

Issue

3

Thursday
17 February 2022

FLIGHT DAILY NEWS



With distribution supported by

SINGAPORE AIRSHOW 2022
 WHERE AVIATION'S FINEST MEET • 15-18 Feb

Only way is up



Sharing a ride:
Fernandes
and Slattery

Boost for fast-rising urban air mobility market as Vertical and Embraer's Eve secure major Asia-Pacific deals at the show

Dominic Perry & Alfred Chua

Urban air mobility developers were the big winners at the Singapore air show yesterday, as deals were signed for nearly 200 aircraft, including with a new ride-sharing business being created by AirAsia's parent company.

Tony Fernandes, chief executive of Capital A, was in the city to seal an agreement with lessor Avolon for at least 100 examples of Vertical Aerospace's VX4 electric vertical take-off and landing (eVTOL) aircraft.

The aircraft – the first of which could enter service as early as 2025 – will operate under AirAsia's ride-hailing platform and will make the carrier the first Southeast Asian operator of the type.

Avolon, which has orders for 500 VX4s, and AirAsia will work to get the aircraft certificated in key markets, including Malaysia, and research potential opportunities and infrastructure requirements.

As well as being a customer for the VX4, Avolon boss Domhnall Slattery is also the company's chairman.

Avolon's investment and

innovation unit Avolon-e will also work with AirAsia to commercialise eVTOL aircraft operations and “develop an industry-leading urban air mobility platform in Southeast Asia”.

Fernandes says he is “optimistic” about getting the regulatory green-light for operations, including from the Malaysian civil aviation authorities.

“We will be doing all the groundwork now – 2025 is not many years away, but hopefully Avolon can get the aircraft to us faster,” says Fernandes. Certification of the VX4 in the UK is only expected in 2024.

He adds that the business model for the eVTOL ride-sharing will be pitched between AirAsia's airline operations and road ride-hailing services, touting it as a “natural progression” in the group's wide-ranging expansion beyond its core airlines.

Meanwhile, Embraer scored tentative orders from a trio of Australian operators for up to 90 of the eVTOL aircraft to be produced by its Eve urban air mobility unit.

Western Australia-based helicopter operators Avair and HeliSpirit have signed a letter of intent (LoI) for 50 of the eVTOL aircraft. The pair are both part of Australia's HM Group.

The pact envisages flights commencing by 2026 operated by Avair or HeliSpirit.

In addition, Eve has secured an LoI from Melbourne-based helicopter operator Microflite for 40 eVTOL aircraft.

Those deals build on a previous 50-unit commitment from Sydney Seaplanes, another Australian operator.

Eve and Microflite will use also helicopters to conduct proof of concept work that will help define future eVTOL operations.

“Our partnership with Microflite will see progressive commencement of carbon-neutral operations in the lead-up to first deliveries of zero-emission aircraft in 2026,” says Eve co-chief executive Andre Stein.

“We look forward to learning together and building safe and scalable operations with the support of local communities.”

Eve's eVTOL aircraft will use electrically-powered propellers for vertical take-offs and landings, and two ducted fans for forward flight.

Continued on page 3



Take Control with CMC
Open-Architecture Smart
Multi-Function Display

Visit us at booth C-S93



GO BEYOND

F135

UNRIVALED PERFORMANCE. UNPARALLELED VALUE.

POWERING THE F-35 TO STAY AHEAD OF ANY THREAT – AND COMPLETE EVERY MISSION.

An engineering marvel built upon 95+ years of experience, Pratt & Whitney's F135 engine is the pinnacle of combat propulsion. With its adaptive, maintenance-friendly design, unmatched dependability, and 5th Generation technologies, the F135 enables the F-35 to go places other aircraft cannot.

EXPLORE THE CAPABILITIES OF THE F135 AT [PRATTWHITNEY.COM](https://prattwhitney.com)



SIA firms deal for A350F

Alfred Chua

Singapore Airlines firmed its order for seven Airbus A350 freighters here at the show yesterday, while Etihad Airways was disclosed as the fifth customer to commit to the newly-launched cargo version with a preliminary deal for seven aircraft.

Singapore Airlines, which also holds five options for the freighter, will take delivery of its first Rolls-Royce Trent XWB-powered A350F in the fourth quarter of 2025. It will use the aircraft to replace its Boeing 747-400 cargo jets.

The Star Alliance carrier first announced its commitment to what it calls a "new generation" widebody freighter in December 2021, swapping orders for two A350-900 passenger aircraft, as well as 15 A320neos meant for low-cost unit Scoot as part of the agreement.

Speaking at the order announcement, SIA chief Goh Choon Phong says the carrier has "always been looking at the renewal" of its aging 747 freighters, but that "there wasn't really an available...alternative [and effective] plane" in the market.

SIA, currently the world's largest A350 operator, had also been in "early engagements" with Airbus over the development of the A350F, Goh discloses.

"We continue to want to work



SIA chief Goh Choon Phong with Airbus chief commercial officer Christian Scherer

with Airbus in defining some of the commercial requirements, as we work towards the entry-into-service of the plane in 2025," he adds.

UAE carrier Etihad Airways meanwhile has signed a letter of intent covering seven A350Fs. No delivery dates were disclosed. The carrier already has five A350-1000 passenger aircraft.

Etihad Aviation Group chief executive Tony Douglas says: "As

our cargo operations continue to overperform and we work towards a more sustainable future built upon the world's youngest and most fuel-efficient fleet, the addition of the A350F will play a key role in driving our long-term cargo strategy and achieving our 2035 target to reduce CO₂ emissions by 50%."

Airbus secured its first agreement for the A350F – which will have a payload capability of 109t – during

the Dubai air show in November 2021, when lessor Air Lease agreed to take seven examples.

Alongside SIA's now firm commitment for the type, French logistics company CMA CGM Group in December finalised its provisional order for four Airbus A350Fs. The preliminary commitment from Etihad, comes after Air France-KLM signed a letter of intent for four A350Fs in December.

EFW gets A321P2F smart win

Aircraft modification joint venture EFW has secured an order for six Airbus A321 passenger-to-freighter conversions from Latvian operator SmartLynx Airlines, which will operate the freighters for DHL in Europe.

Work will take place between 2022 and 2023 at ST Engineering's facilities in Singapore and China.

SmartLynx currently operates one A321P2F, and ST Engineering says the latest order – announced during the Singapore air show – will "greatly boost the narrowbody freighter aircraft fleet".

EFW chief Andreas Sperl adds: "These new orders, which came after SmartLynx leased and operated its first A321P2F freighter converted by EFW, is a stamp of approval for our conversion solutions."

757 comes out firefighting

ST Engineering is to create the world's first Boeing 757 firefighting aircraft through the conversion of a passenger jet, with service entry expected within two years.

The company is partnering with USA-based Galactic Holdings – an operator of firefighting tankers – on the programme, with conversion work to take place at ST Engineering's US facilities.

Speaking after a signing ceremony at the Singapore Airshow, Leon Tan, senior programme manager for the 757 conversion project, says the first

jet "will be acquired from a passenger fleet".

ST Engineering is targeting service entry in 2024, after it gains supplemental type certification, and expects to convert up to 15 examples for Galactic. Each aircraft can carry two retardant tanks, with total capacity of 7,000 gallons (31,800 litres).

Tan adds that the decision to modify the 757 for firefighting operations comes as existing platforms age and are "in need of replacement". Operating the 757 is more fuel efficient – compared with older aircraft – and

can be deployed to a range of locations for firefighting missions, says ST Engineering.

While the 757 tanker will be operated in the USA, Tan says ST Engineering is also looking at marketing the aircraft to operators in Australia, where wildfires are a perennial issue.

ST Engineering will also perform MRO work on the fleet of 757 firefighting tankers when they enter service.



ST Engineering commercial aerospace president Jeffrey Lam with Galactic Holdings managing member Darrin Henry

continued from page 1



An artist's impression of the AirAsia aircraft

Only way is up

Meanwhile, a report from Rolls-Royce – which provides the powertrain for the VX4 – and consultancy Roland Berger sees advanced air mobility (AAM) operations in the APAC region generating \$36.9 billion of service revenue alone across the APAC region by 2050, including \$350 million in Singapore.

The study also highlights the importance of government, industry and regulators working together to develop the regulation, infrastructure and societal change needed to foster AAM operations.

Lockheed fired up on fighters

Lockheed Martin sees strong continued potential for its F-16 and F-35 fighters, underpinned by innovations in maintenance support.

Speaking at the show yesterday, Randy Howard, vice president of global pursuits at Lockheed, says that despite its longevity, the F-16 programme continues to go well, with production at its new Greenville, South Carolina factory poised to commence.

The iconic type has a backlog of 128 examples for the updated 'V' variant.

As for the F-35, Lockheed notes that over 3,000 examples remain in service, having accumulated 19.5 million flight hours.

Steve Over, director of F-35 business development, notes that over 760 examples have been delivered over the course of the programme, with 1,560 pilots and 11,680 maintainers trained up.

Over anticipates the addition of 140 F-35s to the global fleet this year, bringing the total to about 900 aircraft.

Joining Howard and Over was Steve Sheehy, vice president sustainment strategies & business development.

