappling with how to reconstitute a fast jet capability in the face of relentless pressure from China in its littoral domain.

Most of the region's air forces fall between these two extremes. Indonesia and Malaysia have sizeable air forces and well trained pilots, but struggle to modernise with new equipment. The baleful impact of the coronavirus pandemic will also pressure defence spending – even though military improvements are imperative given the security challenge posed by Beijing, as exemplified by the militarisation of atolls in the South China Sea and the aggressive development if its air and naval power.

Malcolm Davis, senior analyst, defence strategy and capability at the Australian Strategic Policy Institute, feels the region's air forces have urgent requirements in areas such as intelligence, surveillance and reconnaissance (ISR) as well as command and control networks, which would offer better situational awareness of the South China Sea.

Singapore's six MRTT aircraft reached full operational capability last April

Airbus Defence & Space

Tactical transport is also a priority, particularly the ability to deploy forces to disputed areas, and more capable air combat assets.

Another area for improvement would be a move away from operating mixed fleets of combat aircraft, a particular problem for Indonesia and Malaysia.

"What ASEAN states, particularly those with claims to disputed territories in the South China Sea, need to focus on is highly sustainable air combat capabilities that can protect their interests against aggressive air patrolling by the PLAAF [People's Liberation Army Air Force]," he says.

"Obviously, ASEAN states aren't likely to be building up large air forces, but reliance purely on small numbers of expensive and complex-crewed platforms may not be a solution either."

He feels greater reliance on autonomous systems and even low-cost, 'attritable' capabilities may be more viable solutions in the 2020s.

In terms of equipment and overall readiness, no ASEAN air force rivals the Republic of Singapore Air Force (RSAF). The mainstay of the RSAF are 40 Boeing F-15SGs – although Singapore only admits to having 24.

This fleet is divided between Singapore and a detachment at Mountain Home AFB in Idaho. The fighter is equipped with the Raytheon APG-63(V)3 active electronically scanned array (AESA) radar, Lockheed Martin Sniper targeting pod, an infrared search and track sensor and an Israeli electronic warfare system.

In late 2020, Boeing secured a 10-year performance-based logistics (PBL) deal as a direct commercial sale to maintain the type in Singapore service. Boeing said that this was its fourth PBL contract related to Singapore's F-15SGs. In a nod to its customer's caginess about force numbers, Boeing did not provide a value for the deal, or state the number of aircraft involved.

Singapore also is in the process of upgrading about 60 Lockheed F-16s to the F-16V standard. The work will see the fighters' avionics improved and the addition of Northrop Grumman's APG-83 AESA radar. This will allow the fleet to serve into the 2030s.

Singapore has also been approved to acquire up to 12 Lockheed F-35Bs, which will make it the first Southeast Asian country to operate a stealth aircraft. The initial four examples will be delivered in 2026. They will not be immediately deployed to Singapore, but rather operate from Ebbing Air National Guard Base in Arkansas, where a detachment of F-16Vs will also be based. This will maximise opportunities for training with the two types.

The RSAF's fixed-wing strike capabilities are bolstered by its fleet of 18 Boeing AH-64D Apache attack helicopters. A range of support aircraft round out the RSAF fleet. The most prominent of these are six Airbus Defence & Space A330 multi-role tanker transport (MRTT) aircraft, which reached full operational capability last April. In May 2021, Airbus and the RSAF completed flight trials of an automatic refuelling system – or A3R – update for the type.

Test campaign

Conducted in early 2021 and involving Singapore's Defence Science and Technology Agency, the test campaign included 88 fully automated dry and wet contacts made with another A330 MRTT, as well as RSAF F-15SGs and F-16s. Almost 30t of fuel was transferred during the course of this work.

Singapore gets high marks for situational awareness with its fleet of Gulfstream G550-based airborne early warning and control (AEW&C) aircraft, as well as its Fokker 50 MPA Enforcer Mk 2s, which also have an anti-submarine warfare (ASW) capability. Singapore has also invested in unmanned air vehicles (UAVs), with its Israel Aerospace Industries Heron 1s achieving full operational capability in 2017.

For tactical airlift, Singapore operates five Lockheed C-130Hs, four KC-130Bs, and one KC-130H. The average age of these assets is 48.6 years, but the RSAF appears to be happy with its Hercules fleet, which has been kept operationally relevant through extensive upgrades. In addition, the Airbus Helicopters H225M is gradually replacing Singapore's AS332 Super Pumas, and new Boeing CH-47F Chinooks are entering the inventory.

Singapore's methodical, sober approach to air power modernisation is not, however, reflected in larger nations such as Indonesia, Malaysia, and the Philippines.

The Philippines operates 12 KAI FA-50 light-attack jets

US Air Force

Singapore has been approved to acquire up to 12 Lockheed F-35Bs

US Marine Corps

Jakarta's quest

Cirium fleets data suggests that Indonesia has 107 fixed-wing air combat assets. The backbone of this fleet are 32 F-16A/Bs and C/Ds with an average age of 30 years. Jakarta is in the process of upgrading a small number of the earlier F-16A/B Block 15s with Lockheed's Falcon Star mid-life upgrade, which extends service life to 8,000h, from 4,000h. The work also sees avionics and radar improvements.

Jakarta has expressed interest in the upgraded F-16V variant. Lockheed has a dedicated web page for a possible Indonesian F-16V acquisition, stating that the type is an ideal bridge to fifth-generation fighters.

Sixteen Sukhoi Su-27/30s provide Jakarta's air defence capability. For the ground-attack mission, there are 23 BAE Systems Hawk 209s, and 15 Embraer EMB-314 Super Tucanos. In addition, seven Hawk 100 advanced jet trainers have a secondary ground-attack mission.

For years, questions have swirled around Jakarta's plans for new fighters. This effort has seen it associated with the possible acquisition of several types. A recurring theme has been an effort to obtain 11 Su-35s, with credible reports of a Dassault Rafale or Boeing F-15EX acquisition.

Then, on 10 February, Dassault announced that Jakarta had signed up for 42 Rafales, which will make it the seventh export customer for the type. Dassault did not provide a value for the deal, but says it includes crew training, logistical support for Indonesian air bases, and a training centre with two full-mission simulators. Dassault adds that industrial participation is part of the package, including technology from partners Safran and Thales. No delivery timeline was given.

Hours later, the US Defense Security Cooperation Agency (DSCA) said that Indonesia had been cleared to buy 36 F-15ID fighters in a deal that – if concluded – is worth up to $13.9 billion. Based on the equipment included in the potential sale, the 'F-15ID' configuration is essentially the F-15EX now entering service with the US Air Force.

Local media had previously quoted Indonesian Air Chief Marshal Fadjar Prasetyo as saying Jakarta would choose between either the F-15EXs or Rafale, although once he hinted at the possibility of a mixed buy of 36 Rafales and eight F-15EXs.

Jakarta also appears to have abandoned hopes of an Su-35 order, owing to the danger of US sanctions.

Jakarta is also a 20% partner in the Korea Aerospace Industries (KAI) KF-21/IF-X programme, which will see it obtain 50 of the 170 examples produced. Jakarta and Seoul have had disagreements about costs, with the former falling behind on payments and seeking to reduce its investment in the W8.8 trillion ($7.5 billion) effort.

In November 2021 the two parties appeared to reach an agreement. While Indonesia remains on the hook for 20% of development funding, it will now provide 30% of its contribution "in kind". This could see South Korea obtain more Airbus CN235s, which Indonesian Aerospace produces under licence in Bandung. Indonesian engineers have returned to KAI's facility in Sacheon.

As a prelude to February's Rafale news, in November 2021 Jakarta announced a long-anticipated order for two Airbus A400Ms, which will be delivered in a multi-role tanker/transport configuration. This followed an order in September 2021 for five C-130Js.

Indonesia is also beefing up its ISR capabilities. It operates six Chinese-built CASC CH-4 UAVs, which also feature a ground-attack capability. Indonesian Aerospace is working on a medium-altitude, long-endurance UAV dubbed 'Elang Hitam' – Indonesian for 'Black Eagle'.

Indonesia operates no dedicated AEW&C assets. Cirium lists just six fixed-wing aircraft as being tasked with the ASW/maritime patrol mission: three obsolescent Boeing 737-2X9 Surveillers, two CN235, and one C295. Supporting these are a small number of locally produced NC-212s with basic sensor packages.

