Issue
1
Tuesday
20 February 2024

FLIGHT DAILYNEWS

With distribution supported by
RTX
COLLINS AEROSPACE | PRATT & WHITNEY | RAYTHEON

nows its hand

with long-awaited
r C919

BillyPix

the CAIC
opter on public
ational event for

n C919 is the
delivered to the
mme's launch
mber 2022, and
May last year.
accomodate
wo classes:
ass and 156 in

ore air show
ce at an event
C919 did
ow in Zhuhai in

geting European
C919 amid a
omote Chinese
s abroad.

TransNusa is the first international operator of the ARJ21, and deploys its aircraft on domestic routes and short-haul international flights to Malaysia. The ARJ21 is also involved in the flying display during the show's public days.

The Z-10ME features an impressive weapons load of anti-tank missiles, podded rockets, as well as its chin-mounted 23mm chain gun. Also on display are air-to-air missiles and 23mm "high explosive incendiary ammunition".

Sensors include a mast-mounted radar and an electro-optical/infrared (IR) ball on the aircraft's nose. The helicopter also features a missile approach warning receiver and a directional infrared countermeasures system to combat IR-seeking missiles.

FlightGlobal understands that the helicopter was ferried to the show not inside a transport aircraft, but aboard a ship. The helicopter is located in front of state airframer AVIC's display, which bears the tagline "All Value in Cooperation".

The Z-10 is in service with the People's Liberation Army, and Pakistan is also understood to be interested in the type.

BillyPix

The Z-10ME features an array of weapons

Issue 1

Tuesday
20 February 2024

FLIGHT DAILYNEWS

With distribution supported by

RTX
COLLINS AEROSPACE | PRATT & WHITNEY | RAYTHEON

SINGAPORE AIRSHOW 2024
WHERE AVIATION'S FINEST MEET · 20–25 Feb

China shows its hand

Comac export efforts step up with long-awaited debut on international stage for C919

Three Comac aircraft are parked on display static

BillyPix

Alfred Chua & Greg Waldron

China's long-held ambition to break the Airbus and Boeing duopoly in the narrowbody market today entered a significant next stage with the Comac C919's international debut.

The Shanghai-based airframer has brought two examples of the single-aisle jet to Singapore: one for the flying display, and another in China Eastern livery for the static.

Comac is also showing two ARJ21 regional aircraft – a passenger jet painted in Indonesian operator TransNusa's colours, as well as a freighter variant.

Meanwhile, Beijing is also heavily promoting the defence capabilities of its industry with the CAIC Z-10ME attack helicopter on public display at an international event for the first time.

The China Eastern C919 is the first example to be delivered to the carrier – the programme's launch customer – in December 2022, and it entered service in May last year.

It is configured to accomodate 164 passengers in two classes: eight in business class and 156 in economy.

While the Singapore air show is its first appearance at an event outside China, the C919 did feature in the air show in Zhuhai in November 2022.

Comac is also targeting European certification for the C919 amid a broader push to promote Chinese aircraft programmes abroad.

TransNusa is the first international operator of the ARJ21, and deploys its aircraft on domestic routes and short-haul international flights to Malaysia. The ARJ21 is also involved in the flying display during the show's public days.

The Z-10ME features an impressive weapons load of anti-tank missiles, podded rockets, as well as its chin-mounted 23mm chain gun. Also on display are air-to-air missiles and 23mm "high explosive incendiary ammunition".

BillyPix

The Z-10ME features an array of weapons

Sensors include a mast-mounted radar and an electro-optical/infrared (IR) ball on the aircraft's nose. The helicopter also features a missile approach warning receiver and a directional infrared countermeasures system to combat IR-seeking missiles.

FlightGlobal understands that the helicopter was ferried to the show not inside a transport aircraft, but aboard a ship. The helicopter is located in front of state airframer AVIC's display, which bears the tagline "All Value in Cooperation".

The Z-10 is in service with the People's Liberation Army, and Pakistan is also understood to be interested in the type.

Millennium's moment

C-390's Singapore debut comes after stellar year for tactical transport

Da Costa: Airframer's goal is to 'materialise' sales in the coming year

Billy Pix

Ryan Finnerty

After years of effort developing the C-390 Millennium tactical transport, Brazilian airframer Embraer is ready to reap the rewards.

The company logged a banner year in 2023, delivering the first NATO-standard configuration C-390 to Portugal and reaching full operational capability on the jet-powered type with the Brazilian air force. Most recently, Embraer secured its first Millennium customer in the Asia-Pacific with a $544 million order from South Korea for a trio of C-390s.

"We are in a harvest moment," says Bosco da Costa Junior, chief executive of Embraer Defense & Security, of the aircraft, which is making its Singapore debut.

While the company is pushing hard across its entire defence portfolio – including launching a new production line in Gaviao Peixoto to produce Saab Gripen E fighters for Brazil – the C-390 is undoubtedly the main effort for Embraer's military business. After making substantial investments to develop the platform, da Costa says the company is now shifting focus to securing new customers – particularly for the C-390.

"We would like to materialise sales in the coming year," he notes. "That's the main goal."

Coming off a strong 2023, optimism is sky-high at Embraer's Sao Jose dos Campos headquarters.

Without revealing who, da Costa says the company hopes to announce a new C-390 operator before the end of the current quarter.

Among the list of likely candidates is Saudi Arabia, where the Millennium was recently on display for the World Defense Show in Riyadh. Local defence champion SAMI and Embraer have joined forces to pitch the C-390 to the Kingdom.

Europe also has several interested parties, including the Czech Republic, Austria, and the Netherlands. All three countries have signalled their preference for the C-390 and are currently in negotiations with Embraer to acquire two, four and five aircraft, respectively.

RISE above expectations

Early results from windtunnel tests of a one-fifth-scale open-fan engine being evaluated in support of CFM International's RISE programme are even better than predicted, the propulsion specialist disclosed on the eve of the show.

CFM partner company Safran in January announced that trials of the scaled Ecoengine, to assess its aerodynamic and acoustic performance, had begun at facilities run by French aerospace research agency ONERA.

Speaking at a virtual Singapore air show briefing yesterday, Pierre Cottenceau, vice-president, engineering, research and technology at Safran Aircraft Engines, said around two-thirds of the planned 200h of testing have now been completed.

"It will keep on running for some part of 2024," he says. "I would say generally we are very happy with the test results... [which] have come out a bit better than predictions."

GE Aerospace, Safran's US counterpart in the CFM joint venture, is also conducting a range of component level tests as the pair work towards flight tests of a demonstrator engine later this decade.

P&W spreads wings in Southeast Asia

As part of a long-term plan to bolster its presence in Southeast Asia, Pratt & Whitney has expanded its Eagle Services Asia engine centre in Singapore, which it expects will boost geared turbofan (GTF) engine production at the facility by about two-thirds in 2024.

During an opening ceremony yesterday, the RTX subsidiary said the facility has been expanded by some 4,459sq m (48,000sq ft).

A joint venture between SIA Engineering and P&W, the Eagle Services facility is supported by P&W's Singapore Technology Accelerator, which "integrates robotics, automation and machine learning to increase efficiency, lower stress on machine operators and increase safety for key MRO processes", the engine maker says.

The facility has completed more than 500 GTF overhauls since MRO capabilities came online in 2019.

Png Cheong Boon, chair of Singapore's economic development board, framed the expansion as part of a broader investment by aerospace companies in Singapore. Since the last Singapore air show in 2022, he says, 10 companies have committed some $750 million of investments within the next five years.

"These companies' confidence in Singapore is testament that the future of our aerospace industry remains bright," Boon says.

Airbus plays it SAF

Underscoring its environmental focus at the Singapore air show, Airbus is for the first time using sustainable aviation fuel (SAF) to power demonstration flights of its A350-1000.

Using a 35% SAF blend supplied by Shell Aviation, the A350 will perform in the show's daily flying display from today.

The A350 (F-WMIL) had flown into Singapore from the airframer's Toulouse base powered by blended SAF and was topped up with an additional 13t of the fuel at Changi airport on 18 February.

This brings the total amount of blended SAF carried by the aircraft to around 21.8t. Each demonstration flight uses about 3.5t of fuel, says Airbus.

The airframer says the SAF component of the fuel was produced from a feedstock of used cooking oil and tallow. Its aircraft are currently able to operate with up to 50% SAF and it aims to reach 100% by 2030.

BillyPix

Hercules stays strong for ST

Greg Waldron

Singapore's ST Engineering Aerospace sees a long future in providing support for the world's fleets of legacy Lockheed Martin C-130 Hercules tactical transports but is nonetheless seeking to broaden its portfolio to include other aircraft types.

Given Singapore's long-serving and active C-130 fleet, ST has vast experience with the iconic type, says Daniel Ho (*pictured*), who heads strategic plans and international business for the company's defence aerospace business.

ST has also performed extensive work on C-130s in service with foreign air forces. It has provided airframe support for over 650 aircraft, overhauled more than 1,200 Rolls-Royce T56 engines, and provides a range of other sustainment activities, including avionics upgrades and wing-box replacements.

While ST has carried out work for the Republic of Singapore Air Force and regional customers, its client list includes operators from further afield. This includes a deal announced in 2003 to upgrade and maintain a pair of Tunisian air force C-130s.

"We have our own engineers with engineering data and expertise from various customers around the world," says Ho. "This is a big thrust, because the C-130 is still a workhorse."

Greg Waldron/FlightGlobal

Republic of Singapore Air Force C-130H on display in 2018

Ho declines to specify the number of C-130s that ST can handle simultaneously but indicates that the company's capacity is significant. And while several countries have their own C-130 support capabilities, if these are fully utilised they can tap ST for what Ho calls "overflow" work.

Ho adds that legacy C-130B/H aircraft still have a long future in service, even with the arrival of newer tactical transport options.

"There are many air forces that even if they have bought C-130Js or new tactical transports, the C-130H is still the backbone [of thier fleets]," says Ho.

"Especially in large countries like Indonesia and the Philippines with many islands where you need to hop big geographical spans."

In addition to military roles, Ho point out that older C-130s are also critical for humanitarian and United Nations missions.

Nonetheless, ST is looking to expand its capabilities to cover other transports, potentially including aircraft that are not operated by Singapore.

He observes that types such as the Airbus Defence & Space C295, A400M, and Embraer C-390 are increasingly prevalent.

"We want to look to the future where these platforms start to become more mainstream in this region," adds Ho.

"I think one of the things the [OEMs] appreciate about us is that we are a high-quality, cost-effective centre in the region, and regional customers of new tactical transports don't want to fly aircraft back to the OEM somewhere far away."