He states that Lockheed is taking a new approach to sustainment, with a focus on machine learning and artificial intelligence, to create what he dubs 'resilient logistics.'

"Logistics need not just to survive speed bumps, but thrive through them."

Sheehy describes resilient logistics as being highly reliable, as well as using predictive health to monitor aircraft, and condition-based maintenance that minimises unscheduled maintenance. It also uses what he calls a "high velocity supply system."

Howard: F-16 programme continues to prosper, despite its longevity



Airbus: LMXT tanker clear choice for USA

Greg Waldron

Airbus Defence & Space chief executive Michael Schoellhorn (*pictured*) believes that Lockheed Martin's proposed LMXT tanker is the only aircraft that will meet the US Air Force's (USAF's) nascent KC-Y requirement.

During a media roundtable with journalists at the show, he was asked whether it made financial sense for the USAF to obtain a new tanker type in addition to the Boeing KC-46. Lockheed's LMXT will be based on the A330 multi-role tanker transport (MRTT).

"Cost is always a concern," he says. "If the requirements fit to the KC-46, it would be the smartest decision just to continue with KC-46. But if you look at the needs of the air force in terms of range, in terms of fuel displacement, in terms of fuel offload, and how many air bases you connect to... the KC-46 is limited."

"It cannot accomplish nearly as much as the MRTT can, so then it becomes an apples to oranges kind of thing."

Schoellhorn also touched on differences between the LMXT and current MRTT. One difference is that the USAF appears to have no requirement for the jet to carry cargo or personnel, it is a pure tanker.



Lockheed has said that the LXMT will have 123t (271,000lb) of fuel capacity – 12t more than the MRTT. This is 27t greater than that of the KC-46.

In a Monday media engagement, Leanne Caret, chief executive of Boeing Defense, Space & Security, insisted that the KC-46 is the USAF's best choice for KC-Y, which envisages the acquisition of up to 160 new tankers as a "bridge" to its future 'Advanced Air Refueling Tanker' effort.

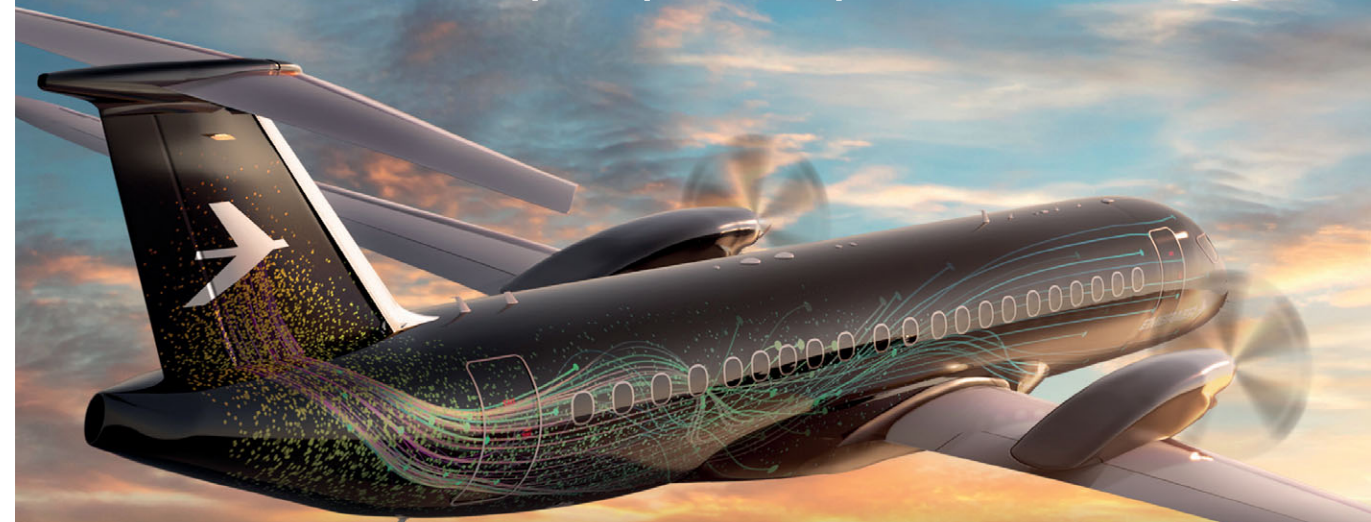
Noting that the USAF has yet to

announce a formal acquisition, she took issue with the cost of obtaining a second tanker type.

On other differences from the MRTT, Schoellhorn adds that there will be "a lot of small things", as well as "a lot of things that we don't know about that Lockheed will take care of".

Lockheed's proposal involves building the A330-200 in Mobile, Alabama, with military conversion work to be performed in Marietta, Georgia.

Embraer turboprop tempts Rolls-Royce



"We are very interested in supporting Embraer with a potential turboprop engine for this aircraft, we see a lot of potential," Chris Cholerton, president Civil Aerospace, Rolls-Royce, told reporters yesterday, referring to comments made here in Singapore by Embraer head Arjan Meijer that the Brazilian manufacturer could unveil a new programme for a 70-90 seater by the end of this year.

If a Rolls-Royce bid was successful it would mark a return to the commercial regional aircraft engine market in this category for the manufacturer. Cholerton declines at this early stage of discussions to reveal any specifics about the engine platform but says the engine maker "is putting forward a compelling proposition".

Today, the primary turboprop product in the Rolls-Royce family in this size category is the AE 2100 turboprop developed by the Allison Engine Company, now part of Rolls-Royce North America. This engine was developed to power military transports such as the Lockheed Martin C-130J Hercules.

While not specifically commenting on any Rolls-Royce proposition for this potential programme, Rob Watson, president electrical at the company, says that next generation regional aircraft do offer the opportunity for greater hybridisation to create a more electric engine over time, particularly using electric power as boost power for certain parts of a flight profile.

IAI's loitering munitions include the Harpy



Asian countries looking at loitering

Garrett Reim

After the 2020 Nagorno-Karabakh conflict between Armenia and Azerbaijan, in which loitering munitions were seen as playing a decisive role, interest in the new weapon type among Asian militaries is growing.

The vast Pacific Ocean, as well as the many smaller seas and thousands of islands that dot the region, are driving interest in maritime uses of loitering munitions, says Assaf Schechter, director of loitering munition systems with Israel Aerospace Industries, at the show.

Militaries are interested in anti-

shipping applications for the weapon type, as well as uses against tanks and radars. Schechter declines to name specific potential customers. IAI makes a variety of loitering munitions – essentially explosive laden drones – including the Harpy, Harop, Green Dragon and Rotem.

Loitering munitions will complement conventional anti-ship missiles, but not replace them, Schechter says. The type gives commanders a way to disable an enemy ship, without sinking it.

"If you cripple the bridge or the rudder or the missile base, you succeed and you don't need to sink a ship," Schechter says.

Militaries are interested in giving

commanders options to sideline an adversary while limiting potential for a situation to escalate, he says.

"When you're going against a superpower on the first shot you do not want to sink a ship," says Schechter.

Loitering munitions fly much slower than rocket-powered anti-ship missiles, making the type vulnerable to being shot down by ship-borne close-in weapon systems, such as automated Gatling guns. Still, there are ways for loitering munitions to get through, especially if multiples of the type converge on the target, says Schechter.

"Coming from different directions and different angles, more than one kill vehicle will penetrate," he says.

Rafael hopes for export sales Spike

After the US Army adopted the Spike non-line-of-sight (NLOS) missile as an interim long-range weapon for its Boeing AH-64 Apache attack helicopter, manufacturer Rafael believes more export orders could come.

The Israeli company has partnered with Lockheed Martin to manufacture the missile in the USA and is pitching the weapon for the US Army's longer-term programme of record, the Long-Range Precision Munition. Rafael hopes to sell the Spike NLOS through the US government's Foreign Military Sales process.

"Every country that has the Apache helicopter I believe will adopt the Spike NLOS," says Ran Gozali, executive vice-president of Rafael's land and naval division at the Singapore Airshow.

Operators of the AH-64 in Asia include India, Indonesia, Japan, Singapore and South Korea.

The Spike NLOS is controlled using an electro-optical and infrared camera seeker and a wireless



Rafael's Spike on display at the show

datalink. Rafael says that makes the missile impervious to electronic warfare interference, such as GPS jamming.

Gozali declines to talk about specific country interest, but notes that the 21.6nm (40km) range of the Spike NLOS when launched from an Apache,

as well as its multipurpose warhead – effective against tanks, bunkers and ships – makes the weapon appealing to a variety of countries in Asia-Pacific. That versatility ensures the weapon is effective at land warfare, as well as defending against shore assaults, he says.



Hulst: Fundamentals remain strong for aviation in the Asia-Pacific region

Boeing banks on a big bounce back

Despite 24 to 30 months of lost growth because of the impact of the pandemic, the Asia-Pacific air travel market will return to its pre-Covid level and strong growth, according to Darren Hulst, vice president commercial marketing of Boeing, speaking at the Singapore Airshow.

In its latest 20-year Commercial Market Outlook, which covers the period up to 2040, it sees a compound annual growth rate for intra Southeast Asia passenger traffic of 6.7% for this period compared to a global growth rate of 4.0%.