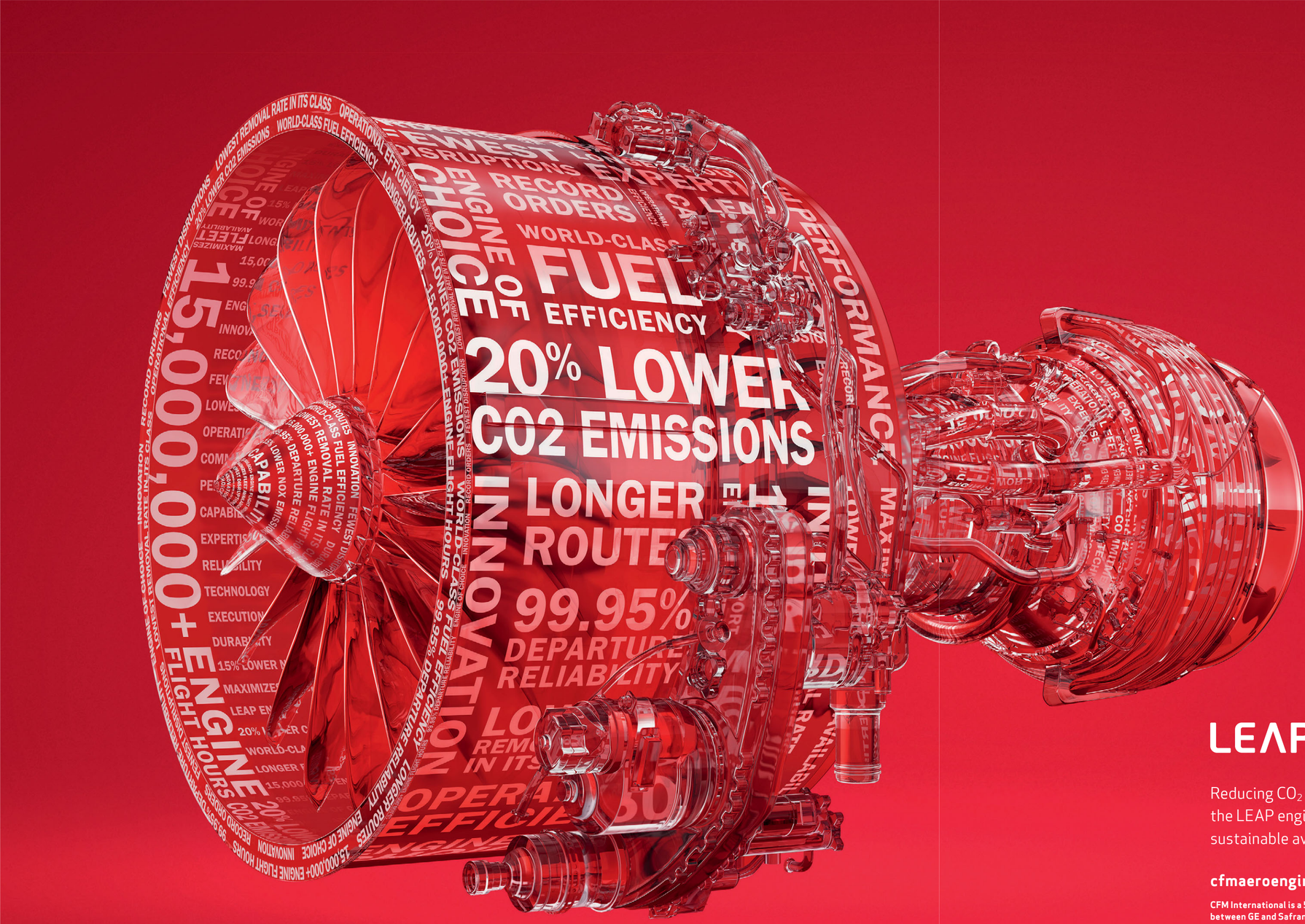
In 2013, then defence minister Purnomo Yusgiantoro said Indonesia needed 33 NC-212s and 21 CN235s "to fully control its territory". Given China's growing presence in the South China Sea – including territorial spats with Indonesia – maritime patrol aircraft (MPA) will increasingly be at premium.

Territorial ambitions

If Beijing's territorial ambitions are a headache for Jakarta, they are a migraine for Manila. Territorial disagreements between China and the Philippines are rife, but Manila is woefully deficient in the military

Jakarta announced an order for two Airbus A400Ms in November 2021

Airbus Defence & Space



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Malaysia operates 12 single-seat Hawk 208s in the ground-attack role

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capabilities to deter its increasingly strident and vastly more powerful rival.

Manila's fixed-wing air combat capabilities are served by a dozen KAI FA-50 light-attack jets – which also serve as trainers – and six Super Tucanos. Apart from these assets, its combat capability is provided by rotorcraft, namely eight armed Leonardo Helicopters AW109Es, and up to 24 MD Helicopters MD500s that are nearly three decades old. In addition, Manila is on the verge of receiving six Turkish Aerospace T129 ATAK helicopters.

In short, Philippine airpower is geared toward fighting insurgents, particularly on the volatile southern island of Mindanao. From May to October 2017, Philippine forces fought a fierce urban battle in the southern city of Marawi after it was taken over by Islamic State militants.

While Manila was ultimately victorious, a lack of precision strike slowed combat operations and led to extensive collateral damage. Shortly after the battle concluded, Manila ordered its Super Tucanos.

Unfortunately, light-attack aircraft and helicopters are not sufficient to counter the PLAAF, which can operate over the South China Sea from both Mainland China and the island of Hainan, as well as from bases that Beijing has developed from coral atolls in international waters. The People's Liberation Army Navy is also developing its aircraft carrier fleet, with two vessels in use, and a third set for service entry in the mid- to late-2020s.

The South China Sea situation has added urgency to Manila's efforts to reconstitute its fast jet capability, which disappeared when the Philippine air force's Northrop F-5s were retired in 2004. Saab has offered 14 Gripen C/Ds, while the US government has cleared the possible sale of 12 F-16 Block 70/72s, as well as anti-ship and air-to-air missiles.

As early as 2018, defence minister Delfin Lorenzana stated his preference for the Swedish fighter, but the country's messy procurement process has apparently delayed a firm order. As for the F-16 deal, the $2.43 billion price tag is apparently a stumbling block.

November 2021 also saw Manila receive its final five Sikorsky S-70i Black Hawk helicopters, bringing its fleet to 15 examples. Its original order was for 16 rotorcraft, but one was lost in a June 2021 crash.

Manila also has a limited fixed-wing maritime patrol capability, with five Beechcraft King Air 90s.

Kuala Lumpur has long dithered about urgently needed upgrades to its air combat fleet. Domestic political turmoil and the pandemic have done little to help matters.

The cornerstone of the Royal Malaysian Air Force's (RMAF's) capability are 18 Su-30MKMs, but sustainment issues plague this fleet. The Su-30s are backed up by eight F/A-18Ds. In the ground-attack role, the RMAF operates 12 single-seat Hawk 208s. Cumulatively, the average age of the combat fleet is 20.1 years.

Cash-strapped Malaysia has a dismal history with big defence acquisitions. For over a decade it flirted with several aircraft to replace its now-retired RAC MiG-29 fighters with 18 new combat aircraft, but this process came to nothing.

In June 2021, it kicked off a tender for 18 jets to fill a new lead-in trainer-light combat aircraft, or FLIR-LCA, requirement. This is part of the air force's Capability 55 plan issued in 2018, outlining its goal of reaching a desired force structure by 2055. The opportunity attracted some interest at the last instalment of the Langkawi International Maritime and Aerospace (LIMA) show in March 2019.

Bangkok sent upgraded F-5 to the Singapore air show in 2020

Nattanon Tavonthammanuj/Shutterstock

Rival bidders

The event saw the Hindustan Aeronautics Tejas Mk 1 and Irkut Yak-130 make their debuts at the show. The appearance of the Tejas was especially notable because it was the first time the type had appeared in a flying display outside India. The Yak-130 also appeared on both static and in the flying display.

The pair were part of an eclectic group apparently vying for the requirement, following a previous request for information to several manufacturers. Other potential contenders included the FA-50, Chengdu/Pakistan Aeronautical Complex JF-17, and Leonardo's M-346. Reports in 2021, however, suggest that the JF-17 has been ruled out.