Amphibious Caravan makes a splash

Textron Aviation has delivered a Cessna Grand Caravan EX amphibian turboprop to Malaysian company Oriental Sky, a subsidiary of the Ikhasas property group.

The aircraft will be managed and operated by Systematic Aviation Services and used to transport passengers between Kuala Lumpur and a new waterfront resort on Perhentian islands, off the country's northeast coast.

Textron Aviation, which made the announcement on the eve of the show, says it will be Malaysia's first seaplane operation in recent history after the local regulator granted approvals to launch operations.

Meanwhile, the airframer has also notched up a sale agreement for the first passenger variant of the Cessna SkyCourier in Australia. Regional airline Hinterland Aviation already operates a fleet of Grand Caravans serving remote communities in Queensland, as well as the tourism and business sectors, and will take delivery of the SkyCourier in 2026.

Yugo's eVTOL vision with Eve

Embraer spin-out Eve Air Mobility has signed an agreement with Singapore-based aviation firm Yugo Global Industries to study the potential for urban air mobility (UAM) operations in Southeast Asia. Yugo, which counts existing jet and rotorcraft operators PhilJets and Helistar as partners, was set up to support air mobility innovation in the region.

Covered by a memorandum of understanding, the pair will jointly focus on the infrastructure and regulations required to support operations of electric vertical take-off and landing (eVTOL) aircraft. Additionally, the companies will analyse service centre and vertiport size and capabilities, ground handling and other areas.

"We are looking forward to collaboratively working with Yugo to study and help define the UAM ecosystem in Singapore and Southeast Asia," says Johann Bordais, chief executive of Eve.

"Our goal is to also understand and define a business model that not only enables eVTOL flights in the region, but also advances the overall mobility ecosystem."

"We strongly believe that Southeast Asian economies will greatly contribute to the development of the eVTOL and UAM industry," adds Thierry Tea, chairman of Yugo.

Eve expects to fly its first prototype in 2024, with service entry targeted for 2026. Featuring eight lifting rotors and a pusher propeller for cruise, it boasts a claimed range of 32nm (100km) and 100kt (185km/h) speed.

BillyPix

Eve eVTOL cabin mock-up at the show

RSAF chief: Lessons to learn

Greg Waldron

Singapore's top air force leader says Russia's invasion of Ukraine highlights the continued importance of airpower in modern warfare, as the nation looks to upgrade existing platforms and introduce new aircraft.

"The Russia-Ukraine conflict has reinforced the importance of achieving air superiority," says Major General Kelvin Khong in an emailed interview with media on the eve of the Singapore air show.

"I believe that if either side had achieved air superiority, the conflict would have taken on a very different trajectory. There is a higher probability that it would not have been so long and protracted."

Although Russia has an ostensibly superior air force, it has been largely neutralised by Ukraine's air defence capabilities, which include legacy Russian-designed systems and new Western-supplied equipment. Similarly, Ukraine's small air force has been unable to fully support army units fighting on the frontlines.

The lack of decisive airpower on either side has led to a grinding, high-attrition conflict.

"I believe recent conflicts have reinforced the importance of cross-domain and cross-service integration," adds Khong.

"In battles where air forces have freedom of action and where air power is tightly integrated with forces on the ground, we see successful outcomes. On the other hand, where air power is absent, or where air power is not well integrated with other domains, the outcomes are less desirable."

Khong adds that the conflict has seen the rise of what he calls the "air littoral", characterised by small, low-cost unmanned air vehicles, including first-person-view weapons that operators fly directly into targets. While such innovations can be effective for a time, they can be quickly countered in a cycle of rapid innovation.

Khong also touched on the Republic of Singapore Air Force's (RSAF's) upgrade acquisition plans.

Singapore will receive four Lockheed Martin F-35Bs in 2026, with the remaining eight it has on order to follow in subsequent years. It has plans to start training pilots for the type, as it continues to monitor the broader programme.

"Training will begin in the United States so that we can leverage the vast airspace to hone our operational skills and air combat readiness and allow us to have enhanced joint training and exchanges with the US forces," says Khong.

Meanwhile, Singapore's programme to upgrade about 60 Lockheed F-16C/Ds to the F-16V standard is "progressing well", with some upgraded assets deployed with the RSAF's Peace Carvin II detachment at Luke AFB in Arizona.

BillyPix

Khong: F-16 upgrade is 'progressing well'

The updated fighters will gain a new active electronically scanned array radar in the form of the Northrop Grumman APG-83, as well as other improvements. Khong says the F-16 fleet will serve into the 2030s.

Khong hints that Singapore's Boeing F-15SGs could also receive enhancements, although he does not offer specifics.

"The F-15SGs have been serving us well since 2009, and they are expected to continue to meet our operational needs," he says.

"Nonetheless, we will continue to review our platform capabilities and refresh them when necessary and opportune to meet our operational requirements."

Singapore officially says it has 24 F-15SGs but is widely believed to have 40 examples.

Boeing has said that it is in talks with legacy operators of the F-15 about possible upgrades that benefit from its work on the F-15EX.

Khong adds that Singapore will undertake a life-extension programme on its Boeing AH-64D Apache attack helicopters, pushing their retirement date "beyond 2030". Cirium fleets data suggests that Singapore has 18 in-service Apaches.

In addition, Khong says the RSAF's Lockheed C-130 tactical transports, Fokker 50 maritime patrol aircraft, and Gulfstream G550 airborne early warning and control aircraft continue to perform their missions.

"Notwithstanding, we continually monitor the systems' performances and when necessary, we will refresh, upgrade or replace the capabilities to meet our mission needs," says Khong.

While well maintained, the RSAF's 10-strong C-130 fleet has an average age of 50.8 years. Embraer, which is displaying its C-390 transport at the Singapore air show for the first time, likely sees an opportunity in the city state.

"The RSAF will continue to build on the transformation that has brought us from the Cessnas in 1968 to the modern fleet that we operate today," adds Khong.

"We must recognise the strength in our people and organisation, provide them with training and skills necessary to excel in a dynamic and unpredictable security environment and never lose sight of our primary mission to defend Singapore's skies."

Singapore slingshot

The Republic of Singapore Air Force (RSAF) has crafted a unique flying display for this year's air show, which sees a Boeing F-15SG fighter paired with an AH-64D Apache attack helicopter.

The two platforms have vastly different flight capabilities, and the RSAF display aims to highlight the specific performance characteristics of each.

Opening the display is the "Slingshot" manoeuvre, which sees the AH-64D approach the audience and pull up sharply to reduce airspeed to zero, while the F-15SG conducts a high-*g* turn around the helicopter.

The F-15SG then conducts several manoeuvres including the "SAM Weave", a series of "aggressive twists and turns" that the fighter would use if it was targeted by a surface-to-air missile.

The AH-64D returns and the two aircraft conduct a close proximity pass, with the F-15SG rotating sideways as it passes the helicopter.

Following a series of AH-64D solo manoeuvres, both aircraft perform a complicated "Double Helix" move, simulating a strike mission against ground targets.

Finally, the two aircraft conduct "The Golden Salute", which sees the Apache dip forwards in a "bow" movement, while the fighter enters a vertical spiral climb, ejecting flares as it ascends.

In addition to the flying display, the RSAF has a major presence in the static park. Displayed assets include the F-15SG and AH-64D, Lockheed Martin F-16, Boeing CH-47 Chinook, and an Airbus Helicopters H225M.

BillyPix

Bell's 429 with VIP interior at the show

BillyPix

Bell's bright prospects

Alfred Chua

Helicopter manufacturer Bell expects a robust year ahead across its product portfolios on the back of strong demand post-pandemic.

Sameer Rehman, Bell's managing director for Asia Pacific, says the region has "seen the bright light of promise", pointing to the "telling signs" that commercial and military rotorcraft demand is on the rise.

Rehman says the light-single 505 has continued to see "robust sales", with the manufacturer picking up orders for two examples from Malaysia-based operator Hammock Helicopter at the start of the Singapore air show.

It is the latest in a string of orders from Southeast Asian customers, including 505s bound for the Philippines and Indonesia. To date, the company has delivered more than 505 units of the helicopter worldwide.

Rehman says the 505 has great potential as a military trainer, viewing it as a "key segment" for the company. Notably, South Korea in May 2022 decided to procure 40 examples for training army and navy pilots.

Bell's larger single-engined 407GXi is also set to enter service soon with two Asian operators: Ginger Aviation in Taiwan and Meghna Aviation in Bangladesh.

Meghna's 407GXi is the latest addition to the Dhaka-based operator's fleet: it already has an older 407GX, as well as a twin-engined 429 which it signed for in 2017. The latest purchase will be deployed to "support the company's corporate, leisure and utility helicopter charter services".

Meanwhile, at the Singapore show, Bell is also exhibiting the 429 equipped with the company's new Designer Series interior – the first time the VIP design has been showcased in Southeast Asia.

Rehman also promises that the 525 Relentless will finally enter service this year. In development for over a decade – it was launched in 2012 – the super-medium-twin is the airframer's "the most anticipated" product update for 2024. However, it has yet to secure US certification.

He also acknowledges that while Bell is not immune to the global aerospace supply chain crunch, the company is "continuously looking at the supply chain... to examine ways to [build] our products more efficiently, both cost- and time-wise".

"We are not out of the woods when it comes to the supply chain... but the great thing is that we are diverse. We have a global supply chain that allows us to navigate geopolitical issues, labour issues, among other things," he adds.

In 2023, Bell delivered 171 commercial helicopters, slightly down from 2022's 179-unit total. Of the 171, more than half were 505s and 407s.

Rehman is positive about the prospects of the broader sector. "Rotorcraft will remain a mainstay, they are not vintage by any means – [but] we are developing technologies to... be in step with advances in innovation."

FLIGHT DAILY NEWS

Produced by FlightGlobal, 1st Floor, Chancery House, St Nicholas Way, Sutton, Surrey SM1 1JB, UK

HOW TO CONTACT US

We are located in C-G106

Editor Murdo Morrison murdo.morrison@flightglobal.com

Executive Editor, Flightglobal Graham Dunn graham.dunn@flightglobal.com

News Editor Dominic Perry dominic.perry@flightglobal.com

Reporting team Alfred Chua, Ryan Finnerty, Howard Hardee, Greg Waldron

Production Louise Murrell

Designer Sarah Eversfield

Picture editor James Robbins

Photography Tom Gordon, Law Kian Yan

Distribution Stuart Burgess, Dawn Hartwell, Beatrice Olsen

Divisional Director, FlightGlobal Sophie Wild

Printers Times Printers, Singapore

Aero Soc head vows more for Singapore

The Royal Aeronautical Society has announced Paul Ashcroft as the new president of its Singapore branch.