Boeing's view is that the "fundamental growth drivers remain strong in Southeast Asia", says Hulst, referring to healthy domestic and regional markets, an expanding middle class and an increasing propensity to travel. "There will be an additional 63 million people entering the middle class in the next 15 years," he says.

For Boeing, this return to growth translates into a demand for 4,415 new aircraft in the next 20 years for the Southeast Asia market. This breaks down to 3,600 narrowbodies, 770 widebodies, 20 regional jets and 25 freighters.

Boeing has seen tremendous growth in the global air cargo market driving its best-ever year in 2021 for sales of new and converted freighter aircraft, says Hulst. It sold 204 of these types, consisting of 80 production and 120 Boeing Converted Freighters.

"The industry is poised for recovery," says Hulst with aircraft gradually returning to service and traffic improving. Boeing predicts traffic will recover to pre-Covid levels by the end of 2023 and early 2024. "The aviation industry has proved its resilience again," he says.

TAI on the hunt with stealthy TF-X

Garrett Rein

Turkish Aerospace Industries is seeking out potential customers and partners for its TF-X stealth fighter programme. The company is at the Singapore Airshow, bringing along a full-scale mockup of the aircraft. It is looking for collaborators and sees opportunities in Asian countries that are also interested in its basic and advanced trainers.

"Especially, the potential customers for our turboprop training aircraft Hürkuş and jet trainer aircraft Hurjet are interested in procuring this aircraft," the company says. "For example, Hurjet is already competing for the Malaysian Light Fighter Jet and Advanced Trainer Aircraft tender."

"The earlier the involvement happens, the more the interested country may benefit from a partnership as they may have opportunities to participate in design and development activities apart from production opportunities as well," says the company.

The twin-engined TF-X is an indigenous effort by Turkey to build a stealth fighter. The market for



The mock-up on the static display

fifth-generation aircraft is currently dominated by the Lockheed Martin F-35, but the likes of Turkish Aerospace's TF-X, Korea Aerospace Industries' KF-21 and Russia's Sukhoi Su-57 are looking for a way in.

The TF-X programme is scheduled to reach preliminary design review in 2022, with aircraft roll-out and engine run tests planned for March

2023. First flight is anticipated before the end of 2025.

Turkish Aerospace is primarily building the TF-X for the Turkish air force and plans to start deliveries in 2029. Depending on the TF-X's configuration, the manufacturer believes it can start exporting the stealth fighter in the 2030s. The company is also looking for

collaborators for its Hurjet advanced trainer and light combat aircraft. That single-engine, tandem seat aircraft is supersonic capable.

Turkish Aerospace says it is open to technology transfer agreements, as well as local part production, component assembly and final assembly line deals with potential customers of the Hurjet.

Zero E: Way forward for air travel?



Industry at brink of disruptive shift

The aerospace sector is at a "critical juncture" in the march towards a significant, disruptive technological shift, according to panellists at an aerospace roundtable, who also stress that sustainability will underpin these changes.

At the wide-ranging webinar, organised by FlightGlobal and Experia Events in partnership with CFM International in the lead-up to the Singapore Airshow, the five panellists spoke about how the Asia-Pacific is fast becoming a hotbed for innovation and technology, including urban air mobility solutions and sustainable aviation.

The panel comprised Airbus Asia-Pacific president Anand Stanley, ST Engineering commercial aerospace president Jeffrey Lam, GE Aviation's general manager for engineering Vikram Reddy, Volocopter Singapore head Hon Lung Chu, and Eve Urban Air Mobility chief Andre Stein.

GE's Reddy, when asked whether he felt there would be a step

change in the industry over the next 10 years, said the sector was at a "critical juncture".

Pointing at recent trends in engine design and innovation - including electrification and unducted turbofans - he said: "It is the most important, most accelerated transition that ever happened in history...If you see the combination of all these, I think the next 10-20 years is going to be extremely different from what there was in the last 30-40 years."

Concurring, Airbus's Stanley stated: "[The] momentum has really taken off quite a bit in terms of multiple technology factors."

He added: "If we look at today's technologies, of course, decarbonisation is what's on everyone's mind, and it's accelerating at a very fast pace... But the question is, what more can we do? It's not just either/or, it's a combination of things."

Lam of ST Engineering offered a slightly different take, stating

that the industry was not yet at a "revolutionary stage", but in what he called a "revolutionary evolution".

"We are seeing confluence of many factors coming together, including digitalisation, sustainability, propulsion, technology, electrification, and even Covid-19 has contributed to, you know, us moving faster ahead in many of these areas," he said.

The panellists also agreed that sustainability will play a key role in how these innovative technologies will move forward.

Short-term steps towards achieving sustainability include using sustainable aviation fuels, as well as making use of digital technologies for better flight navigation and air traffic control, to reduce emissions.

In the longer term, Airbus's Stanley said zero-emission aircraft - like the airframer's in-development Zero E hydrogen-powered aircraft - will be a way forward for air travel.

SAF route for Safran and ST Engineering

Safran Helicopter Engines and ST Engineering are to work together to study the use of sustainable aviation fuel (SAF) in the French manufacturer's turboshaft powerplants. Detailed in a memorandum of understanding, the pact is designed to help "helicopter operators in their transition to SAF".

Ground testing of Safran engines using SAF will be performed at ST Engineering's facilities, while flight trials with participating helicopter operators will also be conducted.

All of Safran's helicopter engines are currently certificated to operate on up to 50% SAF blends and the objective of the collaboration is to raise this figure to 100%.

Safran and Airbus Helicopters last year flew a H225 heavy-twin with one of its two Makila 2 engines running on 100% SAF.

Valerie Patuel, managing director of Safran Helicopter Engines Asia, says: "This agreement strengthens the technical and industrial partnership we have built with ST Engineering over the years. It also marks a key milestone in our common endeavour to transform the aviation industry towards a more sustainable future."

Tay Eng Guan, vice-president and general manager of the commercial aerospace engines arm of ST Engineering adds: "The partnership also reflects our shared beliefs that aerospace companies must come together to develop robust solutions that can effectively reduce the industry's carbon footprint."



ADVANCING SUSTAINABILITY TOGETHER

Our innovations enable all of humanity to take flight. Across commercial, defense, services, and space, we're finding new ways to bring sustainability to the forefront of our business.

boeing.com/singapore



Singapore's upgraded F-16 in service

Greg Waldron & Dominic Perry

Singapore's first upgraded Lockheed Martin F-16 fighter has entered service following delivery of the aircraft in June last year, its air force chief has revealed.

Chief of the Air Force Major General Kelvin Khong discloses that the fourth-generation F-16C/Ds, which are being upgraded to the V-model standard, are to be operated "for at least another decade".

"Subsequent deliveries will be rolled out progressively to ensure that the RSAF continues to have a capable fleet of fighter aircraft to meet our defence requirements," he said, responding to a series of written questions from journalists. The service continues to eye the fighters' eventual replacement, Khong adds.

Meanwhile, the Republic of Singapore Air Force (RSAF) is gearing up to receive its first of four F-35Bs in 2026.

Those aircraft will be based in the USA for training, says Khong, where the service "will test the aircraft's advanced capabilities, including its short take-off and vertical landing capability, and determine the integration requirements with the rest of the SAF's warfighting systems. "We have stringent and rigorous



Khong: F-15SGs have served air force well since 2009

evaluation processes in place and have been following the developments of the F-35 closely. We will ensure that the F-35B meets our requirements before inducting them for operations."

Ebbing Air National Guard Base in Arkansas has been selected to host the RSAF's F-35 and F-16 fighter training detachment - relocating from Luke AFB in Arizona - pending the outcome of an environmental impact assessment.

Co-location of the two aircraft types will "maximise opportunities

for integrated training between our fourth- and fifth-generation fighter aircraft," he says.

In addition, the RSAF continues to evaluate the potential for an upgrade to its 40-strong Boeing F-15SG fleet.

"These fighter jets have served us well since we first took delivery in 2009 and remain a crucial component of our fighter fleet in the next-generation air force," Khong adds.

Having achieved full operating capability with its six Airbus Defence and Space A330 multi-role tanker transport (MRTT) aircraft in April 2021, the air force continues to enhance the platform. It is working with the airframer on the so-called "Smart A330 MRTT" programme to deliver an automatic air-to-air refuelling (AAR) capability, alongside enhanced maintenance solutions for the jet.

"The automated refuelling will reduce air refuelling operator workload, improve safety and optimise AAR in operational conditions. Trials are ongoing and progressing well," says Khong, who describes the twinjet as a "versatile and valuable asset" for the RSAF.

With maritime patrol an increasingly pressing issue for all nations in the region, the RSAF is working in tandem with the country's navy to evaluate the "air capabilities necessary to meet requirements in



Republic of Singapore Air Force F-16s are gaining upgrade to V-model standard

the maritime domain."

Its fleet of five Fokker 50 Maritime Patrol Aircraft underwent a life extension programme in 2017 to address obsolescence issues, but a further upgrade could be required, says Khong.

"We will continue to operate the Fokker 50 but will upgrade or acquire new systems if required to ensure we remain operationally capable and effective."