Given Malaysia's record, it is far from clear when (or if) FLIR-LCA will ever become an actual acquisition. Speaking in parliament in December 2021, the nation's deputy defence minister reportedly said that Kuala Lumpur wished to speak to Kuwait about surplus F/A-18C/Ds, but apparently no discussions have been held.

Highlighting the urgency facing Malaysia, in June 2021 up to 16 PLAAF transport aircraft, including Ilyushin Il-76s and Xian Y-20s, ranged far south over the South China Sea, to within 60nm (111km) of Malaysia's coastline on the island of Borneo. The RMAF was able to intercept the intruders with Hawk 208s based on the island of Labuan. The incursion caused a brief diplomatic row between the two countries.

One bright spot for the RMAF are its four A400Ms, with an average age of 5.8 years. Maritime patrol, however, continues to be a challenging area. Although Indonesian Aerospace is converting a trio of Malaysian CN235s to the maritime surveillance mission, the pandemic has apparently delayed this work. A long-awaited tender for "five or six" dedicated MPA remains stalled.

Budgets continue to be a challenge for the Royal Thai Air Force (RTAF). Plans to obtain a single Gripen C to replace an example lost in a 2017 air show crash have yet to materialise, leaving the country's Gripen C/D fleet at 11 examples.

At the Singapore air show in 2020, the RTAF told FlightGlobal that it would upgrade a total of 10 F-5Es to the improved F-5TH standard with a new Elbit Systems avionics suite and an all-glass cockpit. The aircraft also gains a Leonardo Grifo-F mechanically scanned radar, which allows a slightly shorter nose. The updated type was commissioned in late 2019, and will allow F-5 operations into the 2030s.

In November 2021, Textron Aviation Defense announced that the RTAF is to become the first international operator of its armed AT-6 Wolverine turboprop. Deliveries of its locally designated AT-6THs are expected from 2024 under the $143 million acquisition.

Meanwhile, FlightGlobal understands that a portion of the RTAF's fleet of F-16A/Bs are suffering obsolescence issues, but replacement efforts face budgetary constraints. RTAF officials have publicly discussed a desire to obtain eight F-35s, but this will involve discussions with the USA and finding sufficient funding.

Royal command

Given Thailand's reverence for its royal family, the RTAF boasts an impressive VIP/head of state fleet, with 17 fixed- and rotary-wing assets tasked for this mission. Key assets include three A320-family aircraft, one A340-500, and three Sukhoi Superjet 100s. Also included are three ATR 72-500s and seven helicopters.

Perhaps the most inscrutable air force in the region belongs to Vietnam. Although both China and Vietnam are communist dictatorships, the two countries have a range of territorial disputes. They even fought a brief border war in 1979.

Cirium data suggests that the Vietnamese People's Air Force operates 75 combat assets. These comprise six Su-27Ks, 35 Su-30MK2Vs, and 34 Su-22s. Media reports have suggested that Vietnam could obtain 12 Su-35s. The country has also taken delivery of six Yak-130 advanced jet trainers, and has firm orders for an additional six.

Helicopters feature prominently in Vietnam's air power line-up, with 86 Mil Mi-8s listed as in service. Dedicated ISR assets are, however, limited.

Anand Stanley is president, Asia-Pacific for Airbus, where he is responsible for the activities of all the European company's divisions across the region. He outlines how Airbus has supported its customers through the pandemic and his hopes for 2022 and beyond

Journey to sustainability

Q The past two years have been a terrible time for the region's airlines, most of whom are Airbus customers. How has this impacted Airbus here?

A The Asia-Pacific region has been particularly hard-hit by the pandemic and especially by the very severe border restrictions and quarantine measures that have been in place and still are limiting the recovery of air travel. However, we are now seeing a number of countries in the region easing measures and allowing travel to restart, to allow people to reconnect and trade to resume.

At Airbus, our focus in the region has been to work closely with customers to adapt, supporting each individual airline where required, helping them restructure contracts and reschedule deliveries. We have together been generally able to protect future delivery positions, and, as seen with recent order announcements, we are now seeing a renewed demand for airlines to review their future fleet requirements.

What is clear is that airlines will be focusing on replacing older aircraft with more efficient, more sustainable types.

Airbus

Q Now that air travel is picking up, what is Airbus's role in helping airlines get moving again?

A We are working very closely with each customer to review their future fleet requirements, offering our comprehensive and modern product line. We are also offering our support services, to enable airlines to efficiently return to service fleets that may have been grounded.

We are also looking further down the line and are in close contact with many airlines in the region on our decarbonisation journey. We have a stepped approach that includes increased use of sustainable aviation fuel and further down the road, we are working to bring to market a zero-emission aircraft by 2035.

Q Since the last air show, Airbus has consolidated into a major campus in Seletar. Can you give us a sense of the campus's business scope?

A The campus in Singapore is our regional headquarters for all our businesses. It brings together teams from commercial aircraft, helicopters, defence and space into this integrated space for enhanced competitiveness and synergy. In addition, it is home to our Asia-Pacific flight crew training centre; the base for our spare parts distribution system for the whole region; and also the hub for digital technologies and innovations. From Singapore we can connect easily with every part of the region, including the Pacific. This helps us get closer to our customers in fast-growing and competitive markets.

Q Can you discuss Airbus's outlook for the Asia-Pacific market over the next few years?

A We will present our latest APAC market forecast this week, but we see sizable demand for aircraft in the small category, which includes the A220 and A320 family. Airbus is the single-aisle market leader in the Asia-Pacific with over 4,300 aircraft in service with more than 110 airlines and over 1,900 on order.

The Asia-Pacific region is also the dominant market for widebody aircraft. Although this is the segment that has been most affected by the pandemic, we see a return to long-haul travel as well as the use of widebody aircraft on regional routes in the second half of this decade. Our latest forecast indicates a demand for nearly 1,500 widebodies for the Asia-Pacific region for the next 20 years.

Q The airline industry aims to achieve net zero emissions by the year 2050. What is Airbus's role in helping airlines with this journey?

A Airbus is committed to decarbonising the aviation industry. We are confident of meeting the Paris Agreement targets and leading the decarbonisation of the aviation sector in full collaboration with all stakeholders. We are convinced that carbon-neutral aviation is not only possible, but achievable within our lifetime. This is why we have the ambition to develop the world's first zero-emission commercial aircraft by 2035.

In parallel, we are developing a multifaceted climate-impact programme for commercial aircraft. This includes a focus on sustainable aviation fuels, air traffic management solutions and market-based measures. Airbus supports ICAO's Carbon Offsetting and Reduction Scheme for International Aviation (or CORSIA in short), as the only global market-based measure for international aviation. We are committed with our ATAG partners (other manufacturers and airlines) to reach net zero carbon emission by 2050.

Our R&D [research and development] is pressing ahead into new generation cleaner technologies including hybrid-electric engines, alternative fuels and hydrogen technologies, to decarbonise our industry. Airbus believes that hydrogen has a key role in reducing aircraft emissions, but there are significant hurdles in terms of technology and infrastructure.

Q What needs to happen in the Asia-Pacific for the region to benefit from the rise of hydrogen?

A Hydrogen is one of the most promising zero-emission technologies currently under consideration. If generated from renewable energy through electrolysis, it generates no CO2 emissions. Declining renewable energy costs could significantly drive down the cost of hydrogen as early as 2030. This will make hydrogen increasingly cost-competitive with existing options, such as jet fuel and sustainable aviation fuels. A decision on these options is expected within the next few years when technology reaches adequate maturity. We have recently reworked and refined studies conducted in 2003, which conclude that hydrogen technology is scalable to the core of our market.

At Airbus, we believe that decarbonisation is a key priority for international aviation and will require an unprecedented level of global collaboration across sectors. In the Asia-Pacific region, we've seen countries like Singapore place a strong focus on ensuring a sustainable future. The aviation sector is of course one critical area of focus and priority as the nation continues to steer a strong air hub. This is a cross-sectoral approach that requires the rethinking of infrastructure, production, transport and distribution of alternative fuel sources such as hydrogen. Therefore, it is not just about aircraft technology. We also need airports, regulators, energy producers, and the fuel transportation system to get involved.

Passengers could soon be taking flights on electric air taxis, and many think the region, with its huge, high-density conurbations, is the perfect launch market

Birthplace of the revolution

Kate Sarsfield

Asia-Pacific is emerging as a key testbed and market for the new segment of urban air mobility (UAM), with developers eyeing governments and customers in the region as likely early adopters of electric vertical take-off and landing (eVTOL) technology.