Ashcroft, who is senior vice-president Asia Pacific for aftermarket support specialist AerFin, says the city state has a "commanding aviation presence" as home to hundreds of aviation businesses and thousands of professionals.

He plans to increase diversity in the branch and "enthuse tomorrow's aviation professionals with a host of stimulating activities and events".

Flying flag for team USA

At a time of rising global tensions – in the Indo-Pacific as well as Europe and the Middle East – supporting its allies in this region remains a vital mission of the US military, as well as the US companies that supply much of those countries' military hardware and systems.

Advocacy body the Aerospace Industries Association is preparing for a busy week at the show, not just by flying the flag for US industry, but acting as an independent facilitator, hosting round tables between businesses and members of government, as well as with representatives of customer nations.

"We are representing US industry at large, rather than individual companies," explains AIA chief executive officer Eric Fanning. "That makes it easier for us to bring key people together."

AIA also liaises with the US Air Force and other branches of the military to bring operational military aircraft and their crews to shows such as Singapore, Dubai, Paris, and Farnborough.

AIA has around 330 members, from the largest aerospace and defence contractors to family-owned suppliers, and across defence, commercial, business aviation and spaceflight.

Fanning acknowledges that the snags in the global supply chain that have blighted both the commercial and defence sides of the industry since the pandemic recovery began in late-2021 could "take us a while to get out of".

While he admits some pressures are easing, including in transportation and raw materials, shortages of skilled workers remain a challenge for US companies.

There are structural problems too, argues Fanning. On the commercial side, manufacturers have spent a decade or more becoming leaner, cutting inventories, and adopting just-in-time models. While this has lowered prices, the impact of Covid-19 and geo-political crises "has made it difficult for companies who have built very efficient systems to adjust quickly".

On the defence side, some suppliers have been reluctant to ramp-up to meet government demand for equipment prompted by the likes of Russia's invasion of Ukraine because they have no guarantees their investment will pay off in the longer term.

"That is why we are working with government to encourage more consistent investment," says Fanning.

AIA

Fanning: We are here at the Singapore show for industry at large

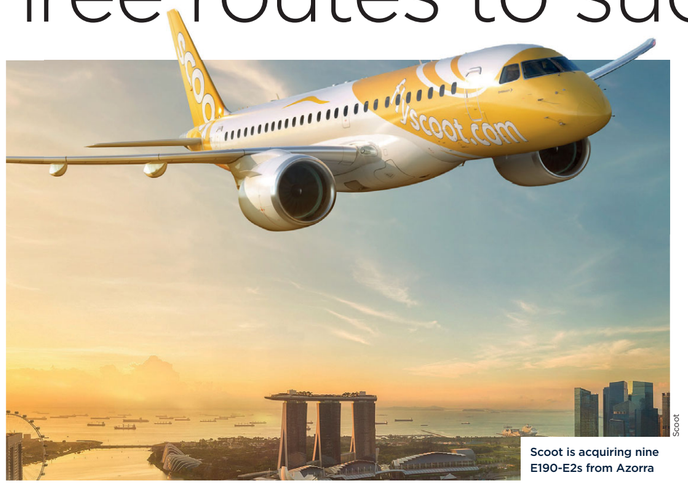
E2's three routes to success

Murdo Morrison

Embraer is displaying its E195-E2 at the show and is confident of securing more customers in the region for its latest generation of regional jets after securing a brace of breakthrough deals in 2023.

"We had a good year in APAC," says vice-president marketing Adam Young, referring to commitments from Singapore-based low-cost carrier Scoot and SKS Airways of Malaysia. Scoot will take delivery within weeks of its first of nine E190-E2s leased from Azorra, while SKS has agreed to take 10 of the larger E195-E2 from the same lessor, starting this year.

Embraer – which is also displaying its C-390 military transport and Praetor 600 business jet in the static display – yesterday inaugurated its E2 simulator at the Singapore CAE Flight Training centre near Changi airport. The device is the first in the region, and Scoot pilots have begun training on it.



Scoot is acquiring nine E190-E2s from Azorra

Scoot

E2 variants are now certificated in China, Malaysia, Singapore, and Vietnam, and Young says three factors will continue to drive demand for the family across Asia-Pacific.

Firstly, more airlines are responding to customer demand for point-to-point services on thinner routes that cannot justify a larger narrowbody, he says.

"In 2017 about 65% of airline traffic in Southeast Asia went through about six hubs. Six years later, that proportion had come down by five percentage points. It proves that if passengers are able to fly directly to a secondary or tertiary city, they will."

Scoot chief executive Leslie Thng said last year that the carrier's E190-E2s, another four of which will be delivered during 2024, will be deployed on "a mix of new and exciting destinations".

Secondly, E2 jets can access runways as short as 1,300m that larger Airbus and Boeing aircraft cannot, giving airlines "full mission capability" into many smaller airports, asserts Young.

A third attraction of the E2, he says, is its environmental credentials. "We are reminding the market that we have the most sustainable single-aisle aircraft in terms of noise and carbon emissions," says Young. "This is becoming increasingly important in places like Japan, Australia and New Zealand."

He also expects the E2 to gain ground in Australia, which is already a significant market for older-generation E-Jets. Last year, charter operator Alliance Airlines announced it is to purchase 30 used Embraer E190s, taking its overall fleet of the type to 63.

The deal will make Australia the third E-Jet market in the world after the USA and China, surpassing Japan and Brazil, says Young.

92% asset availability

LEADERS AREN'T BORN. THEY'RE ENGINEERED.

LEAP

LEAP turns heads in the boardroom.

LEAP-powered aircraft are achieving the highest days flown ratio* for their thrust class. That means fewer spare aircraft and more flights, which helps profitability climb. Another reason to say **LEAP. By example.**

*Compared to 83% for competition per third-party data.

cfmaeroengines.com

Bernd Peters is vice-president of business development and strategy at Boeing Defense, Space & Security, tasked with 'delivering innovative solutions to global customers'. He outlines what we can expect from the business at the show

Countering the threats

Boeing

Q What platforms and capabilities is Boeing focusing on this week?

A Boeing has a longstanding relationship with Singapore and the broader Asia-Pacific region. For more than 75 years, Boeing has provided customers across the region with commercial aviation, defence and services solutions, while supporting local supply chain, community and research collaborations.

We're proud of this legacy, and at this year's show, Boeing will showcase critical defence and services capabilities that support our customers' strategic objectives, including, the F-15EX, the world's most advanced modern combat fighter; the AH-64 Apache attack helicopter; the H-47 Chinook multi-mission helicopter; and, the P-8 Poseidon multi-mission maritime patrol aircraft. We are also focused on our payload and autonomous offerings, particularly Integrator Extended Range and ScanEagle, by our subsidiary Insitu, and Wave Glider, by our subsidiary Liquid Robotics.

Q What are some broader security themes in Asia-Pacific?

A Maritime domain awareness and security are a priority in Asia-Pacific given its vast geography and economic interests. Knowing what is happening on and under the seas – and responding accordingly, is vital to national, economic and human security. These requirements demand range, speed, persistence and multi-mission capability.

For example, Boeing's P-8 is operational today with key customers such as Australia, New Zealand and India, performing critical missions to protect the seas and secure borders. Additionally, our Insitu uncrewed family of systems and the Wave Glider uncrewed surface vehicle further extend maritime patrol and intelligence, surveillance and reconnaissance capabilities.

We also see customers investing in fleet modernisation to meet critical national security needs while countering evolving threats. This includes upgrades and new aircraft sales of F-15 fighters for air defence missions, Apache for multi-domain attack, and Chinook for its broad versatility across combat and humanitarian operations.

Q Can you discuss opportunities in vertical lift in Asia-Pacific?

A The ability to reliably reach remote areas quickly and engage in versatile defense and humanitarian missions across Asia-Pacific are hallmarks of the Apache and Chinook helicopters. We continue to modernise both platforms with the latest advanced technologies, and we see opportunities for continued upgrades and sales across the existing user base.

With more than 60 years of proven combat and humanitarian experience, the Chinook is the most battle-tested, reliable and advanced heavy-lift helicopter in the world. The new CH-47F Block II programme provides enhanced capabilities today and positions the aircraft for affordable upgrades well into the future. Currently, there are more than 100 Chinooks in the Asia-Pacific region, and a number of countries are actively engaged in acquiring modernised Block II Chinooks to meet the challenges of today's rapidly changing environment.

Q When speaking with customers in Asia-Pacific, is interoperability with the USA and other partners seen as a priority?

A Yes, we continue to see interoperability as a growing priority for our customers in Asia-Pacific, serving as a force multiplier and driver of fleet longevity. Given the region's unique geographic footprint and importance to global prosperity and security, synergies across operations, training and sustainment are critical to mission success between the USA and its allies and partners.

Boeing's H-47, AH-64, P-8, E-7 and KC-46 aircraft are operational and participating in multi-lateral military exercises ensuring readiness against evolving threats today. Further opportunities to strengthen interoperability between the United States, its allies and partners are on the horizon as we work to deliver E-7 and F-15EX capabilities to the United States Air Force.

Q Several Asia-Pacific countries operate the AH-64 Apache. What are the prospects of new sales and upgrades?

A We are honoured that 18 countries around the globe have chosen the Apache as their attack helicopter platform, totaling more than 1,280 aircraft in service worldwide. Australia recently became the latest country to select the AH-64E Version 6 to replace its armed reconnaissance helicopter, joining other key customers in the Asia-Pacific region, such as Singapore, Indonesia, Japan, South Korea and India.

We continue to work with current operators to ensure the mission readiness of their AH-64 fleets. As they look to acquire these advanced capabilities, we see opportunities for both upgrades and new aircraft sales, as well as interest from potential new customers.

Q What is the outlook in Asia-Pacific for tankers such as the KC-46?

A International interest in the KC-46 continues to grow and is based on our ability to offer an operational capability that delivers superior interoperability, efficiency and affordability. With more aircraft in service globally than any tanker except the Boeing-built KC-135, the KC-46A is delivering fuel, data and multi-mission capability for the USA and its allies.

The KC-46A is ideally suited for air mobility support in the Asia-Pacific region, delivering more fuel at all ranges and from shorter runways and using less ramp space than competing tankers to ensure mission reach from forward and austere airfields. The KC-46A can convert between cargo, passenger and aeromedical evacuation modes in just two hours.

To date, 153 KC-46A aircraft are on contract globally, including 143 tankers for the USAF, six aircraft for Japan and four for Israel.