Khong, meanwhile, says the service continues to evolve to meet future challenges. "We are faced with a wide spectrum of conventional and unconventional threats and can expect future air combat to evolve.

"Looking ahead, we will develop the RSAF in dynamic and multi-faceted ways - continue to invest in conventional air combat capabilities while building capabilities to handle emerging threats."

BillyPik



ST Engineering's engine shop

ST Engineering's Leap in capabilities

ST Engineering Aerospace has announced plans to boost its MRO capabilities for the CFM International Leap-1B turbofan.

The company says it has already set up quick-turn services for the engine at its local facility, and will expand this to a full MRO capability by the end of 2023.

"ST Engineering has a longstanding relationship with CFM as a licensed service centre for its CFM56-5B and -7B engines," says ST Engineering's commercial aerospace president Jeffrey Lam.

The Leap-1B is the exclusive powerplant for the Boeing 737 Max. Cirium fleets data indicates that there are 24 737 Max aircraft in the fleets of Southeast Asian carriers, and 576 firm orders.

Embraer, R-R, Wideroe in zero-emission quest

Embraer, Wideroe and Rolls-Royce have unveiled plans for a 12-month study into a conceptual zero-emission regional aircraft seeking to understand the propulsion and operational options for such types.

The study is an extension of work Wideroe is undertaking with both manufacturers and brings all three together. "This is an exciting project which will shape our thinking on solutions for net-zero regional operation," says Rolls-Royce president civil aerospace Chris Cholerton. "We have an excellent working relationship with both Embraer and Wideroe and look forward to deepening our collaboration."

Wideroe and Rolls-Royce have collaborated on zero-emission aircraft since 2019 to develop an electric aircraft that can meet Norway's zero emissions target for 2030 and replace the airline's fleet of fossil-fuel powered aircraft. In November, the carrier announced it was working with Embraer's urban air mobility spin-out



BillyPik

Eve to work on the potential operation of electric vertical take-off and landing (eVTOL) aircraft in Scandinavia.

The study will cover a wide range of applications for new propulsion technologies to examine a range of potential solutions - including all-electric, hydrogen fuel cell or hydrogen fueled gas turbine powered aircraft, say the partners.

"Working with the world's leading aerospace technology firms, our aim is to understand how viable business can be built around zero emissions regional concepts, and to

advise the manufacturers on operational requirements and customer expectations to design the best possible and sustainable air mobility service," says Andreas Aks, chief executive of Wideroe Zero, the air mobility business incubator division of the Norwegian airline.

Embraer Commercial Aviation president Arjan Meijer (pictured) says: "The aim of our collaboration is to create new flight solutions that serve expanded market segments in a sustainable manner."

The partners say the 12-month co-operation study will address passenger requirements to "stay connected in a post Covid-19 world, but do so sustainably", and seeks to accelerate the knowledge of the technologies necessary for this transition. "Such technologies will allow national governments to continue to support passenger mobility while reusing most of the existing infrastructure in a more sustainable way," the partners note.

A Step Ahead – The Combat Proven AESA Naval Radars

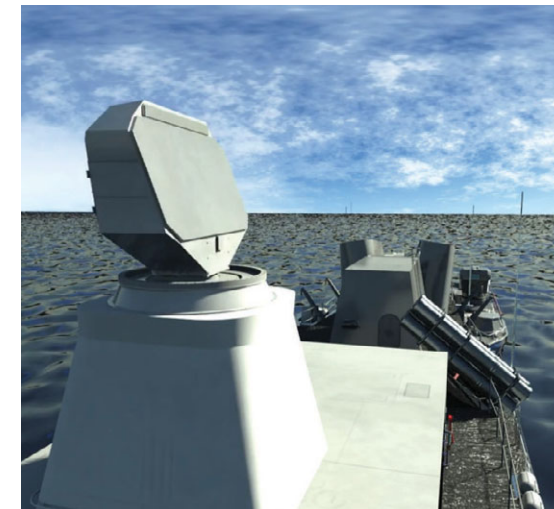
Advertorial

New Threats Require Proven Solutions

Modern navies face a continuously evolving threat arena powered by significant technical developments in targeting and attack systems. Newer dangers include low visibility manned and unmanned aerial platforms, and long-range cruise and hypersonic anti-ship missiles. The latter are of particular concern because their trajectories are difficult to predict and their high speeds leave little time for intercept.

These threats increase the enemy's ability to execute coordinated attacks from beyond the ship's line of sight and overwhelm current defensive systems. The dangers are further exacerbated when the enemy has access to long range sensors deployed from airborne platforms or satellites, or when naval forces operate in proximity to enemy shores, exposed to additional sensors and weapon systems.

If navies are to operate effectively it is imperative that they achieve the ability to efficiently detect, track, engage and eliminate these threats. The creation of a protective hemisphere around naval assets – the battlespace – is thus of central importance to modern fleet warfare. To overcome sophisticated adversaries and effectively secure the requisite battlespace, modern navies require cutting-edge future-ready sensors and systems, including high performance naval radars.



ALPHA - Multi-Function Rotating Digital AESA Radar | IAI ELTA

The Pioneer in Fixed-panel Digital AESA Radars

In response, ELTA Systems Ltd., the defense electronics subsidiary of IAI, Israel's largest aerospace and defense company, has leveraged its rich technological heritage and culture of innovation to field the MF-STAR and ALPHA shipborne multi-function radars, providing naval forces with the situational awareness needed to cope with advanced threats. The powerful radars feature class leading multi-beam and multi-technique capabilities together with superior ECCM features. In addition to being the most mature radars in their respective classes, they are also the most flexible with regard to future growth potential and the ability to be continually upgraded, mainly by software-only updates that address new threats as they enter the arena.

Both MF-STAR and ALPHA exploit breakthrough achievements in wideband Active Electronic Scanning Array (AESA) technology. A revolutionary

concept developed and matured at ELTA over the past decade, AESA is built with an array of wideband solid-state transceivers. It provides a dramatic increase both in receiver sensitivity and in Effective Radiated Power (ERP) – significantly exceeding legacy solutions. Furthermore, AESA technology facilitates narrow multi-beam operation in reception and transmission, enabling the systems to simultaneously track multiple threats with unmatched efficiency.

ELTA's combat proven, fully digital radars are already in service, or in the process of installation, on over thirty ships in navies around the globe. While competing AESA systems are still in their first generation, ELTA's pioneering efforts are such that both MF-STAR and ALPHA represent operationally proven, third generation designs, with all the advantages that years of ongoing field experience and development efforts afford.

Proven Multi-function Performance and Automation

MF-STAR and ALPHA are true long-range multi-function radar systems. They provide both local and area defense in blue and littoral waters with their surveillance, tracking and weapons guidance capabilities. Moreover, extended-range versions can be equipped to detect and track tactical ballistic missiles (Ballistic Missile Support). In fact, the German Navy chose ELTA radars to equip their F124 Air Defense Frigates based on their performance and Ballistic Missile Support capabilities.

Highly automated, these radars require little if any operator involvement and are easily installed and maintained. Designed to reduce life cycle cost, the radars make use of extensive automated Built in Test (BIT), plug-in elements, and military COTS modules and components.

Unsurpassed Upgradeability and Scalability

In addition to their modular, software driven designs, MF-STAR and ALPHA's unique architectures ensure unmatched long-term upgradeability. The radars



MFSTAR - Radar installed in various vessels around the world | IAI ELTA

employ ELTA's proprietary fully digital TRG (Transmit Receive Group) units, which constitute compact, efficient building blocks. Each TRG unit contains individual S-Band transmit/receive channels, which exploit the latest GaN Solid State Amplifier (SSA) technology and feature a range of adjustable parameters. The use of TRGs enables the radars to be scaled to different vessel sizes, mission profiles and budgets. The future addition of TRGs facilitates a simple, low-cost increase in performance. The TRGs also contribute to streamlined logistic requirements since all MF-STAR and ALPHA configurations share this important component.

Configurations for Every Vessel Size, Installation and Budget

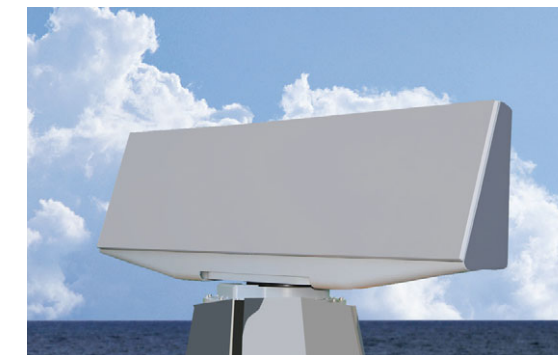
MF-STAR employs four oblique fixed conformal panels, in single or dual mast configurations, providing 360-degree coverage while minimizing the vessel's radar signature. Versions are available for larger vessels such as frigates while lighter, more compact configurations address smaller ships. Range is commensurate with the size of the array, each offering class leading performance.

The ALPHA radar, with built-in IFF and navigation antennas, utilizes a single phased array panel similar to that of MF-STAR, but this lighter, more compact radar is mounted on a rotating pedestal to achieve 360-degree coverage. Like MF-STAR, ALPHA can be enhanced with the addition of TRG modules.