Part of the reason is that the area is home to some of the globe's most gridlocked cities. A 2020 study by management consultancy Roland Berger forecasts more than 160,000 small, remotely-piloted passenger aircraft will be in service in congested metropolitan areas around the world by 2050. By then, it predicts 70% of humans will live within these conurbations – from 50% today – with population growth expected to outstrip ground transportation capacity by over a third.

Like many burgeoning, technology-led sectors, UAM looks like one ripe for consolidation. Roland Berger estimates that more than 100 eVTOL projects are in various stages of development. They include those owned or backed by Airbus, Boeing and Embraer as well as countless independent start-ups. While several prototypes have been test flown – including in urban environments – none are anywhere near being approved for trial operations, let alone to carry paying passengers.

However, when that moment comes, several countries in Asia-Pacific could be at the front of the queue to offer UAM air taxi services.

China's EHang is close to securing type certification for its EH216 UAM platform in its home market, and has completed over 20,000 flights with the two-seat eVTOL aircraft in 10 other countries where it is seeking approval, including Japan and Indonesia.

As part of its effort to commercialise the 19nm (35km)-range EH216, the Guangzhou-headquartered company has created a scheme – the 100 Air Mobility Routes Initiative – which is focused on developing a template for an air mobility operating system, including route planning, flight operations, safety management, regulatory compliance, and sales and marketing functions.

EHang is also creating a digital platform that will be open to multiple users. Around 50 stakeholders are contributing to this initiative, it says, including prospective operators such as Hainan Airlines, Hong Kong Airlines, HK Express, and highways group Shenzhen Expressway. Around 3,000 flights have been conducted so far, including in the cities of Guangzhou, Shenzhen and Zhaoqing.

In addition, EHang is developing the VT-30, a larger, longer-range version of the EH216, which is designed for journeys up to 160nm with 100min endurance. A certification and service entry timeframe has not been disclosed, but EHang says it has secured the first order for the two-seat model from Japan's Okayama Kurashiki Mizushima Aero & Space Industry Cluster Study Group (MASC).

The pair are currently exploring use cases for the EH216 in Japan and have conducted a series of demonstration flights during the last six months in Fukushima and Okayama.

Germany's Volocopter is aiming for type certification and service entry of its similar-sized VoloCity eVTOL aircraft "within the next two to three years", and says Singapore – home to its Asia Pacific headquarters – will be one of the first cities to launch commercial services with the two-seat, 19nm-range type.

It follows a successful public demonstration in October 2019 of its 2X prototype – a precursor to the VoloCity – in the city's Marina Bay district, along with the first full-scale air taxi "vertiport", operated and assembled by its UK partner Skyports.

Volocopter says is has been "working closely with key stakeholders" – including the country's Ministry of Transport, Civil Aviation Authority and Economic Development Board – "to promote urban air mobility in Singapore".

Volocopter is working with stakeholders in Singapore to promote urban air mobility in the city state

Volocopter

The Bruschal-headquartered firm expects the first service to be a tourist route over the south coast of the island, "offering breath-taking views of Marina Bay". Follow-on connections may include cross-border flights to enhance regional connectivity and offer what the company calls "significantly improved travel experience to Singapore's closest economic centres".

Volocopter is also making gains elsewhere in the region. In Japan it has an agreement with Osaka Roundtable to introduce air taxi services in the city around 2025.

A joint venture was created in April 2021 with China's Geely Technology Group to roll-out electric air taxi services. The venture, Volocopter Chengdu, has a commitment for 150 aircraft including the VoloDrone and the four-seat, 52nm-range VoloConnect which is scheduled for certification and service entry in the second half of the decade.

Volocopter also has designs on South Korea, performing demonstration flights in November 2021 with the 2X at Seoul's Gimpo and Incheon airports. In partnership with local firm Kakao Mobility, Volocopter has launched a feasibility study to examine the potential of UAM operations in the country.

It has also commissioned a study with Malaysia Airports Holdings – which manages 39 airports across the country – and Skyports to explore the potential deployment of electric air taxi services there. That study will be published later this year, says Volocopter.

Embraer's UAM division, Eve, says it is also conducting "deep dive" surveys into a number of cities across the Asia-Pacific where it sees a "vast market" for UAM services. The Melbourne, Florida-headquartered firm – which recently announced plans to float on the New York stock exchange – has secured tentative commitments for over 1,700 units of its five-seat eVTOL aircraft, also called Eve, which it plans to bring to market within the next five years. Asia Pacific-based operators account for nearly 10% of this total. Customers include Australian firms Sydney Seaplanes and Nautilus Aviation – with commitments for 50 and 10 aircraft respectively – and Singapore-headquartered Ascent Flights with a deal for 100 units.

An artist's impression of an Ascent-liveried Eve air taxi over Singapore

Eve

"We expect sales in the region to soar as interest in the UAM concept gathers pace," says Eve co-chief executive Andre Stein. He describes UAM as a "new frontier for aerospace and an entirely new business model for everybody".

Manufacturers entering this sector, Stein concedes, "are looking beyond their traditional role of building and selling hardware to the end user".

Eve is "selective" in its choice of customer, he says. "We are seeking to collaborate with local operators, to create opportunities together and share the risk and the growth."

Before the UAM sector can realise its potential in the Asia Pacific, Stein says "it needs to create and build the ecosystem – infrastructure, systems and technologies – to support the vast number of electric models both on the ground and in the air".

He continues: "No-one yet knows how to operate this new genre of aircraft, so if we share the risk, there is a massive potential for growth. A lifetime opportunity for something that's a real win-win."

He suggests that while Embraer's home country of Brazil is a "natural choice" to launch the first eVTOL services, "so too is the Asia Pacific, given the sheer size of the market and its eager customer base".

Eve has already secured a partnership with Australian helicopter operator Microflite to launch eVTOL aircraft operations there, possibly in 2026. Stein says Microflite and Eve will use helicopters at the initial stages of the collaboration as a proof of concept to "validate parameters" applicable to eVTOL aircraft operations in the future.

The partnership builds on a 2019 concept of operations developed by Eve and Airservices Australia, which saw Microflite play a contributory role. Melbourne has been earmarked as the testbed for electric air taxi services in the country.

"We are talking to several different [air service providers] in key markets across the Asia-Pacific," Stein says.

Lionel Sinai-Sinelnikoff, founder and chief executive of Singapore-based Ascent Flights, says the Asia-Pacific is "crying out for UAM", and he expects the region to spearhead the "eVTOL aircraft revolution".

"Asia Pacific is undergoing the largest growth in urbanisation in the world and is home to the highest concentration of megacities such as Beijing, Jakarta, Manilla and Tokyo," he says.

Even a small city-state like Singapore is an ideal hub for eVTOL-based services, he continues, due to its proximity to other popular islands as well as the "bustling" Malaysian market.

"Such is the interest in the UAM model across the region, we have been invited by a number of countries to work on an air mobility solution," says Sinai-Sinelnikoff.

However, Asia-Pacific presents a number of "unique" challenges due, Eve's Stein says, to the "diversity of its markets".

"There are different cities, different communities, which will have different needs and requirements," he adds.

Gaining certification for the Eve across the region is not a "big issue", Stein concedes, as many of the regulators in the key markets look set to adopt the new common eVTOL standards spearheaded by the European Union Aviation Safety Agency and the US Federal Aviation Administration. "However, there could be different standards for noise levels depending on the city," he says.

In conurbations where helicopters are already a common feature of the urban transportation system – Manilla and Jakarta for example – there will be more tolerance to the "much quieter" eVTOLS.

A survey conducted by Volocopter in Singapore following its October 2019 public demonstration of the 2X delivered a spectator approval rating of 75%, the German developer says, with the majority of respondents stating that the eVTOL aircraft low noise profile "exceeded their expectations".

Stein admits, however, that tolerance thresholds for noise and nuisance are subjective. "Getting the public to embrace UAM will be easier if these new, time-saving, innovative platforms are available to the masses, rather than a privileged few," he says.

Focusing solely on the benefits of a few wealthy individuals – much as a conventional VIP helicopter market does today – will prevent UAM from realising its full potential, says Stein. The industry needs to lower the barrier to entry and make this new generation of aircraft available to the masses, he argues.