US Air Force

The KC-46A is ideally suited for air mobility support in Asia-Pacific, says Boeing

Two of the region's blue-chip airlines have opted for the A350F, as Toulouse takes on Boeing's dominance in Asia-Pacific's vital large-freighter market

Cathay disclosed its A350F order in December

Airbus

Airbus's cargo queen

David Kaminski-Morrow

Cathay Pacific's order for the Airbus A350 freighter underpins Asia-Pacific demand for the new aircraft and is arguably the strongest endorsement of the cargo twinjet so far.

Singapore Airlines became an early customer for the aircraft, which was launched by Airbus in July 2021 and is expected to enter service in 2026. The flag-carrier tentatively signed for seven in late 2021 – the same months as Airbus sealed its initial firm A350F orders from US lessor Air Lease and French logistics specialist CMA CGM – and declaring that it would be the first carrier to operate the type.

These agreements emerged as Airbus's long-haul activity remained suppressed by the pandemic, and the commitment from blue-chip airlines under the circumstances proved encouraging to a manufacturer which has struggled to regain a presence in the dedicated freighter market since ceasing production of the A300-600F.

Cathay Pacific disclosed on 8 December – exactly a year since the first A350F order was added to Airbus's backlog – that it would be acquiring six A350Fs but, crucially, was also opting to take up to 20 more. It will use the jets on services to North and South America, as well as Europe.

The agreement is particularly significant given that Cathay has a fleet of 20 Boeing 747 freighters and had appeared to be maintaining its US loyalty in the sector by leaning towards the 777-8F – Boeing's counter to the A350F, unveiled at the beginning of 2022.

Boeing has dominated the large freighter market with production of the 767-300F and 777F and, until a year ago, the 747-8F, while the MD-11F remains in service with a number of large cargo carriers.

Airbus ended A300-600F production in mid-2007 and efforts to re-enter the freighter sector have largely misfired. The A380F, initially ordered by carriers including FedEx and UPS, was abandoned while the A330-200F backlog dropped to zero after just 38 deliveries.

The airframer argues that the A330 freighter might have achieved greater success if it had been based on the -300 rather than the -200, prioritising payload over range.

This is the rationale behind the A350F. The aircraft is based mainly on the structure for the A350-1000 passenger model and, although it will be slightly shorter, will still be larger than the -900. It is intended to address the high-capacity end of the dedicated freighter market, offered as an efficient twinjet alternative to the three-engined MD-11 and four-engined 747.

Cathay's order brought to a round 50 the total number of A350Fs in Airbus's backlog by the end of 2023. Nine identified airlines and lessors, and one undisclosed customer, have signed for the aircraft.

Airbus chief commercial officer Christian Scherer says the figures demonstrate that the freighter has achieved a "remarkable market resonance". The airframer is intending the jet, powered by Rolls-Royce Trent XWB engines, to enter service in 2026.

It unveiled plans to develop the aircraft in mid-2021, while the pandemic was still inflicting heavy damage on passenger air transport, but generating substantial cargo traffic from such areas as e-commerce and the shipping of medical supplies.

Airbus chief executive, Guillaume Faury, acknowledged that the airframer had a "weak" presence in the freighter market.

"We'll be more aggressive," he insisted. "We believe we have the products to be able to be more aggressive in the future."

Airbus originally indicated that the freighter would be able to transport a 90t-plus payload, but the subsequent development has enabled the company to list the A350F's capability as 111t, enabling it to compete with the 747 while offering twin-engined economics.

Although the traffic effects of the pandemic have subsided, and passenger aircraft belly capacity has returned, Faury believes there is underlying potential in the cargo sector which will drive demand for the new freighter as older aircraft are retired – particularly given the trend towards sustainability.

He argues that the timing of the A350F's entry into service will coincide with an upcoming "wave of replacements" which is likely to emerge in the second half of the 2020s.

Airbus also stresses that the A350F will comply with new ICAO environmental standards which are set to come into force during 2028, introducing stricter emissions criteria for in-production aircraft. New-build aircraft that cannot meet the standard will need to be modified or discontinued.

Component and structure production for the A350F is already underway and assembly will be embedded in the current A350 lines.

Recent IATA figures have indicated a positive direction for the air cargo market, with Asia-Pacific airlines recording rising volumes and, as passenger aircraft returned to operation, higher available capacity.

But the A350F will face competition in the sector, not only from the 777-8F – which has secured over 50 orders from such carriers as Qatar Airways, Cargolux, Lufthansa, All Nippon Airways and Silk Way West – but also the emerging conversion market for older 777 passenger models.

Israel Aerospace Industries has developed a 'Big Twin' modification of the 777-300ER, while US-based Mammoth Freighters has been aiming to convert both 777-300ERs and 777-200LRs. Another US firm, Kansas Modification Center, has also developed a 777-300ER conversion programme in co-operation with Wichita State University's National Institute for Aviation Research.

Alongside Cathay Pacific, Singapore Airlines, Air Lease and CMA CGM the A350F has been ordered by Air France, Martinair, Turkish Airlines, Etihad Airways and Silk Way West – plus the unidentified customer.

TALLEST WIDEST SMARTEST PERIOD.

The incomparable Falcon 6X cabin 1.98 m tall, 2.58 m wide. With wide aisles. Bright, extra-large windows and skylight. Whisper-quiet cabin. Cutting-edge technology. Amazing.

Falcon 6X

WWW.DASSAULTFALCON.COM | KUALA LUMPUR: +60 122 132 132 | SHANGHAI: +86 189 1157 7115

DASSAULT AVIATION

The market is the airframer's most lucrative, with local carriers also first on the list for new STOL and premium cabin variants of the Toulouse-built regional turboprops

ATR's Asian advantage

Murdo Morrison

ATR

The region accounts for 40% of ATR's fleet

With four in 10 of the worldwide ATR fleet based in Asia-Pacific, the region – with its archipelagos, isolated communities, and hard-to-access airfields – remains key for the Franco-Italian airframer. "It's really where we see things happening," says Nathalie Tarnaud Laude, ATR's chief executive.

After notching up orders from the likes of Air New Zealand, Beryaya Air, Maldivian, and Mandarin Airlines during 2023, the Toulouse-based airframer is eyeing opportunities in India, Indonesia, Malaysia, the Philippines, New Zealand, and Japan, with the latter's environmental rules and consumer attitudes making ATR's low-emission message particularly attractive, she says.

ATR is not exhibiting aircraft at this year's show but does expect to be talking to potential new customers. It comes after the manufacturer released its results for 2023 on 14 February, revealing that it fell short of its delivery target for 2023. However, it hailed the tally of 36 aircraft – a 44% increase over the previous year – as "a big achievement".

Laude, the first woman to lead ATR, had predicted in September last year that the Toulouse-based business would ship at least 40 turboprops, and blamed the shortfall on lingering supplier challenges and unforeseen problems around the financing of two aircraft at the end of the year.

She says that two aircraft expected to be included in December were handed over early in the new year, and that ATR would deliver "more than 40" ATR 42-600s and 72-600s in 2024.

She said that after a difficult post-pandemic period, where annual deliveries shrunk to 31 units in 2021 and just 25 aircraft in 2022, the Airbus-Leonardo joint venture was "back on track" and that 2024 would be "a year of stabilization, paving the way for future growth".

With 40 net orders in 2023, a 53% rise from the previous year, Laude says ATR's problem is not lack of market demand. Instead, raw material and component shortages are hampering the manufacturer's attempts to ramp up.

"We expect it to continue to be intense during 2024, which is why we are being quite cautious on output, but we would hope to start to normalise by the end of the year," she says.

ATR says it achieved almost $1.2 billion in revenues for the first time since the pandemic, with services revenue at a record $400 million.

ATR

Laude: Asia-Pacific is where we really see things happening

Laude denies that an active market in used ATRs – there were close to 100 transactions in 2023 – is a threat to new aircraft sales. "These are different customers. We see this positively," she says.

ATR in December resumed flight testing of a short take-off and landing (STOL) variant of the ATR 42-600 – now in its production design configuration – that it hopes to have certificated by June 2025. The variant was launched in 2019, and ATR had originally hoped to have the version certificated by 2022.

The company has orders for 21 ATR 42-600S aircraft, but Laude expects this to increase once flight test data is published. "Some customers are waiting for performance figures before they commit, which is understandable," she says. "We expect more orders in the second half of 2024."

Airlines in the region that have already publicly committed to the ATR 42-600S include PNG Air, which placed orders for three in 2020, and Air Tahiti, which was confirmed as launch operator at the 2019 Paris air show. Air Tahiti said its two ATR 42-600S examples would allow it to access destinations with short runways such as Maupiti at full load capacity.

PNG Air, meanwhile, will replace its fleet of 36-seat de Havilland Dash 8-100s with its three ATR 42-600S aircraft, which can land on 800m runways with 40 passengers.

An Asian carrier, Berjaya Air of Malaysia, last year became the launch operator of another new configuration – ATR's HighLine all-premium cabin design, one of a series of novel interior concepts unveiled at June's Aircraft Interiors show in Hamburg. It signed a heads of agreement for two aircraft.

Berjaya's cabin will be fitted in a 1-1 layout and will be delivered in 2025 and 2026. The airline, based at Sultan Abdul Aziz Shah airport in Subang, plans to use the aircraft to serve resorts run by Beryaya Group.

Another landmark in the region for ATR during 2023 was the certification by the Japanese Civil Aviation Authority of its Singapore-based ATR 72-600 full flight simulator, something the company says will "enable us to better serve our Japanese customers, offering them additional capability to train their pilots as the country is steadily growing its ATR fleet".

Countries around the world are taking an interest in this transformative type of weapon as they confront new modern warfare challenges

Loitering munitions – the battlefield game changer

Loitering munitions (LM) have emerged as a disruptive new weapons category following numerous deployments in recent conflicts. They set the ground for the modern battlefield, allowing for critical flexibility at the tip of the operator's fingers. As a result, armies around the world have taken interest in this weapons category and are stocking up.

Unlike other precision guided munitions which require the exact location of a target in advance, loitering munitions may be launched to a target at an unknown location, and can hover or "loiter" to acquire the target.

LMs provide the added benefit of an attack weapon which also conducts intelligence, surveillance, and reconnaissance (ISR) all while being launched at a considerable distance from the ultimate strike point. Once a target is acquired, the "man-in-the-loop" commands fire. Having LMs as part of an army's arsenal provides a quick response to much needed firepower for time-critical targets.