Summary

MF-STAR and ALPHA not only constitute the most advanced systems in their respective classes but also the most mature and combat proven. Successfully installed on numerous vessels, these radars have amassed ten years of operational experience and demonstrated reliability. Their unique construction, utilizing high performance TRG modules, endows unmatched scalability and upgradeability. It is therefore not surprising that MF-STAR and Alpha constitute the backbone of the Israel Navy's air surveillance and defense array, and that they have also been chosen by leading navies worldwide.

For further information, please contact us at market@ELTA.co.il



STAR-X - New Cost Effective Radar Solution for OPV's | IAI ELTA

Collins displays array of technologies

Greg Waldron

Collins Aerospace is promoting a range of mission systems at the show, from advanced reconnaissance capabilities to its ACES 5 ejection seat.

Richard Jerome, senior director of international business development, mission systems, says that Asia-Pacific defence customers are interested in improving situational awareness, ensuring battlefield communications, interoperability with US forces, as well as simulations and training.

One system the company is promoting is its MS-110 multispectral airborne reconnaissance system, which is available under the US Foreign Military Sales process.

The MS-110 can be carried by the Boeing F-15 and Lockheed Martin F-16, as well as other platforms. Collins says it is capable of imaging in multiple visual and infrared bands at long standoff ranges.

"By definition, you can scan multiple bands in the spectrum, and have the ability to superimpose images from different parts of the spectrum, to get a better definition and better view of what's out there," says Jerome.

Crucially, the sensor has a



Jerome (third from left) with colleagues (l-r) Dean Baxevanis, William O'Brien, and Francis St-Louis.

high-speed data link capability, helping militaries shorten kill chains. Collins also offers the DB-110, which incorporates a tactical synthetic aperture radar from Leonardo.

On the communications front, the company is promoting its AR-1500 (Airborne Radio 1500). The system uses the Saturn waveform, which is far more resistant to communications jamming. It also greatly enhances interoperability with US forces.

"The USA is already using [the Saturn waveform] and some NATO allies too," says Jerome. "It's faster

and more difficult to jam."

Jerome also highlights the company's training and simulation systems, particularly for advanced assets such as the Lockheed Martin F-35.

"In order to be effective you need to train, and you need simulation tools, because you can't afford to be using real assets all of the time," he says.

In particular, the company is focused on live visual construction training, which mixes live and simulated assets.

"We're very proud of some of the work we do in the USA on next

generation air combat training," says Jerome.

He cites work with the US Navy under the Tactical Combat Training System Increment II programme, which allows for a highly flexible training environment, incorporating a range of assets and capabilities. Also falling under the Collins Mission Systems umbrella is the company's ACES 5 ejection seat. The primary platforms for the seat are the F-15 and F-16. Collins sees opportunities to upgrade air forces using the legacy ACES 2 seat, as well as provide ACES 5 for newly acquired assets.

PROVEN AEROSPACE POWER SOLUTIONS

S3AERODEFENSE.COM

Boeing to set up China 767 freighter line

Boeing is to establish a 767-300BCF conversion line at ST Engineering's airframe facility in Guangzhou in response to growing customer demand for freighters.

The new line adds to the two additional 767-300BCF conversion lines Boeing announced last September at Guangzhou-based GAMECO.

The new addition at ST Engineering's facility, announced by the US airframer during the Singapore Airshow, will be added during the second half of this year.

Boeing Global Services chief executive Ted Colbert says: "Boeing is pleased to further expand our strong and long-standing relationship with ST Engineering on the versatile 767-300BCF and its global customer base."

"ST Engineering has been an MRO supplier for more than forty 767-300BCF conversions and their technical expertise and commitment to the programme is recognised and greatly appreciated."

ST Engineering commercial aerospace president Jeffrey Lam says: "Our latest 767-300BCF conversion line will strongly augment the conversion capacity for the Boeing Converted Freighter. We look forward to replicating our long-term collaboration with Boeing by consistently delivering on time and high-quality conversions."

Boeing says the 767-300BCF has more than 100 orders and commitments from customers.

The US manufacturer's most recent market outlook forecasts a need for 1,720 freighter conversions over the next 20 years and sees Asia-Pacific-based airlines requiring 505 large and medium widebody freighters, both new-build and conversions, over that period.



Colbert: ST Engineering commitment greatly appreciated



FlightGlobal pair win trio of awards

FlightGlobal had a big night at the Aerospace Media Awards Asia, held on the first evening of the show, with the company's Singapore bureau winning top honours in three categories.

Asia Managing Editor Greg Waldron (right) was crowned in two categories.

His feature entitled 'China's enigmatic J-20 powers up for second decade' was named the Best Military Aviation submission.

He also won Best MRO submission for his story about the high costs involved in refitting the Airbus A380 - and how airlines might be reluctant to take this on amid the coronavirus pandemic.

Asia-Pacific reporter Alfred Chua's comprehensive interview with Malaysia Airlines chief executive Izhom Ismail was named as the Best Commercial Aviation submission.

Overall, Chua and Waldron were shortlisted for nine awards across eight categories.

CDB commmits to more A330P2Fs

Graham Dunn

Aircraft lessor CDB Aviation has committed to a further dozen Airbus A330 passenger-to-freighter conversions with German aircraft modification joint venture EFW after disclosing its first lease commitments with Chinese operators.

The conversion commitments, announced during the show, take CDB Aviation's A330P2F orders to 14. The China Development Bank's Irish leasing subsidiary had previously signed for a pair of A330 freighter conversions with EFW in November 2020, marking its first entry into the air cargo sector.

CDB Aviation's first two A330P2Fs are being converted at EFW's facility in Dresden and are due to be re-delivered to launch operator, Mexico-based MasAir, early this year.

The lessor has now disclosed lease commitments covering three more converted aircraft from Sichuan Airlines and Jiangxi Cargo Airlines, marking the converted freighter's first placements in China.

Chengdu-based Sichuan Airlines will lease two A330-300P2Fs, adding to the carrier's existing three A330-200Fs. The aircraft are due for delivery in late 2022 and the middle of 2023 respectively.

Jiangxi Cargo Airlines, a new Nanchang-based start-up carrier created through a joint venture between the Jiangxi Provincial Government and Hongyuan Group, will lease one A330-300P2F. The aircraft is due for delivery early next year.

CDB Aviation's chief executive Patrick Hannigan says: "The A330P2F continues to gain traction

as the preferred next-generation type in the fast-growing medium widebody freighter space.

"We have strategically positioned our platform to be the A330P2F programme frontrunner among lessors. We're very satisfied with this programme's progress and momentum to date and look forward to further expanding our freighter fleet in collaboration with our partners at Airbus, ST Engineering and EFW."

EFW chief executive Andreas Sperl adds: "The A330P2F programme is proving highly popular, and we now have over

80 aircraft on order. To ensure we can meet the rising demand for freighter conversions, EFW and ST Engineering are in the process of ramping up their conversion capacity."

CDB Aviation will this year expand its global conversion footprint by becoming the first customer for A330P2F conversions taking place in the facilities of ST Engineering in Shanghai and VT MAE in Mobile, Alabama. These conversion locations have been added to the existing A330P2F conversion facilities of EFW in Dresden and ST Engineering in Singapore.



You red it here first

Meet the red team - the folk responsible for handing you your copy of *Flight Daily News* every morning of the show. Our hard-working crew, in their distinctive flight suits, are pictured in front of the ATR stand - sponsor of the distribution team at this year's Singapore event.

JetBlue signs for more A220s

JetBlue Airways has ordered another 30 Airbus A220-300s to take its firm commitment for the type to 100, the airframer announced during the show.

The US carrier launched services with its first A220-300 in April last year and has eight of the type in service.

JetBlue chief executive Robin Hayes says: "We're already seeing benefits from the eight A220s we've added to the fleet, and we're very happy to have more on the way. We've seen double-digits increases in customer satisfaction scores, and these fuel-efficient aircraft support our leadership in reducing carbon emissions."

"With 30 additional A220s on order, we're in a position to accelerate our fleet modernisation plans to deliver stronger cost performance and support our focus city network strategy."

JetBlue operates its A220s in a 140-seat configuration.

FLIGHT DAILYNEWS

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

©2022 DVV Media International

HOW TO CONTACT US

Editorial office A-S35

Editor Murdo Morrison
murdo.morrison@flightglobal.com

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

Reporting team Alfred Chua,
Dominic Perry, Mark Pilling,
Garrett Reim, Greg Waldron

Production Louise Murrell

Designer Sarah Eversfield, Tim Noonan

Picture editor Jim Robbins

Photography Tom Gordon

Distribution Dawn Hartwell,
Steve Wood

Divisional Director, FlightGlobal
Sophie Wild

Printers Times Printers, Singapore

Connecting the battlefield



The DoD describes the F-35 as its quarterback

Garrett Reim

Lockheed Martin believes foreign militaries will follow the US Air Force's (USAF) example and fund development of battlefield networks of their own.