"This can only be done by addressing operational costs," Stein notes. Not only should these new eVTOL aircraft be designed for ease of manufacturing, maintainability and reliability – key aspects Embraer has learned through its commercial and business aviation divisions – "but to truly democratise this form of air travel in the Asia Pacific we need to build a large, diverse fleet of aircraft, that are positioned in sweet spots within key markets".

The product must also be desirable, says Stein. Late last year, Eve conducted a month-long trial in Rio de Janeiro to test a proof-of-concept for future operations of its eVTOL aircraft.

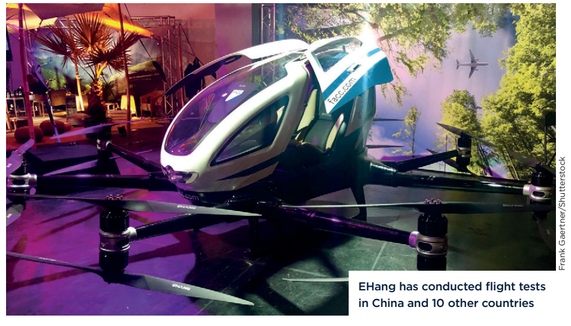
The evaluation was conducted on a "all-new, straight route" between the east side of the city and the airport, using a helicopter supplied by local operator Helisul. Tickets were sold to the customers through Brazilian broker Flapper. A key aspect of the trial, Stein says, was to engage with the end user, and this was a "great success" with over 600 passengers flown, many taking a flight for the first time.

Eve now plans to replicate the trial using direct routes in other cities across the world, including in the Asia-Pacific, says Stein.

Ascent welcomes Eve's initiative. "Offer an affordable and appealing product and customers will buy it," says Sinai-Sinelnikoff.

Ascent calculates the cost of an eVTOL aircraft transfer from downtown Manilla to the commercial airport will be approximately $50 per seat, compared with $150 per seat on a helicopter.

"This offering is appealing from both a cost, sustainability and time-saving perspective, given it can take up to three hours to do the same journey by car," says Sinai-Sinelnikoff. "For travellers in the Asia-Pacific, like elsewhere in the world, time is the ultimate currency," he adds.



EHang has conducted flight tests in China and 10 other countries

Frank Gaertner/Shutterstock

Pressing home the Advantage

Mary Ellen Jones is vice-president, Asia-Pacific customer business for Pratt & Whitney. She explains how the engine maker has weathered the Covid-19 storm and how emerging technology will boost its prospects in the region

Pratt & Whitney

Q Asia-Pacific has been arguably the worst-hit region during the pandemic due to generally very strict travel measures imposed. How has this affected your business, both in terms of aircraft deliveries and MRO, and how do you see the trajectory of recovery this year?

A While utilisation is still recovering across the board, Asia-Pacific has been especially challenged. International travel restrictions remain in place, and domestic guidelines frequently change. However, we're in a good position, powering the segments recovering most quickly. These include GTF and V2500 engines on single-aisle aircraft and PW4000-powered freighters. GTF-powered aircraft are especially well-positioned for growth – not only for domestic operation, but also for the longer routes made possible by Airbus A321neo, A321LR and soon A321XLR aircraft. In certain cases, these aircraft are replacing widebodies.

The increase in utilisation we're seeing globally is also translating into higher MRO demand, especially in Asia-Pacific. Our overhaul shops in the region serve airlines around the world, so Asia is benefitting from the recovery elsewhere. The V2500 benefits from a strong position on the A321ceo and new demand in freighter conversions.

Longer term, we see tremendous growth in commercial aviation in Asia-Pacific over the next decade. Almost 8,000 new aircraft are forecast to be required, with about 3,300 of those in the next five years. We anticipate about two-thirds of these will be single-aisle aircraft – exactly the segment served by GTF engines.

Q You unveiled the GTF Advantage at the end of 2021. Tell us about what that engine offers compared with the current version, and what difference it will make.

A The GTF is the quietest, most sustainable engine for single-aisle aircraft, with up to 20% less fuel and CO2, 50% less NOx and a 75% smaller noise footprint. With more than 1,200 aircraft in service with 62 operators, it's saved more than 600 million gallons of fuel and avoided more than six million metric tonnes of CO2. Certified for 50% sustainable aviation fuel (SAF), these engines can achieve even lower emissions.

The GTF Advantage engine for the A320neo family extends the benefits of the GTF engine, which already offers the lowest fuel burn and CO2 emissions for single-aisle aircraft. GTF Advantage improves these figures by an additional 1% and offers higher thrust capability, providing even more options and flexibility for operators. And the GTF Advantage will be compatible with 100% SAF, helping the industry meet its commitment to net zero emissions by 2050.

GTF Advantage includes technology enhancements throughout the engine core, for which we've already completed more than a year of ground and flight testing. The engine will be available for A320neo family aircraft starting in January 2024. For a seamless introduction for operators, this new configuration will be interchangeable with engines already delivered, and it will become the new production standard.

Q What measures have you taken to keep your service network active during the past two years?

A We continue to expand the GTF MRO network to support the growing fleet. In the past two years, we announced five shops and transformed our West Palm Beach facility into a fully capable GTF MRO shop. Today we have 11 active shops across three continents, with more coming on line soon. MTU Maintenance Zhuhai inducted China's first GTF engine last year, having industrialised during the pandemic. In 2020 we announced that China Airlines and Ameco would be joining the GTF MRO network, and in December 2021 reached an agreement with Korean Airlines to become a network member. These shops will be needed to serve growing GTF demand in Asia-Pac and around the world.

Cargo has remained a bright spot. PW2000 and PW4000 engines powered many of the aircraft that transported the first vaccines. We power around 190 aircraft with FedEx and UPS, along with 757, 767, 777 and A330 passenger fleets around the world. Traditionally, much of the world's cargo flew in the bellies of passenger aircraft. During the pandemic, many airlines operated cargo-only flights.

Close relationships with our customers helped us better forecast and schedule maintenance, which allowed us to adjust to the realities of the pandemic. For example, with many aircraft inactive in 2020 and early 2021, we had a window of opportunity to incorporate planned upgrades into the GTF fleet. Rather than slow MRO activity, we accelerated upgrades and restored the fleet to full readiness ahead of the recovery. And starting last year, we've seen a recovery in MRO demand.

Q How is your market share on the Airbus A320 family in this region? Is it broadly consistent with your share globally?

A Newer, more fuel efficient GTF-powered aircraft like the A320neo, A220 and Embraer E-Jets E2 families have been popular with Asia-Pacific operators. There are more than 500 GTF-powered aircraft with 25 customers in the region, accounting for more than 40% of the global GTF fleet. We also have more than 1,000 V2500-powered aircraft with 50 customers in the region, which is about a third of the global V2500 fleet. We expect demand for GTF-powered aircraft to be strong as the recovery continues, and as the middle class continues to grow in the region.

Q How do you view prospects in this region for other smaller types that your engines power, such as the Embraer E2 family and the Airbus A220? And, of course, for regional turboprops – both ATRs and De Havilland Canada Dash 8-400s are powered by Pratt & Whitney Canada engines?

A From turboprops through small single-aisle types, Asia-Pacific could see the need for more than 1,400 aircraft in the coming decade. We excel in these, from turboprops with our PW100 and PW150 engines, all the way up to the GTF-powered E-Jets E2 and A220 aircraft.

Pratt & Whitney Canada alone has more than 10,000 engines in Asia-Pacific, and with the drive toward sustainability, we're introducing new engine models and pioneering new technologies to make aviation even more environmentally friendly. We recently announced the PW127XT engine with 40% longer time on wing, 20% lower maintenance costs and 3% lower fuel consumption. We're also working with De Havilland Canada and Collins Aerospace on a hybrid-electric aircraft demonstrator, with flight testing targeted in 2024. We expect to achieve a 30% fuel burn improvement for a typical 250-mile regional turboprop mission using this technology. Of course, we expect many of these technologies to be applicable to larger commercial engines like GTF, as well.

Heidi Grant is vice-president business development for Boeing's defence and space portfolio. She joined the company in November from the US Department of Defense where she headed the Defense Security Cooperation Agency. She talks about her new role and Boeing's aspirations in the Southeast Asia market

A trusted partner

Boeing Defence and Space

Q What have been your priorities since joining Boeing?

A First and foremost, I've been spending time getting to know the incredibly talented and dedicated business development team I now have the honour of leading. I've been diving in deep to understand what our strengths are and where I can bring my outside-in perspective and knowledge of global customers to bear. After more than three decades serving in globally-facing roles in the DoD, I'm focused on bringing a partnership mentality to all we do, achieving win-win solutions for both our global government customers and Boeing.