Loitering munitions are often described as "hunters on the prowl", patiently watching and waiting for the target to reveal itself, then delivering the lethal blow at the right time. These weapons are designed to operate in complex arenas and detect hidden stationary targets, and targets moving on foot, in vehicles, or at sea. Having an LM in the sky with the relevant sensors is the most efficient way to surprise attack enemy targets and locate additional targets. IAI's family of loitering munitions is the ideal match for time-sensitive and elusive targets.

IAI

ROTEM, a VTOL loitering munition, has proven effective in various combat zones since 2019

A Legacy of loitering munitions

In the 1980s, IAI was the first to invent the loitering munition weapons class, with the advent of the Harpy – often times dubbed the "kamikaze drone". Designed with an anti-radiation seeker for the autonomous Suppression of Enemy Air Defense (SEAD) missions, the Harpy was instrumental in replacing combat aircraft in very dangerous missions as it took out enemy defense radars.

The Harop, which evolved from the Harpy, carries an electro-optical sensor allowing an operator to remain in-the-loop and re-route to different targets. The Harop has proven to be a major asset in wars around the world. The Harop operates in a concept of "shoot first, then seek a target," in which no preliminary intelligence is needed. This capability makes it a cost-effective weapon against high-value, time-sensitive targets.

IAI

The Harop's electro-optical sensor allows an operator to remain in-the-loop and re-route to different targets

Harop was proven in combat, providing tremendous operational impact in pursuing a wide range of deep-strike missions.

Operating under harsh battlefield conditions and electronic countermeasures that prevented other loitering munition systems from taking off from their launchers, hundreds of Harop LMs proved highly effective in combat, with a 98% mission success rate.

An additional member to IAI's LM family is the tactical series ROTEM, designed for special forces and other tactical units. ROTEM, a vertical-takeoff-and-landing (VTOL) loitering munition, has proven effective in various combat zones since 2019. Designed for deployment by an individual soldier at the unit level, ROTEM is carried in a backpack by one soldier and is effective up to a range of 10 kilometers. ROTEM is an affordable solution for operators that require ISR to gain situational awareness, all while seeing beyond line of sight, and having the immediate ability to strike the enemy as soon as targets appear.

Like alert hunters, IAI's loitering munitions ensure that navy, army, and special operations can monitor the battlespace, loiter, and then strike targets as soon as they expose themselves. With a growing demand from armed forces worldwide, IAI's loitering munitions dominate the battlefield with unmatched and decisive advantages, overcoming intelligence gaps, and eliminating elusive disappearing enemies.

Comac was absent from the past two Singapore shows, but with the debut of its C919, the Chinese airframer is returning with a big statement of intent

China's challenger

Alfred Chua

Matt Leung/Shutterstock

In mid-December 2023, the aircraft visited Hong Kong as part of a week-long showcase

The Comac C919's first international appearance at the 2024 Singapore air show caps off an eventful year for the Chinese airframer, as it turns its eye towards growing its presence globally.

It is the first time the narrowbody jet has been displayed overseas after it was certificated by Chinese regulators in November 2022. In some ways, it also marks the coming-of-age of the programme China hopes can take on the Airbus-Boeing duopoly in the narrowbody market.

Singapore is the second location outside of Mainland China to receive the C919. In mid-December 2023, the aircraft visited Hong Kong as part of a week-long showcase.

The C919 – together with the ARJ21 regional jet – exhibited at Hong Kong international airport between 12 and 17 December. The C919's demonstration flight over downtown Victoria Harbour took place on 16 December.

Indeed, the showing at Singapore is markedly different from under a year ago at the Paris air show, where Comac kept a lower profile.

At that show in June 2023, the airframer said it had intended to "undertake targeted market promotion activities... and forge connections with potential customers". It had no aircraft on static display – understandable given the show's larger focus on Western aerospace companies – nor were there any press briefings held.

In Singapore, Comac's showing also comes four years after the Covid-19 pandemic, which saw Chinese aerospace firms abruptly pull out of the 2020 edition and remain absent in 2022.

The Civil Aviation Administration of China has also disclosed its plans to promote Comac's aircraft programmes to the international market – further underscoring Beijing's commitment to its indigenous aerospace industry.

One target outlined by the CAAC is getting the C919 certificated by European regulators. It did not elaborate further but reiterates that the ultimate goal is to "promote homegrown aircraft programmes abroad".

When it clinched its type certificate in 2022, Beijing hailed the moment as a breakthrough. Yet, it would take several months later – and reportedly a few technical delays – before it would actually enter commercial service with launch customer China Eastern Airlines.

The first of China Eastern's five C919s entered service on 28 May 2023, in an event Comac called a "new beginning" for the Chinese aerospace industry.

China Eastern now operates four C919s, operating on a trio of domestic destinations – Shanghai Hongqiao, Beijing Daxing and Chengdu. The SkyTeam carrier in September 2023 expanded its commitments for the type, signing for an additional 100 jets.

"As China Eastern's C919 fleet continues to grow, China Eastern will continue to act as a 'pioneer' and work with all parties to explore commercial...opportunities... optimise and improve operations, and [launch] new C919 routes," the airline states.

Other than China Eastern, Hainan Airlines group carriers Suparna Airlines and Urumqi Air are listed as customers for the programme.

The two carriers first disclosed commitments for 60 C919s in April, in a 100-aircraft order that included 40 ARJ21 regional jets. Suparna firmed up its leases for 30 examples in July.

Comac now holds over 1,000 commitments for the C919, all of which are for the Chinese market. Yet, the airframer might already be inching closer to its first international commitment.

China-backed start-up GallopAir of Brunei has indicated it could take C919s in the future when it disclosed intentions to order up to 30 Chinese aircraft in September.

Comac is also looking to develop different variants of the C919. At the Shanghai International Airshow in November 2023, it teased two new versions of the narrowbody: a stretched version, and a second shortened variant, purportedly meant for high-altitude operations.

Technical specifications of the two variants were not publicly available at the time, though it would be several weeks later when Comac signed a cooperation agreement with Tibet Airlines covering the development of the high-altitude variant. Tibet Airlines would only state that the agreement covers "all-round strategic cooperation", but did not elaborate further.

Comac's other programmes also hit significant milestones, after a dormant period amid China's strict pandemic curbs. The ARJ21 regional jet, for example, entered service with its first foreign customer – TransNusa Airlines in Indonesia.

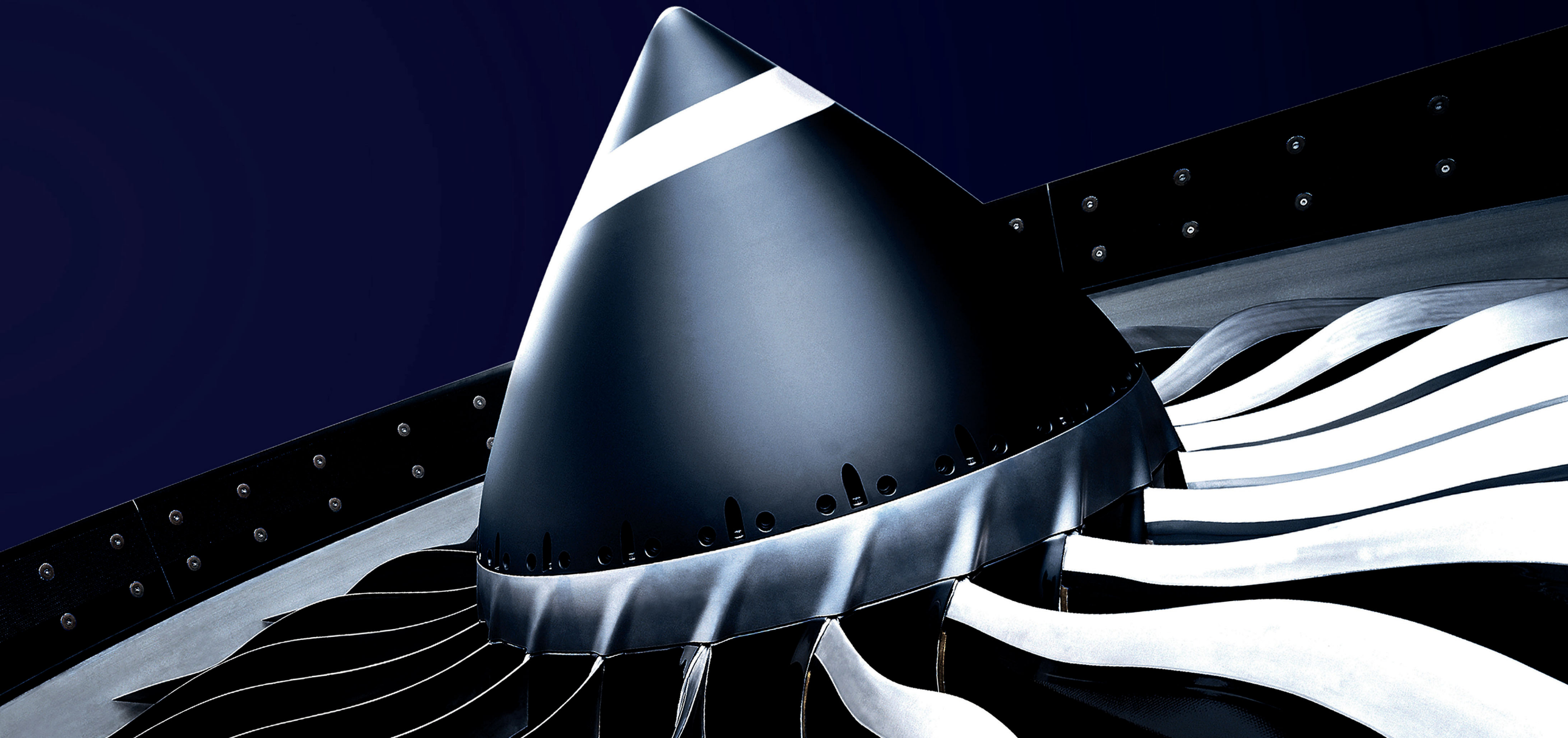
Indeed, the C919's recent milestones, coupled with the recent safety and reliability issues at rival Boeing, has had several quarters wondering if the C919 is an alternative to be taken seriously by the wider aviation sector.

That idea – once seen as far-fetched – seems very plausible now, with the string of positive developments from Comac. The airframer's week-long outing in Singapore is perhaps the start.

The future is our starting point

Every day, we're working to help move the world forward. Today, and for generations to come. The future of flight starts now.