The company is involved in development of the USAF's Advanced Battle Management System (ABMS), a network that is supposed to allow aircraft to quickly pass around information about the battlefield, enabling US pilots to get a jump on the enemy. Lockheed Martin is also competing in a similar Australian Defence Force programme called Project AIR6500.

At the core of the USAF's ABMS vision is the Lockheed

Martin F-35 stealth fighter, which the Department of Defense has described as a "quarterback" that will gather information about the battlefield and then call plays. Lockheed bills the F-35 as the "most advanced node" in the service's network.

Yet, battlefield networks of the future will connect many different pieces of equipment, including ground vehicles and ships, as well as various aircraft. That means each network is likely to be custom built, says Tim Cahill, Lockheed Martin senior vice-president for global business development and strategy.

A desire to be interoperable with US forces will likely drive some commonality and standards across militaries, especially those that are allies or partners of Washington.

However, the requirement to network legacy aircraft and other equipment will mean customisation will be inevitable.

"Once you build out some of these pieces, I think you've got the opportunity perhaps to take them to other countries and drop them in whole," says Cahill. "But, my guess is there's going to be some significant adaptation."

While all-encompassing battlefield networks are cutting-edge currently, Lockheed Martin envisions the systems will eventually become must-have technology.

"It's going to be necessary to win the fight," says Cahill. "It's going to become an enabler... and so, it's by definition going to be a relatively large segment of the market at some point in the future."

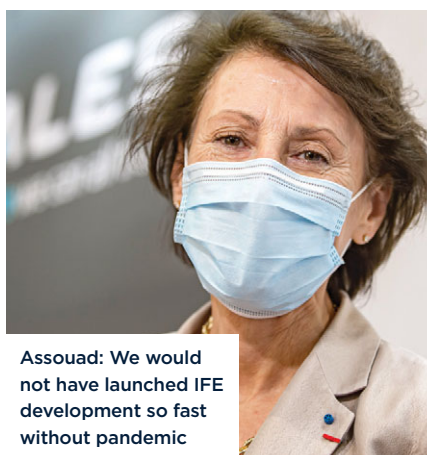
Thales upbeat on Asia opportunities

Despite slower recovery in the Asia-Pacific region from the coronavirus crisis, Thales remains confident of opportunities in the region.

Yannick Assouad, executive vice-president for avionics at the French company, says its avionics MRO activity in the region is only at half of pre-pandemic levels. Work in Europe and the Americas has returned faster, she notes.

Still, she sees room for optimism: "So it seems like it is coming back up, and we will have opportunities [again] in Asia and for the MRO business," she adds.

The pandemic has presented an



Assouad: We would not have launched IFE development so fast without pandemic

opportunity for Thales, which counts in-flight entertainment among its wide-ranging aerospace portfolio.

Assouad says that as air transport gets back on track, passengers will "want to travel seamlessly without touching anything".

"So clearly we are focusing our IFE development on touchless features. That could go as far as being connected [to the IFE system] while at home before you start your journey," she says. Other features include the ability to shop in flight – or order meals on board – from a mobile phone.

"These kind of ideas were brought

about, somehow, by the Covid-19 crisis. We would not have not launched it as fast without this," adds Assouad.

She also sees avionics playing a key role in advancing the industry's sustainability goals.

Assouad oversaw the development of Thales' PureFlyt, a flight management system that "optimises aircraft trajectory" to minimise fuel consumption and noise pollution. Thales says the system can calculate end-to-end trajectory – including horizontal and vertical flight profiles – more accurately than competing systems.

At the Forefront of Defence

All-in-One Air and Missile Defence Solution for Manoeuvring Tactical Forces



See us at
SINGAPORE AIRSHOW 2022
Hall B, Booth N51

RAFAEL 
ADVANCED DEFENSE SYSTEMS LTD.
www.rafael.co.il

In the hot seat

Mark Pilling

Martin-Baker, the leading UK-based manufacturer of ejection and crashworthy seats, is showing off its US18E ejection seat for the first time in the region. "We are offering the US18E for retrofit for the F-16 retrofit market," says Steve Roberts, head of business development at Martin-Baker. The US18E ejection seat has been developed for the Lockheed Martin F-16 Block 70/72 fighter for Foreign Military Sales, a programme run by the US Department of Defense.

The seat is to be delivered on new Block 70/72 F-16s and marketed as a retrofit option for air forces seeking to upgrade their existing F-16s.

"We have seen significant interest from five Asian

nations in the seat, and we've been able to show our customers this mock-up here at the show," says Roberts. "A lot of Asian operators are looking at upgrading their F-16s. There's a real market here," he adds.

The US18E is a drop-in product that can replace the legacy seat without affecting the cockpit or canopy ejection systems, which has cost-saving benefits.

Martin-Baker has designed a new neck protection device and head support panel to prevent active movement of the pilot's head when ejecting at speeds up to 600 knots. The seat also features the firm's smart sequencer system that actively manages the timings of the entire ejection and parachute deployment to optimise the physical loads on the pilot.

Martin-Baker is working on an entry-into-service timeframe from 2025.



Martin-Baker's Steve Roberts straps in tight to the firm's new US18E ejection seat, being shown here at the show for the first time



Joey Jubas, senior project manager of Easy Aerial with the firm's new Raptor hybrid drone

Making it look Easy

Easy Aerial is a newcomer to the show, exhibiting as part of the USA Pavilion, and has brought its latest autonomous unmanned aerial vehicle, the Raptor, to the Asia-Pacific for its first appearance.

The US firm has been developing UAVs for military, civil security, and emergency applications since 2015 and is now seeking to branch out into new markets, says Joey Jubas, senior project manager at Easy Aerial.

The Raptor is a hybrid UAV solution because it can operate in tethered mode for prolonged missions and can be released from this mode for a free-flight autonomous or directed mission. "There are a lot of use cases where the operator likes to have

a drone up in the air at all times, but should something happen elsewhere they want to send the drone to that site," says Jubas.

The Raptor has been in service with several customers over the past year, with about 20 units in total being deployed, says Jubas. The units are manufactured to order with options like different tether lengths and a variety of camera systems depending on the mission requirement.

The Raptor weighs 5.5kg without a payload, it can carry a 3kg payload and has free-flight endurance time of 45 minutes.

Easy Aerial also offers a range of Easy Guard ground stations - dubbed drone-in-a-box - for affordable and portable UAV operations.

Speed cleaning

Mark Pilling

Diethelm Keller Aviation has launched an upgraded version of its AURA rapid aircraft disinfection system, in partnership with local hygiene supplier Sureclean, and has brought it to the show for the first time. The AURA unit, which is mounted on a standard in-flight catering trolley, has been on trial with Singapore Airlines and ground handling provider SATS at Changi Airport for the past six months, says Fergus Lopez, chief executive of Diethelm Keller, which is headquartered in Singapore and has its manufacturing base here.

Following feedback from the operators, the company has produced an AURA Mk 2 that has the capability of wirelessly

uploading data from a disinfection procedure which is useful for compliance and recording purposes, says AURA inventor and chief executive of Sureclean Alvin Tan. An electrostatic spray gun has also been added to speed up the process and give greater accessibility.

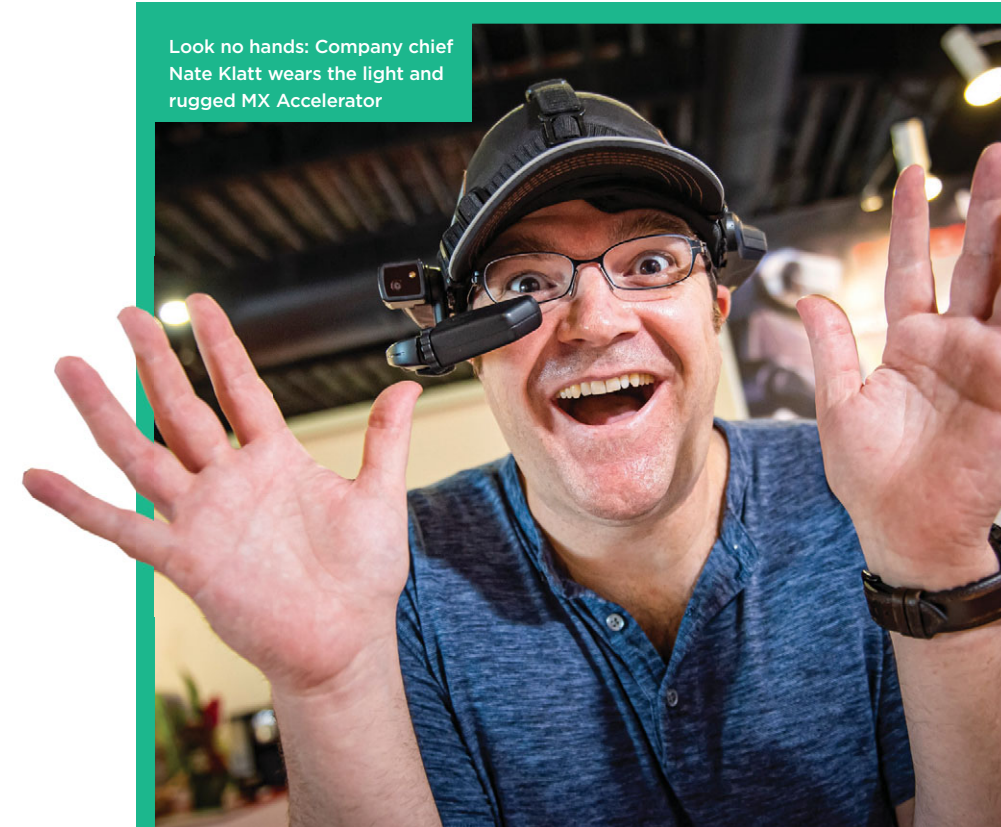
The AURA can disinfect a standard narrowbody in just 10 minutes with a single operator, some 30 minutes faster than current systems, says Tan. Disinfection takes place during the turnaround operation when the aircraft is on the ground. Used in conjunction with hospital grade Germ Clean disinfectant, which Diethelm Keller recommends, the disinfectant coating lasts up to 30 days.