Q What are some of your objectives at the show?

A We're excited to be back in Singapore and to have the opportunity to reengage with our customers, industry partners and media. We're having conversations with military customers around the region about their fleet modernisation efforts and enduring needs for maritime security, intelligence, surveillance and reconnaissance and tanking capabilities, as well as for fighters, trainers, cargo and attack helicopters. Customers across Southeast Asia have placed their trust in Boeing to sustain and upgrade their fleets. We'll underscore our commitment to their mission readiness and to strengthening our partnership with local industry partners.

Q Can you share your view on further Boeing fighter sales in the region?

A Boeing is well-positioned to support fighter missions of customers across the Indo-Pacific as partners and allies adjust their plans to a rapidly changing security environment. We are humbled by Korea's trust in Boeing to upgrade its existing F-15 fleet with performance-based logistics, and by Japan's decision to upgrade its fleet under the F-15 Super Interceptor Upgrade programme.

We are honoured by Indonesia's interest in the F-15EX. With its contemporary sensors and radar, advanced cockpit, and range, speed and payload capacity, we believe the F-15EX can add critical capability to militaries around the region. In Indonesia, a Boeing selection can open up differentiated industrial cooperation opportunities and benefits to the country's defence and local industry.

With the T-7, we look forward to continued engagement with customers throughout the region to reimagine integrated training and fighter force structures with the fighter-like capabilities inherent in the T-7 Advanced Pilot Training System.

Q Japan is undertaking a major upgrade of its legacy F-15 fleet. Can you discuss Boeing's role in this effort?

A We welcome Japan's decision to continue work on the F-15 Super Interceptor Upgrade programme. The F-15JSI will significantly upgrade the capabilities of the Japan Air Self Defense Force. This critical upgrade programme relies on our longstanding partnership with Mitsubishi Heavy Industries and Koku Jietai for the F-15, and we look forward to enhancing the fleet with next-generation technologies that meet Japan's current and future needs.

Q What about opportunities for Boeing's rotorcraft portfolio in the Asia-Pacific?

A We see tremendous opportunity for customers in the region to upgrade their existing rotocraft fleets to the newest, most advanced configurations or acquire new aircraft. We are proud to support the missions of our Japan and Korea customers with the H-47 Chinook – both countries join the UK in operating the largest fleet of H-47 Chinook helicopters in the world.

The Japan Self Defence Force was Bell Boeing's first international customer for the V-22 Osprey and we've now delivered the first seven aircraft to Japan. We value our partnership with Japanese industry, including Subaru on the V-22, that has enabled us to deliver on our commitments and provide this one-of-a-kind tiltrotor capability.

We welcome Australia's confidence in the AH-64E Apache as the backbone of their attack helicopter fleet, and it remains the mainstay of various countries across the Asia-Pacific. Robust demand for the Apache is supported by an active production line and a US Army modernisation plan through the late 2040s, thereby ensuring the platform remains the leading attack platform of choice through 2050 and beyond. We also welcome Australia's intent to procure four additional F model Chinooks, which takes the Australian Army's fleet from 10 to 14. Australia's utilisation of its Chinook fleet has been very impressive to see – the Chinook played a pivotal role in warfighting and humanitarian missions.

Q On an Asia-Pacific level, what are the key technologies your customers are asking about?

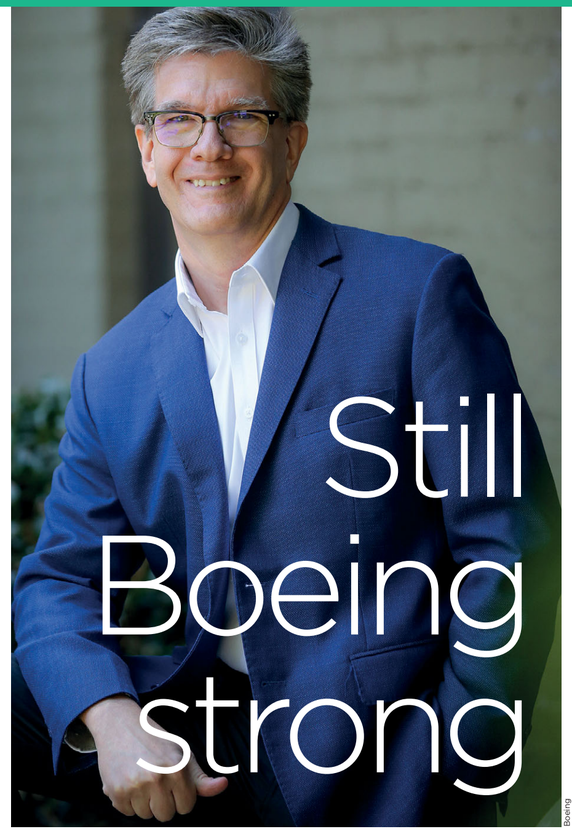
A Our customers want to know what Boeing can do to help them gain a digital advantage in the battlespace, and what investments we're making in areas like open-systems architecture, driving interoperability and creating factories of the future based on modularity and flexibility. I can tell you that customers want to be able to field faster at a lower price – and fight smarter to stay ahead of threats. Boeing is responding to that call to action by shifting our focus away from what we build to how we build it. By digitally transforming how we design, build, test, field and support our solutions, we are providing our customers with the speed, flexibility and predictability that they need to stay ahead of future threats.

Q Covid-19 has had a major impact on the world's economies, yet a challenging geopolitical environment is placing an increasing premium on defence. What can governments do to ensure they get the most value of their defence expenditure?

A The prolonged pandemic has added an additional layer of uncertainty on top of what was already an increasingly unstable global environment, and tensions are rising. Global government customers have recognised that maintaining – and even increasing – investment in defence serves at least three critical, peace-keeping aims: deterring conflict, increasing capability and readiness in the event of conflict and bolstering the global industrial and manufacturing economy. In this environment, global military customers would be well-served to invest in proven platforms and systems with known, documented life-cycle costs, backed by integrated services and support plans. Underpinning these defence procurements with comprehensive offset programmes – with partners like Boeing who guarantee their commitments – is more important than ever.

Still Boeing strong

John Bruns is the US airframer's vice-president, commercial sales & marketing for India and Southeast Asia. He explains what the company is doing to help its airline customers steer their businesses to recovery, and what the prospects are for its range of airliners in the region



Boeing

Q What will Boeing be talking about at this year's show?

A Boeing is excited to participate at Singapore and engage directly with government officials, customers, partners, suppliers, media and other stakeholders from the region and beyond. The air show is a great opportunity to highlight our portfolio of commercial airplanes, defence platforms, and sustainment and services. It is fitting that technology, innovation and sustainability are key themes at the show as they are priority focus areas for Boeing and are all critical in supporting both near-term recovery and long-term growth of the aerospace industry throughout the region.

Q Southeast Asian airlines have been particularly hard hit by travel restrictions. Can you share some perspectives on the challenges this created for Boeing, and how you worked with customers during this period?

A There's no question that Southeast Asia has been and remains one of the most challenged markets globally with traffic levels, particularly on international routes, well below what other regions such as North America and Europe are seeing. Early in the pandemic, Boeing focused on easing passenger concerns through our Confident Travel Initiative (CTI). CTI continues to promote that Boeing aircraft are designed to help minimise the risk of disease transmission. High Efficiency Particulate Air (HEPA) filters used in all Boeing airplanes trap more than 99.9% of particulates, as recirculated air passes through them and prevents those particulates from re-circulating back into the cabin. We continue to support our airline customers as we collectively navigate this public health emergency. We support the guidance our customers deliver to passengers in conjunction with the guidance of governments and health agencies around the world. The CTI efforts have shifted more recently to focus on opening borders through the promotion of testing as a more effective means to control spread and support travel recovery.

Q With air travel ramping up in the region, what is Boeing doing to support airlines as they get back on their feet?

A We have stayed close to our customers throughout the pandemic and have been supporting them on multiple fronts. Other than CTI, another great example is cargo operations which have been a real lifeline for many operators throughout Asia. Particularly transpacific cargo yields have been significantly higher than pre-crisis. Boeing partnered with airlines across the globe with technical support to allow for seat removals and cargo on the main deck of passenger aircraft, to enable them to capture cargo revenue opportunities and more fully utilize their fleets.

Q Can you describe progress with the 737 Max family in the region?