GE Aerospace



We review how the city-state and its regional neighbours are bolstering their fleets to deter expansionist China

Domestic defences

Republic of Singapore Air Force

F-15SGs represent the mainstay of the Republic of Singapore Air Force's fleet

Greg Waldron

In the *Harry Potter* fantasy series characters are reluctant to name the chief villain. When they refer to him it is often as "He-Who-Must-Not-Be-Named" or "You-Know-Who".

Similarly, Southeast Asian governments are reluctant to name – or even allude to – the regional Voldemort that is pushing them to take air power more seriously.

But although the name 'China' is unlikely to pass the lips of regional air chiefs and defence ministers in public, Beijing's massive defence build-up is contributing to a sense of urgency with combat aircraft procurement in the region. Air forces are ordering new equipment and eyeing more potent capabilities.

Another spur is Russia's war against Ukraine. Southeast Asian governments, having enjoyed decades of peaceful economic growth, have received a stark reminder that major conventional wars can and do still happen.

Although the Chinese mainland lies well to the north of Southeast Asia, Beijing claims virtually the entire South China Sea – in contravention of international law. Despite assurances that it would not militarise the strategic body of water, it has built air bases on Fiery Cross Reef and Subi Reef in the Spratly Islands, as well as two in the Paracel Islands, which are contested with Vietnam.

These strategic islands, as well as Beijing's ambitions to build a fleet of aircraft carriers, put Southeast Asia within easy range of its vast aerial armada.

"The PRC's [People's Republic of China's] outposts on the Spratly Islands are capable of supporting military operations, including advanced weapon systems, and have supported non-combat aircraft," the US Department of Defense wrote in a recent report to Congress.

Regular harassment

While Beijing has yet to make a full-scale deployment of combat aircraft to the South China Sea air bases, its assets regularly harass foreign aircraft operating in international airspace over the contested waterway.

As the main victim of China's expansion, the Philippines has been the most vocal about its concerns, but other countries are more wary of Beijing's ire.

China is, by a considerable margin, the region's biggest trading partner, giving it profound economic leverage. Southeast Asian governments take considerable pains not to offend Beijing.

Still, a greater emphasis on fighter procurement shows that governments are worried.

Malcolm Davis, senior analyst, defence strategy and capability at the Australian Strategic Policy Institute, has been vocal about the security challenge that Beijing represents.

"In terms of accelerating the growth of fighter capability acquisition, I'd argue it would have to be the rapid growth and expansion of the People's Liberation Army Air Force [PLAAF] and People's Liberation Army Navy Air Force [PLANAF] and China's more assertive posture and actions in the South China Sea," says Davis.

"There are no other security challenges in the region or facing Southeast Asia that would warrant a more ambitious growth of national air forces. Another contributing factor could be the need to replace older generation combat aircraft, and a degree of national prestige would factor into that policy choice as well."

The Southeast Asian nation most serious about defence is the region's business and financial hub, Singapore. While the city-state has good relations with its neighbours and with Beijing, it also has close defence ties with the USA and the broader Western world. By a considerable margin Singapore possesses Southeast Asia's most advanced air force.

The mainstay of the Republic of Singapore Air Force (RSAF) fleet is the Boeing F-15SG. Officially the country admits to operating 24 examples, but it is understood that 40 are in service, including examples based in the USA.

Cirium fleets data suggests that the average age of Singapore's F-15SGs is 11.8 years. While Singapore has not announced any plans

for upgrades, it is probably observing advances with the F-15EX, the much-upgraded version of the F-15 that is poised to enter service with the US Air Force.

Indonesia has confirmed orders for 42 Rafales, in major boost for its air force

Dassault Aviation

Upgrade path

Singapore is also in the process of upgrading about 60 Lockheed Martin F-16C/Ds to the F-16V standard, with the first upgraded example delivered in 2021.

The upgraded F-16 features a new active electronically scanned array (AESA) radar in the form of the Northrop Grumman APG-83. It also has new mission computers, updated avionics, and the Link 16 datalink.

The upgraded type made its debut at the Forging Sabre Exercise in the USA in September 2023. Pilots interviewed by the Ministry of Defence's in-house publication, *Pioneer*, said that the improvements make the aircraft far more lethal.

Singapore is also set to become the first Southeast Asian nation to operate a stealth aircraft through its planned acquisition of 12 Lockheed F-35Bs. Singapore likely opted for the short-take off and vertical landing version of the F-35 owing to the country's small geographic size and lack of large air bases. The first four examples will be delivered in 2026 to support training.

The aircraft will be co-located with upgraded F-16Vs at Ebbing Air National Guard Base in Arkansas, allowing the RSAF to experiment with operating the two types together.

Finally, Singapore's fighter fleet has invaluable back-up in the form of key support types, specifically six Airbus Defence & Space A330 Multi-Role Tanker Transports (MRTTs) and four Gulfstream G550 airborne early warning and control (AEW&C) aircraft. According to the defence ministry, the G550-AEW's AESA radar – the Israel Aerospace Industries EL/W-2085 – has a detection range in excess of 174nm (322km).

While Singapore has been assiduous about maintaining and advancing air combat capabilities, the same cannot be said of its northern neighbour, Malaysia.

While Kuala Lumpur has tended to dither about defence procurements, it received a rude jolt in June 2021, when 16 PLAAF Xian Y-20 and Ilyushin Il-76 strategic transports flew an unprecedented sortie deep into the South China Sea region. The large formation flew southwards toward the coast of Borneo, approaching to within 60nm of Malaysian territory. Royal Malaysian Air Force (RMAF) BAE Systems Hawk 208 ground-attack aircraft intercepted the intruders.

In a report into the event, analyst Euan Graham offered a few possibilities. Beijing may have wanted to give Malaysia pause about exploiting new offshore oil resources in Kuala Lumpur's exclusive economic zone. He also speculates that Beijing may have been conducting airlift training, and possibly probing Malaysia's air defence capabilities.

Sustainment issues

On paper the RMAF is impressive, with a fleet of 18 Sukhoi Su-30MKMs. Although these have suffered sustainment issues over the years, air force officials and local industry have said that the type can be kept airworthy.

Aerospace Technology Systems – a locally controlled joint venture between National Aerospace & Defence Industry and Russia's RAC MiG and Rosoboronexport – has conducted service life extension work for the fleet.

Kuala Lumpur also operates eight Boeing F/A-18D Hornets. It acquired a number of spares and other equipment when the Royal Australian Air Force retired its F/A-18A/Bs in favour of the F-35A. In 2022,

Malaysian defence minister Hishamuddin Hussein said that MYR2.4 billion ($687 million) would be invested on Hornet sustainment in 2023, in co-operation with the USA.

In the late 2000s and early 2010s Malaysia had an ambition to replace its now retired MiG-29s. It looked at a number of advanced fighters under its Multi-Role Combat Aircraft requirement. After years of delay, this was eventually dropped and replaced with a watered-down requirement for a Trainer-Light Combat Aircraft, or FLIR-LCA.

Having observed the glacial pace of Malaysian defence procurement, sceptics were surprised in February 2023 when the Korea Aerospace Industries (KAI) FA-50 was selected for FLIR-LCA. A contract was signed at the Langkawi International Maritime and Aerospace exhibition last May covering 18 aircraft, with deliveries starting in 2026. Long-term plans call for an additional 18 examples to be obtained.

KAI recently added Kuala Lumpur as a customer for its light-attack FA-50

US Air Force

While FLIR-LCA is a step in the right direction, Malaysia lacks vital support assets, such as an AEW&C aircraft or dedicated tankers. This limits the capability afforded by its fighters.

Indonesia, Southeast Asia's largest country by population, is also nervous about China – and is investing in its air combat capabilities.

In February 2022, shortly before the last iteration of the Singapore air show, Jakarta committed to 42 Dassault Aviation Rafales. The €8.1 billion ($8.7 billion) package also includes crew training, logistical support, base modernisation and a training centre with two full-mission simulators.

On 8 January, Jakarta activated an order for its third and final tranche of 18 aircraft, adding to commitments concluded in 2022 and 2023.

The Rafales will offer a significant capability upgrade to Indonesia's current combat fleet, the mainstay of which are 11 Su-30MK2s and five Su-27SK/SKMs with an average age of 14 years. Jakarta also operates 32 F-16s with an average age of over 36 years. This fleet comprises nine F-16A/Bs, which are subject to a mid-life upgrade programme, and 23 C/Ds.

In addition, Jakarta has 22 Hawk 209s and 13 Embraer EMB-314 Super Tucanos earmarked for the ground-attack mission.

Prior to the Rafale buy, Indonesian officials had suggested that the choice was between the French type and the F-15EX. Simultaneously with the Rafale order, the US government cleared Indonesia for the possible acquisition of 36 F-15EXs for up to $13.9 billion.

An Indonesian F-15EX buy appears to have traction. In August 2023, Jakarta entered a memorandum of understanding (MoU) with Boeing about the acquisition of up to 24 of the type during a visit by defence minister Prabowo Subianto to the USA. The pact was signed at Boeing's production site in St. Louis, Missouri.

"We are pleased to announce our commitment to procure the critical F-15EX fighter for Indonesia," said Subianto. "This state-of-the-art fighter will protect and secure our nation

The Royal Thai Air Force operates a fleet of upgraded but ageing F-16A/Bs

Commonwealth of Australia

with its advanced capabilities."

Finalising the deal is contingent on the blessings of the US government.

Jakarta has also flirted with the acquisition of 12 surplus Dassault Mirage 2000-5s, via a proposed $735 million arrangement with Qatar. The fighters had been set to arrive in 2025 to fill a capability gap opened by the retirement of Northrop F-5s and the end of service life for Hawk 100/200s. In February, however, Indonesia's defence ministry said the deal had been cancelled..

Sanctions threat

Jakarta formerly had plans to replace the F-5s with Su-35s, but the threat of US sanctions under Washington DC's Countering America's Adversaries Through Sanctions Act legislation killed the potential acquisition.

As with Malaysia, Indonesia is light on support assets for its fighter fleet. It lacks a dedicated AEW&C capability, but could be close to ordering the A330 MRTT. In September 2023, the nation's defence ministry indicated that four Airbus types are in "effective contract".

While Airbus Helicopters' AS565 and H225M are already in service and Jakarta has a firm order for two A400M tactical transports, no formal commitment for the A330 tanker/transport has been announced. Airbus, for its part, indicated that Indonesia has selected the MRTT, but suggested that details still need to be finalised.

The Rafale order and F-15EX MoU raised eyebrows in South Korea, where Jakarta is a 20% partner in KAI's KF-21 development programme. Although Indonesian officials periodically state their commitment to the twin-engined fighter, persistent media reports suggest that Jakarta is chronically behind on payments.