The firm won the Singapore National Innovation Challenge in 2021 with the AURA for a product that helps restore public confidence in travel.



AURA inventor Alvin Tan (right) with Diethelm Keller Aviation chief executive Fergus Lopez

Look no hands: Company chief Nate Klatt wears the light and rugged MX Accelerator



Klatt on a hat

California-based Klatt Works is showing its MX Accelerator for the first time here at show, a hands-free product worn either on a hat or on a pair of safety glasses that promises to dramatically improve the working life of maintenance engineers both in military and civil operations.

The MX has been developed by chief executive Nate Klatt, who had a career in the US Air Force and advanced tech firms, when he was asked by the USAF to help on maintenance tasks for the Bell Boeing CV-22 Osprey. The requirement is to enable the technician to see a "how-to" video via the headset, view a maintenance manual, call an

offsite service engineer, and fill in a maintenance checklist, all hands-free using the built-in camera and voice control.

Last year it was tested in remote locations by the crew of a Lockheed C-130 Hercules and performed well, said Klatt, who is also in talks with an undisclosed airline that operates Boeing 757s to trial it on various maintenance tasks. It takes a technician about 15 minutes to be trained on the device.

"We don't try to replace traditional MRO software - the idea is to work with these solutions," says Klatt. "It's a combination of ruggedised and simple technology" to create a product that suits the needs of the market, he believes.

Robots to fight fires

Hope Technik has brought two of its fire-fighting robots and an Omnidirectional Weapons Loader (OWL) to the show. The Singapore-based robotics and engineering company specialises in developing and manufacturing a variety of innovative automation products for a range of industries.

Three Fire-Fighting Robots (FFR) are in service with the Singapore Civil Defense Force where the product is used as a companion to firefighters in tackling blazes in high-rise buildings. It is equipped with a thermal imager able to detect

hot spots in a fire and a camera. It is attached to a fire tender or a hydrant to deliver water.

The SCDF will begin taking a further 16 FFRs to accompany the same number of new fire-fighting vehicles being delivered from later this year, says Daniel Nia, deputy chief executive of Hope Technik.

At the show it is also showing a new larger and multi-purpose robot that can climb stairs and handle a payload such as a stretcher. The OWL is an electric vehicle with a motorised steel table capable of handling payloads of up to 1.3 tonnes.



Daniel Nia of Hope Technik with his firm's Fire-Fighting Robot



SIA is one of the world's most famous and respected airlines. But the flag-carrier's reputation for exemplary service has come under pressure during a difficult two years

Brand rebuilding



SIA aims to have 193 aircraft in its fleet by March

Greg Waldron

Singapore Airlines (SIA) remains a national icon with strong government support and a disciplined management team, but the post-pandemic world promises new challenges.

The carrier stands alone among regional peers. Despite major losses stemming from the world's endless tangle of travel restrictions, SIA is flush with cash owing to strong fundraising efforts, and is driving the city state's air travel recovery as the coronavirus pandemic abates.

SIA's fundraising capabilities were again on display in January with the issue of \$600 million in bonds, carrying a relatively low interest rate

of 3.38%. As of September 2021, it had raised over S\$21.6 billion (\$16 billion) in fresh liquidity, with cash and cash equivalents of \$12.5 billion, up from \$7 billion a year earlier.

A critical factor in SIA's ability to raise cash is its majority shareholder, Singapore sovereign wealth fund Temasek Holdings, which has supported fund raising efforts. The Singapore government also recognises the crucial connectivity its flag carrier provides – and leaves airline management to run the carrier professionally.

Nonetheless, it has been a painful time for SIA. In the six months ended 30 September, the group – mainline carrier SIA and low-cost unit Scoot – posted an operating loss of S\$619 million (\$457 million),

although this was an improvement from the record S\$1.86 billion operating loss during the same period a year earlier.

There airline also boasts a relatively modern fleet, numbering 178 aircraft as of 30 September 2021 – 128 with SIA, 50 with Scoot. By 31 March, it aims to have 193 aircraft, of which 136 will be with SIA and 57 with Scoot, providing plenty of capacity to ride 2022's (hoped for) air travel recovery.

Despite a strong strategic position, the carrier has a few trouble areas. The foremost of these is Singapore's utter lack of a domestic market. By definition, every flight SIA or Scoot operates crosses an international border. This has proven especially problematic given the

myriad restrictions the region's governments – including Singapore itself – have placed on air travel in a bid to fight Covid-19.

Another trouble area – at least in the short term – is customer service on the ground. Though the airline is renowned for its 'Singapore Girl' branding and warm on-board service, as the carrier starts to carry more traffic it has suffered its share of customer service snafus.

As passengers grapple with Covid-19 rules and requirements, wait times on SIA's customer service phone line are well over an hour, and it can take time for passengers to receive a response to on-line queries. The problem has received coverage in the local *Straits Times* newspaper, and is reflected by

customer complaints on SIA's Facebook page.

Customer service bottlenecks, however, reflect the positive development that SIA is starting to fly more – a lot more. In December 2021, SIA and Scoot provided 7.1 million seats, more than double the 2.9 million provided a year earlier. This was largely driven by the Singapore government's introduction of 'Vaccinated Travel Lanes' (VTLs) to select countries, allowing vaccinated travellers to visit the city state without undergoing quarantine.

Load factors also improved in December 2021, rising to 46.5%, a full 32.8 percentage point improvement on December 2020. Group passenger carriage was



Despite its reputation for on-board service, the airline has been criticised heavily for its recent response to customer issues

600,000 in December 2021, almost double the figure in November. Still, this is a far cry from December 2019, when the group carried 3.5 million passengers.

As with other carriers in the region, SIA has benefited from a robust cargo market. In the six months ended 30 September, SIA saw record cargo revenue of \$1.9 billion, up 51.2% from a year earlier. Ongoing supply chain issues and a shortage of cargo capacity globally will continue to drive SIA cargo revenues.

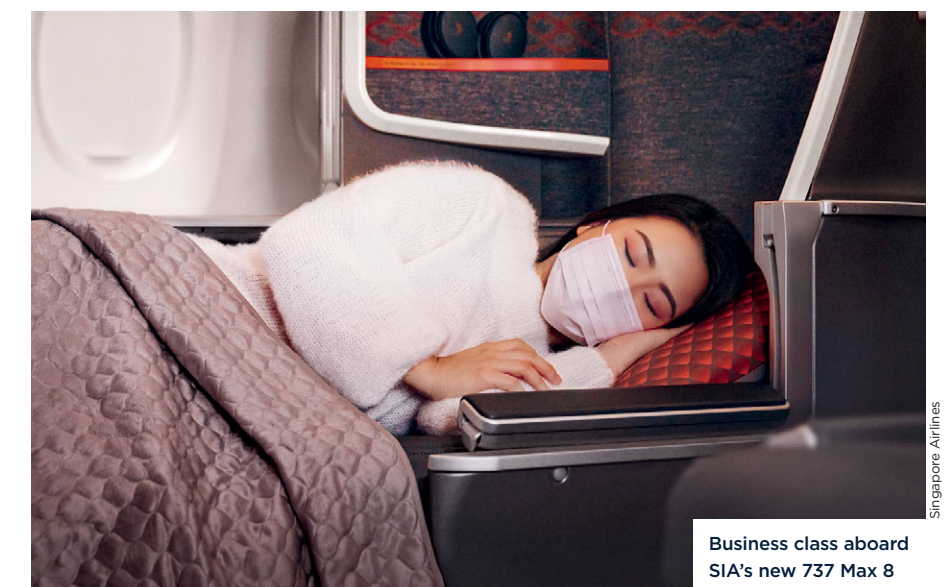
The SIA Group has also moved actively to support VTLs announced by the Singapore government, but the scheme saw a setback in late 2021 with the emergence of the Omicron variant of Covid-19. Uncertainties about the new variant prompted the Singapore government to temporarily reduce capacity on VTL flights, but crucially it did not cut the scheme entirely.

As the Omicron wave passes, it is all but certain that Singapore – which has prioritised reopening borders and living with Covid-19 – will add more VTL destinations beyond the existing 24 countries and regions. In addition, the government has shown flexibility about tweaking the VTL scheme, for example by reduced testing requirements. Any move that makes travel to the city state easier is a boon for the SIA Group.