A We continue to work with global regulators and our customers to safely return the 737-8 and 737-9 to service worldwide. We've made important progress. Since the [US Federal Aviation Administration] un-grounding in November 2020, more than 185 out of 195 global regulators have approved a return to service or opened their airspace to the 737 Max, most recently Indonesia. We've delivered more than 270 airplanes through December. Through early January 2022, 35 operators had more than 475 737 Max in revenue service. Airlines have safely flown more than 300,000 commercial flights, totaling more than 800,000 flight hours. The fleet has a schedule reliability rate of more than 99%.

All of the authorities in the Southeast Asia region have now cleared the Max and it has been, or will soon be, resuming scheduled service with carriers in the region. Interest in the airplane is strong – as airlines look to add or replace single-aisle capacity, especially in an environment of rising fuel prices, the value proposition of the 737 Max family is as compelling as ever.

Q Following from that, how do you see prospects for the 787 and 777X families in the region?

A The 787 has been the most highly utilized twin aisle aircraft throughout the pandemic. Operators around the world have been leveraging the advanced technology and the impressive efficiencies of the aircraft. One great example of the 787's versatility: Vietnam Airlines and Bamboo Airways have both opened up brand new routes connecting Vietnam to West Coast of the US – exactly what the 787 was designed to do.

We are proud to be displaying the 777X at the airshow and fully expect the 777X to become the new flagship for airlines looking to replace older generation large widebodies such as [Airbus] A380s, 747s and 777-300ERs. The 777X has an unmatched value proposition including the most payload capacity and lowest operating cost per seat of any widebody. The Boeing Commercial Market Outlook forecasts 770 widebody new delivery aircraft for the SE Asia region over the next 20 years. A number of these airplanes will be products like the 787 and 777X. Globally we have seen orders placed for every widebody variant Boeing sells in 2021. This is a clear sign that many operators around the world are planning for long haul recovery as the global pandemic begins to shift towards an endemic.

Q Boeing has traditionally had a strong freighter line up. As airlines emerge from the pandemic and bellyhold capacity comes back on-line, do you see demand for maindeck freighters – both narrowbody and widebody – staying resilient?

A For over 30 years, the majority of world air cargo traffic has been carried on dedicated freighter aircraft. Even in 2019, a weak year for the air cargo industry, freighters carried 54% of total world air cargo traffic, a number that surged in 2020 to roughly 70% on freighters due to the removal of passenger belly capacity.

The pandemic has exacerbated several long-term trends in the world containership industry, namely player consolidation, slower capacity/fleet growth, and higher long-term pricing. For example, while world air cargo rates per kilogramme roughly doubled between 2019 and mid-year 2021, world containership rates rose in excess of six-fold in the same timeframe.

Hence, air cargo has become a much more attractive value proposition relative to containership transport, and, as a consequence, freighters will remain at the forefront of supply chain managers' thinking, even after Covid-19 starts to recede as an everyday concern. Shippers that we speak with are desperate for supply chain redundancy, resiliency, and reliability, which only freighter aircraft can provide.

Bicky Bhangu is president, Southeast Asia, Pacific and South Korea for Rolls-Royce, which has a major industrial and MRO footprint in Singapore. He explains how the UK propulsion giant is investing heavily in technologies to deliver ever-cleaner, more efficient aircraft

Powering to a greener future

Rolls-Royce

Q What sort of presence does Rolls-Royce have in Singapore and the wider region?

A Rolls-Royce, together with our aero-engine MRO joint venture operations, employs 2,200 people in Singapore, and is the regional centre for our civil aerospace, defence and power systems businesses, providing service and solutions to customers in Asia Pacific.

We manufacture our Wide Chord Fan Blade – a unique technology that has played a key role in the success of our Trent engines – at our fan blade Singapore facility in Seletar. We also provide aero engine maintenance, repair and overhaul services through our joint venture Singapore Aero Engine Services (SAESL).

Our services portfolio includes digital applications and solutions for our regional customers, and data-led digital platforms like Yocova, enabling users to exchange data and collaborate.

We also have a team in Singapore that is part of the Rolls-Royce global supply chain organisation that manages a network of suppliers in this region.

Singapore is a hotbed for our technology development. We have an in-house team of technologists and deep partnerships with A*STAR and NTU (our University Technology Centre partner) focusing on technology development and acquisition in the areas of electrical, smart manufacturing, AI, and materials and repair.

Q What is the state of the market and what opportunities are there for Rolls-Royce in this region?

A It is encouraging to see engine flying hours recovering, which directly correlates to increasing MRO activity or shop visits. At Rolls-Royce, we are ramping up our activity in our fan-blade production with the increase in production rates for Trent XWB-97K and returning widebody load. On the digital side, we are making accelerated progress in our digital manufacturing journey to ensure we continually improve our processes to support the evolution of the fan blade facility.

We are addressing the sustainability challenge head-on. To decarbonise complex, critical aviation systems, we are making all commercial aero engines that we produce, and our most popular reciprocating engines, compatible with sustainable fuels by 2023. We are investing in improving the efficiency of our Trent engines as well as developing our next generation civil aero engine, the Ultrafan.

Meanwhile, we also see increasing opportunities for hybrid-electric and all-electric solutions, particularly in the urban air mobility (UAM), commuter and regional markets. Through our ACCEEL project, we have made significant progress in building the world's fastest all-electric plane.

Finally, we see the opportunity for digital tools and solutions that improve efficiency and effectiveness of customers' operations. These include applications and new innovative digital platforms, like Yocova, that allows for the exchange of data and collaboration with airlines, regulators, and the supply chain ecosystem.

Q What challenges and threats do you anticipate to business progress?

A Aviation is among the industries in which achieving net zero carbon is the hardest. And yet we believe our technologies can help industries across land, sea, and air achieve their net zero goals. As other parts of the global economy decarbonise, the aviation sector will contribute to a more significant proportion of remaining emissions. Sustainability requires technological breakthroughs. This provides one of the greatest opportunities for the industry, governments and academia to collaborate and co-create technology solutions for a net zero world.

To address this, Rolls-Royce has been continuously boosting our research and development (R&D) expenditure to pivot more towards lower carbon, net zero and zero carbon technologies: moving from approximately 50% of our gross R&D in these areas today to at least 75% by 2025.

Q How important is evolving technology?

A Rolls-Royce has decades of experience in pioneering solutions to some of industry's toughest engineering challenges. Many of our technologies and products have advanced with significantly higher fuel efficiencies and have become net zero emission compatible products.

Our Trent XWB engine is an example. Continual technological advancements have made our Trent engine 15% more fuel efficient than the first generation of Trent engines manufactured in the 1990s. Our Trent XWB engine now has the distinction of being the most efficient large gas turbine engine flying today, powering aircraft from six hours to ultra-long 19 hours routes.

Our Ultrafan engine with advanced technologies is set to power both narrow and widebody aircraft with a significant 25% fuel efficiency improvement compared to its first generation.

We have also made considerable progress through the testing of sustainable aviation fuel, which plays a vital role in decarbonisation of carbon-intensive sectors. And we are exploring the application of hydrogen and new business opportunities in electric flight through Rolls-Royce Electrical.

Q What about your initiatives on sustainability?

A In 2020, Rolls-Royce joined the UN Race to Zero coalition and pledged to play a leading role in enabling sectors in which we operate to reach net zero by 2050.

Last year, we launched our decarbonisation strategy. It starts with emissions in our own operations which we have already halved over the past five years. Our short-term target is to eliminate emissions from our own operations and facilities (excluding product testing and development) by 2030, and we will work to abate our remaining emissions to ensure we are a carbon neutral, climate resilient business by 2050.

Rolls-Royce Singapore, as a hub, has a key role in contributing to the global emissions reductions through our facilities and operations. Our Seletar campus was designed with sustainability in mind. And since 2014, we have reduced carbon emissions by 19% against an increase in operational activities. The main contributor has been the improvements in energy efficiencies, such as deploying low-energy lighting and efficiency gains in the cooling systems. We have also installed over 11,700 photovoltaic panels, which supply around 8% of the site's yearly electricity demand. We are looking to further expand, and study other options for electricity from renewable/low-carbon sources.

It is an exciting challenge for our entire Seletar operation, including manufacturing, to make the net zero transition by 2030. This year will be pivotal for Rolls-Royce Singapore to enable its decarbonisation pathway to achieve that ambition.