Jakarta's clear interest in expensive, high-end western fighters is a further cause for doubt about its commitment to the KF-21. In addition, two Indonesians working on the programme in South Korea are being investigating amid allegations that they used a USB drive to steal technology related to the KF-21. FlightGlobal also understands that there is dissatisfaction in Indonesia with the level of technology transfer that South Korea is willing to provide.

Davis feels that old patterns of rather ad hoc procurements are still a challenge in the region.

"As is usual with Southeast Asian approaches to capability development, it is likely to be lacking in coherency in terms of how Southeast Asian air forces can maintain multiple types of aircraft – usually bought in small numbers – and ensure they are an effective capability," he says.

"This is particularly the case with states such as Indonesia and Malaysia. Clearly Singapore gets things right, and I think the Philippines is taking defence much more seriously in the face of challenges from China," he adds.

Despite facing a daunting security challenge from Beijing, the Philippines has been slow to reconstitute its fast jet capability, operating just 12 FA-50s. Still, this is a big improvement: after retiring its F-5s in 2004, it lacked a fast jet capability until the FA-50s started arriving in 2015. Manila also operates six Super Tucanos.

For years the Philippines has been considering a fighter buy, with the Saab Gripen and F-16 mooted as potential candidates. An F-16 buy appears more likely: last April, the USA said discussions were under way for "a fleet of multi-role fighter aircraft for the Philippine air force" – reportedly to total a dozen.

Other Southeast Asian states, namely Thailand and Vietnam, are also assessing their air power needs.

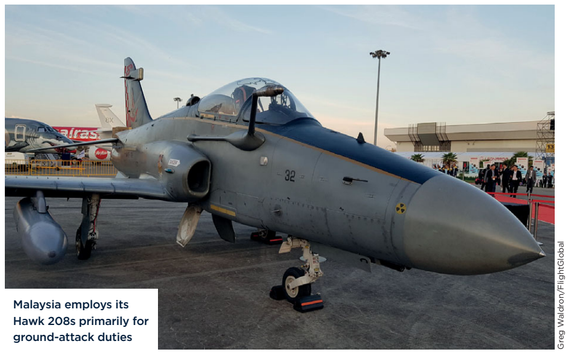
Bangkok was interested in the F-35, but the US government reportedly denied its request and the Thai government has other funding priorities.

The Royal Thai Air Force operates 112 fixed-wing combat aircraft, the majority of which are ageing F-16A/Bs and F-5E/Fs, although both types have been subject to modernisation work. The service also operates 11 Gripen C/Ds, and 18 Dassault/Dornier Alpha Jets in the ground-attack role.

Thailand is the only Southeast Asian nation apart from Singapore to support its fighter fleet with an AEW&C capability, in the form of two Erieye radar-equipped Saab 340Bs.

Vietnam, also under pressure from China, faces the challenge of relying on a distracted Russia for its combat aircraft fleet, which comprises 79 aircraft. The Vietnam People's Air Force operates 35 Su-30MK2Vs, six Su-27SKs and five Su-27UBK trainers, while its ground-attack capability resides in 33 Su-22s.

Hanoi could, however, look to the west for its next fighter investment. In September 2023, Reuters reported that US President Joe Biden had raised the possibility of selling F-16s to Vietnam following a summit in Hanoi. However, it could be some years before any such deal comes to fruition.



Malaysia employs its Hawk 208s primarily for ground-attack duties

Greg Waldron/FlightGlobal

Step change

While the activity around regional fighter fleets is definitely a step change from the 2000s and 2010s, it is debatable whether China can truly be deterred.

"In terms of missions, clearly the Southeast Asian states want a minimal air defence capability to deter lower-level threats by China, and to protect their airspace and offshore territories," says Davis.

"Whether their planned acquisitions will actually deliver such a deterrent capability is quite another thing, and goes back to the individual state's ability to sustain and operate the types of aircraft they are buying. But all of these acquisitions are likely to be piecemeal capability – and certainly won't be a huge challenge to a large PLAAF/PLANAF capability."

Asia-Pacific carriers have seen a slower return to pre-pandemic levels of passenger demand than in other regions, but positive signs are at last beginning to emerge

Revelling in recovery

Asian carriers are expected to collectively make a $1.1 billion profit in 2024

Air Teamimages

Alfred Chua

The mood at the Association of Asia Pacific Airlines' (AAPA's) annual Assembly of Presidents, held in Singapore last November, could perhaps be described as jubilant.

Members including Cathay Pacific, Singapore Airlines (SIA) and Thai Airways International all returned to profitability, on the back of a strong post-pandemic recovery.

SIA had several consecutive quarters of profits, almost all of which smashed pre-pandemic records, while Cathay – which had once lagged behind its regional peers – was on track to report its first full-year profit in three years.

Indeed, member airlines – and other Asian carriers at large – expect to make a full pre-pandemic recovery in 2024, with some already seeing it in parts of their network.

IATA passenger traffic data for November 2023 shows Asia-Pacific carriers led other regions in year-on-year growth. However, the region still lagged behind in achieving full recovery, especially in international travel demand.

"In particular, Asia-Pacific carriers' international demand is 19.5% behind 2019," says IATA director general Willie Walsh. "This could reflect the late lifting of [Covid-19] restrictions in parts of the region, as well as commercial developments and political tensions."

The industry body adds in its forecast for 2024 that Asian carriers are expected to collectively swing to a $1.1 billion profit, from a "small loss" of around $100 million in 2023.

"While some of the region's main domestic markets (China, Australia and India) recovered quickly from the pandemic, international travel to/from the region was subdued as China only eliminated the last of its international travel restrictions in mid-2023," IATA says.

Separately, AAPA data for October 2023 shows the region's carriers doubling their passenger volumes year on year, to 25.3 million. That figure is around 80.5% of pre-pandemic 2019's performance.

The association, which tracks traffic data from 40 Asian carriers, says a "healthy travel appetite" – especially in the short-haul market – boosted international passenger traffic. It also notes that the near-term prospects for Asian carriers remain positive, even amid uncertainty in the global macro-economic and geopolitical environment.

Indeed, it was strong travel demand – coupled with an early head-start in capacity injection before the recovery's emergence in 2022 – that buoyed SIA to record profits quarter after quarter.

In its half-year results for the period to 30 September 2023, SIA Group posted a 26% jump in operating profit. It expects full capacity recovery in 2024.

The Indian airline sector also has seen significant growth over the past year, led by the country's two largest carriers: IndiGo, and Air India. More significantly, Air India is undergoing what some have called "the largest corporate turnaround in history", following its successful privatisation under Tata Sons in 2022.

Both carriers placed record orders in 2023 – Air India for more than 400 Airbus and Boeing aircraft, and months later, IndiGo for 500 Airbus jets.

Merger plans

Air India chief executive Campbell Wilson says it is taking "one new aircraft every six days" from its large orderbook, and will continue to do so for the next two years. It is also working through a merger with compatriot Vistara, which is also owned by Tata.

Speaking at the AAPA meeting, Cathay chief executive Ronald Lam contended that while the carrier was "one of the hardest-hit airlines" from the pandemic, it is making progress.

"Although we started late... so far we've been catching up very fast," he says, outlining the "two missions" Cathay will focus on in 2024: rebuilding its network, and "catching up on our investments".

The airline on 8 December ordered six Airbus A350 freighters as part of its cargo fleet renewal plans. It also has kick-started its medium-haul fleet renewal project, following a commitment for more A321neos months earlier.

Yet, for all the relief that the darkest of the pandemic is but an episode of the past, airline leaders are very well-aware that more challenges loom ahead, and none more so than supply chain woes.

Thai Airways chief executive Chai Eamsiri sums up how deep the impact can be.

The airline is in the process of rebuilding its operations after a business restructuring which has seen its fleet size significantly cut back. As it returns stored aircraft to service and inducts second-hand jets to boost capacity, Eamsiri concedes there are many challenges.

"Some of the service providers... laid off their staff during the pandemic, so that means they are starting from scratch again," he says. As an example, he notes that it takes about six months to modify "just the logo on the screen" of an in-flight entertainment system.

And then there are the lavatories. Noting that new electronic contactless taps are a convenient amenity, Eamsiri says that when bringing aircraft back to service, "we could not find the spare parts".

"We were thinking, maybe we should just [install] mechanical taps... it's more reliable, and easier to maintain," he quips.

Wilson also alludes to supply chain woes, especially when Air India returned aircraft that had been in long-term storage. "[Some] of those aircraft have individually required 4-5,000 parts to get back up into the air," he says.

"It has been a long, painful journey for us, to get these aircraft back to [working condition], and that has not been helped by supply chain issues... it's not fun."

Reliability challenges

There are also engine reliability and aircraft delivery challenges facing AAPA carriers. Delivery delays – and reliability issues on new-generation engines – have come to a head as the airlines regain momentum.

Malaysia Airlines, for instance, faced delays in taking delivery of its new Boeing 737 Max 8s. The type was supposed to enter service in late August 2023, but this was pushed back until mid-November.

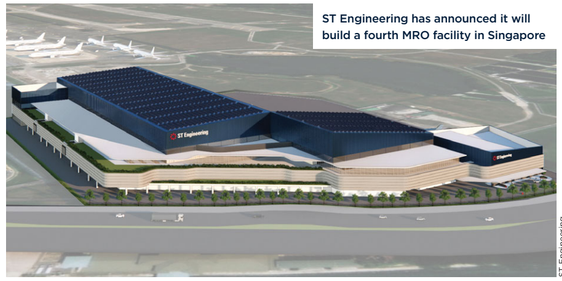
"The global supply chain network has been disrupted heavily, which impacts both manufacturing as well as the logistics," says Izham Ismail, chief executive of parent Malaysia Aviation Group. "Lead time, freight charges, schedules and route have been so volatile in the past two years; that led to the delay in receiving our 737-8s, consequently impacting our projected network expansion."

Scoot, the low-cost unit of SIA, also has had to ground two A320neo-family narrowbodies because of issues with Pratt & Whitney's PW1100G engine which have affected operators globally.

Chief executive Leslie Thng tells FlightGlobal Scoot "has some flexibility" in its fleet, including options to extend the leases on older aircraft, as well as investing in spare engines.

Air India is taking delivery of a new aircraft every six days

Urbanarsport/NurPhoto/Shutterstock



ST Engineering has announced it will build a fourth MRO facility in Singapore

ST Engineering

But other operators like Air New Zealand and Cebu Pacific have had to make operational cuts into 2024 – and trimmed their fleet and capacity growth targets – as a result of the engine issues.

Meanwhile, Philippine Airlines chief executive Stanley Ng says a bigger challenge for the carrier is that of airport infrastructure, especially at its hub airport of Manila.