GE Aviation has been repairing engines and components in Singapore since 1981, but the business is about to move in a new direction as it adopts radical new technologies

One of GE Aviation's sites in Singapore

valeevalley/Shutterstock

Maintaining excellence

Alfred Chua

GE Aviation has just celebrated 40 years of operations in Singapore, making it one of the longest established overseas aerospace in-plants in the city state. Its new head Ian Rodger – who moved to the Singapore engine services unit from a UK-based role with the US company in August – likens the anniversary to a "rebirth", as he looks to take the business in a "subtly different direction" in the post-pandemic era.

"I was joking with some of the team, that life begins at 40, and while it was a little bit of a joke, it does feel that way," noted Rodger, at an event to mark the occasion in November. "It's almost like a rebirth, as we're seeing the growth coming back with new technology."

That new technology comes in the shape of additive manufacturing capabilities, introduced by the Singapore unit last year for engine component MRO, making it the first in the world to do so.

The process, known as direct metal laser melting, is usually used to manufacture engine components, but GE Aviation is the only company to use it for MRO work. Rodger tells FlightGlobal that the process to deploy additive manufacturing technology for component MRO started two years ago, and is co-developed by Singapore engineers with support from local government agencies as well as GE Aviation's US business.

The technology is "significantly faster", says GE, allowing technicians to repair twice as many parts in a day than with conventional methods.

The engine maker adds that the additive manufacturing method will also feature prominently in the development of two new engines: its GE9X powerplant, which powers the Boeing 777X widebody, as well as its Advanced Turboprop.

Rodger adds that the technology "is on its way" to GE's engine MRO facility in Sao Paulo, Brazil. "[GE Aviation Singapore] has got a track record of...farming out, or exporting technology to other parts of the GE family," he says.

Indeed, Rodger points out the importance of the Singapore unit to the broader GE group. The facility here is GE Aviation's largest site for engine component MRO, taking up about 60% of global repair volumes.

It has plans to do more: the company has disclosed plans to create more than 300 new jobs in 2022, primarily in roles in "growth areas" such as additive manufacturing and sustainability, as well as automation and robotics.

The company employs 1,700 people across three facilities in Singapore. Two are engine component repair centres, where the technology, automation, as well as research and development centres are co-located. In 2019, the company built a new production line for high-pressure compressor components.

Rodger points towards a "clearly-thought" strategic direction in the development of an aerospace hub in Singapore, which also includes linking up with educational institutions.

He admits that while talents in engineering and innovation are "readily available" in Singapore, it was a bit trickier to find people with what he calls "traditional skills", like welders and technicians.

To this end, GE Aviation Services Singapore will "re-establish links" with local polytechnics. Rodger also hopes that as borders reopen, it will be able to recruit foreign workforce to fill some of these roles.

In the near-term, Rodger is hoping to embark on "strategic workforce planning", which will involve retraining and "upskilling" GE Aviation's Singapore-based workforce.

"The pace of introduction of [new] technology is becoming more rapid. So strategic workforce planning is key for us... and [to build] relationships even further with academia, with government, with education institutes," he says.

He remains optimistic of an imminent recovery: GE data shows that as of October, its Asia-Pacific narrowbody engine hours, which largely comprise CFM engines, were already at 44% pre-pandemic levels, while widebody engine hours stood at around 55%.

On long-term plans for the business, Rodger offers this: "For the next 40 years, [it is about] pivoting to new products [whether it be] the open rotor, or sustainable engine products."

The location is crucial to GE Aviation's ability to push into new fields. "Singapore is ever keeping itself relevant and focused on what's coming next," he says. "I have no doubt that Singapore can do that, given the focus on innovation in technology."

Singapore trade and industry minister Gan Kim Yong viewing GE Aviation Engine Services Singapore's additive manufacturing technology in November

GE Aviation

Embraer E190-E2

Embraer's E190-E2 was a regular sight on the static display at air shows pre-pandemic, and makes an appearance again at Singapore. The Pratt & Whitney PW1900G-powered type made its debut with Wideroe in April 2018, and was joined in service by its sibling, the larger E195-E2, in 2019.

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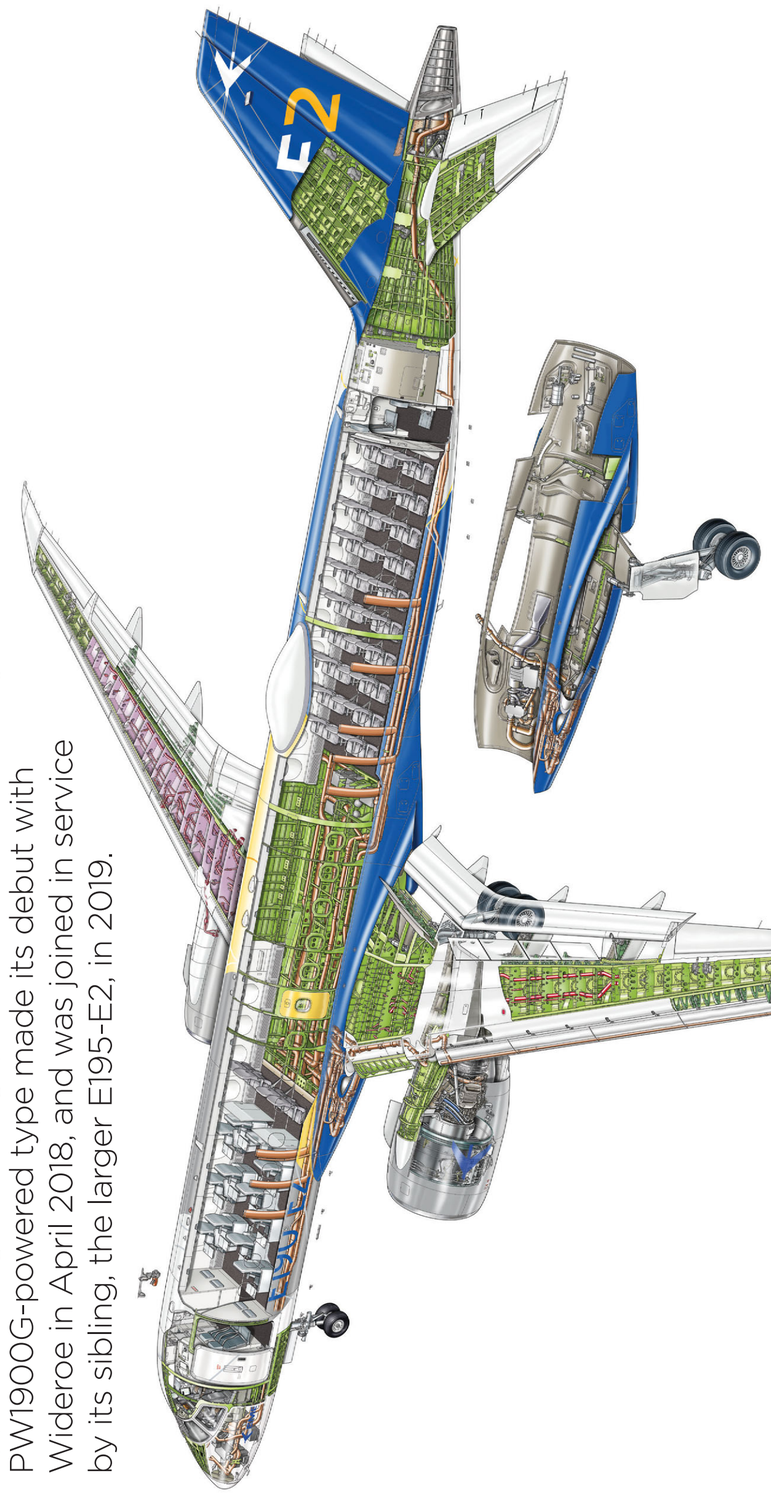

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We've been on a mission to redefine aerospace since day one at Collins Aerospace. And that mission is coming to life in every region and sector we serve – from commercial aviation to defense and space. We're redefining: a more seamless, secure travel experience; the future of commercial and military aircraft; how to connect and protect allied troops in a multi-domain battlespace; and space exploration for government and civilian partners.

Now that we're part of Raytheon Technologies, we're able to extend our mission even further, expanding our capabilities to create even more breakthrough technologies and products. Because, as the world works to emerge from the challenges of the pandemic, we know it will take commitment – and collaboration – to create a more connected, more sustainable world for generations to come.

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