"[Infrastructure] is something we have to work closely with... [the] government [and] private-public partnerships to increase the slots," Ng says.

A similar picture plays out in the Asian MRO sector, where recovery has come head to head with supply chain challenges. MRO providers, like those in Singapore, have seen steady demand as operators emerge from the pandemic, leading to big expansion plans.

ST Engineering in September 2023 announced it would be building its fourth airframe MRO facility in Singapore, which will also be its newest facility in the city-state in more than 10 years.

Expansion plans

Amid its overseas expansion plans, which include facilities in China and the USA, ST Engineering commercial aerospace chief Jeffrey Lam notes that "there is still a long-term future for airframe maintenance in Singapore", despite challenges such as land constraints.

"[The Singapore] workforce is very good, competent and competitive... [so] Singapore obviously is a hub with a strong aerospace industry presence... which supports the whole industry," Lam says.

Another Singapore-based company, SIA Engineering, has expanded its regional presence through shareholding acquisitions of aerospace companies, including Malaysia's Pos Aviation Engineering Services, as well as Singapore-based JAMCO Aero Design & Engineering.

Malaysia-based Asia Digital Engineering, a sister unit to low-cost group AirAsia, is expanding hangar capacity at its Kuala Lumpur headquarters, with construction slated to complete this year.

Like their airline compatriots, the MRO providers also acknowledge there are "teething issues" – as one executive puts it – lingering around.

At an industry event last September, leaders from Asian MRO providers flagged the challenges surrounding manpower and an acute shortage of aircraft parts.

"There should be more options in the supply chain, rather than a sole supplier," said ADE chief executive Mahesh Kumar. "[This] will reduce the burden on any single OEM... any single supplier, because it has become a bottleneck now."

Joshua Ng, a director at Alton Aviation Consultancy, says the supply chain issues are likely to normalise and ease up from 2025, "as manufacturers take steps to alleviate the situation, including turning to nearshoring and tackling workforce recruitment and retention".

Still, he believes the ongoing issues around supply chain and delivery bottlenecks are a silver lining for MRO providers in the region.

Delayed retirements

"[Airlines] are delaying retirement of older aircraft to mitigate new aircraft delivery shortages. The delayed retirement of older aircraft will drive near-term demand for MRO as older aircraft have higher maintenance needs," Ng tells FlightGlobal.

"MRO supply chain challenges are expected to ease ahead of production-related supply chain issues. Production rates will likely be the slowest to recover," he adds.

The issue of manpower has also been flagged by MRO providers, but it is a mixed picture across the region, with some markets – like Indonesia and the Philippines – less affected owing to younger workforces.

Ng concurs: "Aviation career and compensation prospects are still well regarded in the region, and there has been less issue recruiting new talent and retaining existing talent in the APAC [Asia-Pacific] MRO workforce."

The idea of 'nearshoring' – where airlines move their maintenance works nearer to reduce costs and supply chain risks – is an opportunity for the region's MRO firms, says Ng.

This, coupled with forecasts for large fleet growth among operators in Southeast Asia, is good news for Singapore-based MRO providers.

"Singapore has established itself as an MRO hub for the region, anchored by two large local MROs... [and] complemented by the presence of many OEMs establishing their regional MRO centres in the country, and increasingly, aerospace manufacturing as well," says Ng.

He notes that while there are "numerous uncertainties" in the near-term, the "long-term trajectories" for the MRO sector remain positive, thanks to a resilience in air traffic growth.

Mara Motherway, vice-president, strategy & business development, Lockheed Martin Aeronautics, describes why the F-35 and F-16 are vital to the security of allies in Asia-Pacific, and what future variants offer

Staying ahead of the game

Q The F-35 has been adopted by a number of Asia-Pacific air forces, including Singapore. Can you outline how the aircraft is particularly relevant amid geopolitical tensions in the region?

A Adversaries in the Indo-Pacific are rapidly developing their military technologies, including hypersonics and nuclear capabilities, driving our urgent need to develop and deliver new security solutions. The F-35 was designed to rise to these challenges and evolve to meet the needs of the mission. The jet continues to demonstrate combat performance and operational reliability, with 10 nations operating the F-35 on home soil.

Block upgrades that provide additional capabilities position the F-35 to maintain relevance through generations of air power. The next evolution of F-35 introduces open mission systems architecture, a new integrated core processor with greater computing power, an enhanced panoramic cockpit display, a larger memory unit and other classified capabilities that ensure it remains ahead of emerging threats for decades to come.

Q How does the F-35 contribute to interoperability among allies?

A With its unmatched situational awareness and survivability, the F-35 acts as a critical solution in the 21st century security environment, with an ability to serve as an edge computer node, source of data, and a hub for integration of multiple manned and unmanned sensors. The collective fleet of F-35s in the region can gather and fuse data to give unprecedented situational awareness to joint forces. This data can be shared across land-based assets, naval systems and other aircraft, enabling communications across domains and among key allies.

Q So far, Japan and Singapore are the only countries in the region that have committed to the F-35B, the short take-off and vertical landing variant of the F-35. Do you see other opportunities for the F-35B in the region?

A The F-35B, one of the three variants of the F-35, offers supersonic speed, radar-evading stealth and short takeoff/vertical landing (STOVL) capability. This jet offers unequaled basing flexibility and advanced network-enabled mission systems that provide unprecedented multi-mission capability across the spectrum of operations.

We ultimately look to the customer to determine which capabilities are most essential with their missions in mind and proudly partner with them to bring the F-35 to their services. With combined US and allied forces, by the year 2035, there will be a permanent presence of more than 300 F-35s in the Indo-Pacific region.

Q The F-35 has two main depots in the region, located in Australia and Japan. Can you describe how these have developed over the years? Are there plans for more depots in the region?

A Since Initial Depot Capability was declared in 2020, Mitsubishi Heavy Industries (MHI) conducts maintenance, repair, overhaul and upgrade (MRO&U) activities for the North Asia region and provides component repair and maintenance for the F-35 fleet. Also in the region, IHI operates an F-135 engine depot in Japan, and the F-35 Asia-Pacific Regional Warehouse will replenish spares for F-35 operations in Australia and the Indo-Pacific. These facilities contribute to F-35 operational resilience for Australia, regional F-35 operators and US forces deployed in the Indo-Pacific.

To ensure the global readiness of the F-35 fleet well into the future, the F-35 Enterprise is standing up MRO&U sites around the globe with ultimate leadership and decision coming from the Joint Program Office. We remain focused on strengthening the repair capacity and supply chain maturity across the program.

Q Moving onto the F-16, which recently celebrated the 50th anniversary of its first flight. Can you give a brief description of the role it has played in Asia-Pacific these last few decades?

A 2024 marks a milestone achievement for not only Lockheed Martin but our partners, suppliers and operators around the world that rely on the critical capabilities of the F-16. When the YF-16 first took flight on 20 January 1974, it introduced a highly agile and cost-effective fighter concept that revolutionised modern air warfare. This foundation of innovation, versatility and affordability has been integral to the F-16's enduring global success over the past five decades as an air dominant, multi-role fighter. In this time, more than 4,500 F-16s have been produced, amassing an impressive 19.5 million flight hours and more than 13 million sorties worldwide.

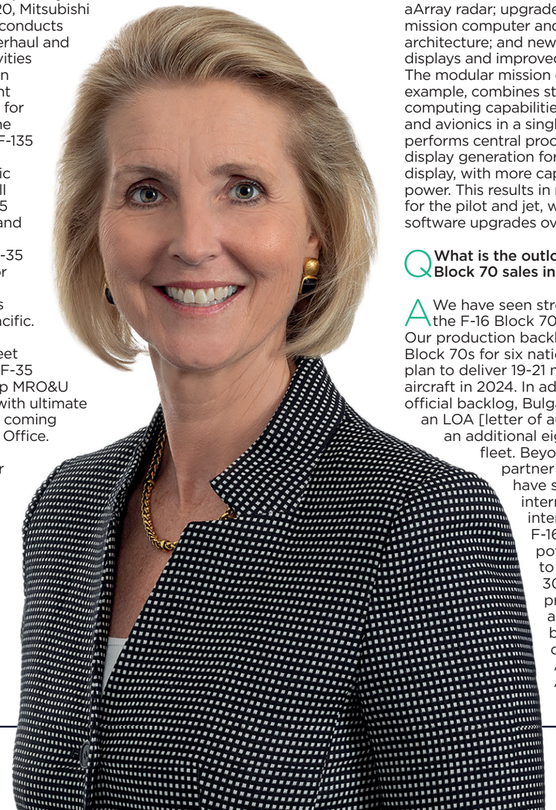
Today, there are 25 countries that operate the F-16 with approximately 3,100 operational F-16s stationed around the world. Many of those operators, including the US Air Force, are based in the Asia-Pacific region. The F-16 has provided advanced 21st century security capabilities to allies to safeguard their borders and airspaces and stay ahead of threats in the region.

Q The F-16 continues to be a mainstay of several air forces in the Asia-Pacific. Can you describe how upgrade programmes can keep the aircraft effective amid the more challenging threat environment?

A The F-16V upgrade package, known as the "Viper" configuration, offers significant capabilities to allies who rely on the platform for peacekeeping within their own borders and those of their partners. These jets include an APG-83 active rlectronically scanned aArray radar; upgraded modular mission computer and avionics architecture; and new cockpit displays and improved controls. The modular mission computer, for example, combines state-of-the-art computing capabilities for weapons and avionics in a single system. It performs central processing and display generation for the head-up display, with more capacity and power. This results in more capability for the pilot and jet, with less costly software upgrades over time.

Q What is the outlook for F-16 Block 70 sales in the region?

A We have seen strong interest in the F-16 Block 70/72 worldwide. Our production backlog is 134 F-16 Block 70s for six nations, and we plan to deliver 19-21 new production aircraft in 2024. In addition to the official backlog, Bulgaria has signed an LOA [letter of authority] for an additional eight jets for its fleet. Beyond our current partner nations, we have seen significant international interest in new F-16s and see potential for up to an additional 300 new production aircraft to be built for countries across Asia, Europe, Africa and the Middle East.



Lockheed Martin

HOW CAN WORKING TOGETHER SET US APART?

For generations, we've been a proud member of the aerospace and defense community throughout the Asia Pacific region. Our thousands of engineers and manufacturing professionals strive to lead the industry forward and make an impact on the communities they call home.

Visit RTX in Hall B and at RTX.com/WeAreRTX

RTX

COLLINS AEROSPACE | PRATT & WHITNEY | RAYTHEON