Yet while SIA's outlook is starting to look more positive beyond Omicron, it – and other airlines – will face a world transformed in the 2020s.

In the 2010s a fundamental element in SIA Group's strategy was connectivity to China. In addition to Singapore's attractiveness as a destination to visitors from the Mainland, Changi served as a superb hub to carry Chinese travellers to onward destinations such as Australia, New Zealand, and Southeast Asia.

Cirium schedules data suggests



Business class aboard SIA's new 737 Max 8

that in December 2019 the SIA Group provided 297,000 seats from China and Hong Kong into Singapore, or 15% of the 2 million inbound seats it provided.

Given the 'Zero-Covid' strategy employed in China and Hong Kong, this market has all but disappeared. It is anyone's guess when China will again send travellers abroad – and if it will do so on anything approaching the scale seen in the 2010s.

Another challenge will be mainline SIA's reliance on business class travel. Though the airline industry has shown a certain bravado in predicting a return of business class travellers, for the time being only the hardest businesspeople will risk flying for work. Even for fully vaccinated travellers, the prospect of testing positive for Covid-19 in a foreign country remains exceedingly grim.

Moreover, if the last two years have taught the business world anything, it is the utility and convenience of on-line platforms such as Microsoft Teams and Zoom. Ironically, the Covid-19 crisis

coincided with a major effort by SIA to substantially upgrade its regional offering by subsuming the Silkair brand, and equipping a new fleet of 737 Max 8 aircraft with ten lie-flat business seats up front, with a decidedly upmarket economy class in back. While this re-booted regional operation will still serve leisure routes, the original objective was to align the regional operation with the main SIA brand – and boost appeal to business travellers.

Low-cost unit Scoot, however, is well placed to capture the surge in leisure travel that will accompany air travel's reopening.

After the go-go 2010s in Asia-Pacific air travel, the 2020s have been – to say the very least – a massive let down. While abating somewhat, Covid-19 has left the industry transformed, and airlines coping with realities that were unimaginable three years ago. This new world will prove challenging to the SIA Group, but its strong finances, skilled management team, and advanced fleet ensure an eventual return to profitability and, one day, growth. ■

Mixed fortunes

On the preceding pages we profiled Singapore Airlines. Here we look at the recent performance and prospects of some of the region's other big operators. Airlines here have been, paradoxically, the most affected by the pandemic, but also among the most profitable. For several, large domestic markets and strong activity in the cargo market have enabled them to remain firmly in the black.



China Southern has benefited from domestic market demand

China Southern Airlines

The fortunes of China Southern Airlines, as with the other big two Chinese operators Air China and China Eastern Airlines, have been directly linked with the evolution of the pandemic in a country which has pursued a 'zero-Covid' strategy. While international traffic has been curtailed ever since the crisis hit, Chinese carriers have benefited from the large domestic market. However, this has gone from highs to lows amid efforts to keep the pandemic under control.

China Southern was able to record a profit at an operating and net level in the second quarter of 2021, and recorded the lowest loss of the big three operators when demand nosedived in the third quarter amid a fresh spike of Covid cases.

Even before the emergence of the Omicron variant, Chinese carriers were set for a tough winter. China Southern's traffic figures were 43% down year on year in November 2021. That was set against a 52% fall in November traffic for Chinese carriers as whole. Chinese airlines will continue to find some comfort in the domestic market in 2022, but the transmissibility of Omicron coupled with Beijing's zero-Covid strategy likely means many speed bumps ahead.

Fleet

Cirium fleets data shows China Southern has just over 600 aircraft in service, with another 37 aircraft grounded. That includes 24 Boeing 737 Max, which remained grounded in China a year after the first countries cleared the type to return. Chinese regulators have though now cleared the path for airlines to resume Max services.

Korean Air

The SkyTeam carrier was able to confound the crisis by making an operating profit in 2020 – one of the few passenger carriers to remain in the black, albeit this was driven by its strong air freight activities. That positive performance has continued, as an operating profit of W439 billion (\$372 million) for the three months ending September 2021 marked its best performance for five years. That included its highest ever quarterly cargo revenues.

The airline meanwhile continues to tick-off regulatory approvals in the region for its planned acquisition of rival Korean operator Asiana Airlines, first announced in November 2020.

With supply chain and shipping challenges to remain in 2022, Korean Air will focus on cargo to drive profitability. At the same time, South Korea's gradual opening to international travel will see passenger revenue start to increase – although a key market, China, remains shut.



A strong freight performance has aided Korean Air

Fleet

Cirium fleets data shows around a quarter of Korean Air's fleet remains in storage – including all but one of its 10 Airbus A380s, seven of its Boeing 747-8s and all 12 of its Boeing 777-200s.

In August, airline chief executive Walter Cho told FlightGlobal that the A380s would exit the fleet within five years and the 747-8s within 10 years.

As of the end of September, Korean still had 16 passenger widebodies temporarily configured for freight operations.

AirAsia

AirAsia has turned to digital markets



Southeast Asia's leading low-cost carrier was hard hit as international travel was all but non-existent during 2021, and Malaysia's domestic market was hammered by travel restrictions.

Indeed, a major focus for group chief executive Tony Fernandes during 2021 was not aviation, but the group's digital ventures, including the AirAsia 'Super App' that offers a range of services on the ground, including food delivery.

Still, the digital business could not offset aviation losses in key markets such as Malaysia, Indonesia and Thailand. In the third quarter to 30 September, AirAsia Aviation, the holding company for the group's airline businesses, saw revenue dive 70% year on year. A focus on cost reductions did though help narrow AirAsia Aviation's EBITDA loss to MYR150 million (\$37 million) in the quarter.

AirAsia's no frills model is likely to benefit

domestically with Malaysia opening up in earnest at the end of 2021, while it also serves key regional destinations such as Singapore and Thailand.

Still, much uncertainty remains. The Omicron variant has threatened to pause or even turn back both domestic and international travel – as Southeast Asia's thus far cautious governments reacted to the latest variant.

Fleet

Following the orders bonanza of the 2010s, AirAsia has 362 firm orders for Airbus narrowbodies. In October, the AirAsia Group converted all remaining orders for A320neos to the larger A321neo, setting the stage for a future fleet comprised exclusively of A321neos.

Three months earlier, in July, the ever-optimistic Fernandes said that discussions with Airbus about this vast orderbook had gone well, and that in the long term he was optimistic about taking all of these aircraft.

Qantas



Qantas plans to resume A380 flights in April

The Oneworld carrier enjoyed a period of strong domestic travel demand, even as Australia's international borders remained shut for most of 2021. However, this recovery was cut short when the Delta variant of the coronavirus hit Australian shores. Domestic flying activity hit rock bottom, as travel restrictions swung into force. Qantas, calling it one of the "worst" periods in the pandemic, operated at just 30% of pre-pandemic capacity.

As Australia eased domestic restrictions and reopened its borders – enabling it to resume international flights in November – Qantas again enjoyed a quick rebound in demand. The emergence of the Omicron variant though has prompted it to pause some of its international restart plans and to curb domestic capacity.

Fleet

Cirium fleets data show Qantas' mainline operation still had 18 out of 128 aircraft parked, including all 12 of its Airbus A380. But the carrier has moved forward the double-decker type's return to service, the first two of which are now set to be deployed on Sydney-Los Angeles flights from April.

Qantas in December picked the A320neo family and A220 jets as its preferred options to replace its current narrowbody fleet. The airline is also expected to firm up its commitments for the A350, which it will operate for its ultra-long-haul Project Sunrise flights between Australia and the UK, as well as the USA east coast.

Cathay Pacific

Hong Kong's 'zero-Covid' strategy, which it embraced to keep in step with the Chinese mainland, has dampened recovery prospects for its flag carrier Cathay Pacific. The airline had already been facing weakened demand from political unrest in Hong Kong in 2019 before the pandemic hit. It has since slashed thousands of jobs, shuttered its regional sub-brand Cathay Dragon, and cut its fleet in a bid to stem losses.

Cathay is forecasting a loss for the second half of 2021, albeit a "considerable improvement" from the first half of the year. That in part is helped by strong cargo activity. Still, Cathay's passenger capacity remains heavily hit, compounded by the Omicron variant. It was operating only 12% of pre-pandemic capacity at the end of last year and tighter travel restrictions for its air crew means 2022 has begun with it operating a skeleton schedule in January, with even cargo flights hit.

Fleet

As at October 2021, Cathay had a fleet of 236 aircraft, of which 68 are parked. This is a slight improvement from the 89 aircraft in storage at the mid-year point. It has taken delivery of eight new aircraft, including its first Airbus A321neos – an aircraft originally destined for the now-shuttered Cathay Dragon.



Cathay further cut capacity in January

Carlos Brana is executive vice-president civil aircraft at Dassault Aviation. He tells us about the prospects for the French manufacturer's Falcon range in Asia-Pacific and the company's contribution to the industry's sustainability drive

Q How important is the Singapore Airshow and the A-Pac region generally to Dassault Aviation?

A The Asia-Pacific region is home to about 100 aircraft of the Falcon fleet today, but they tend to be our newer, longer-range models from more recent buyers who are likely to be repeat customers. And there is a lot of room for growth. Since the inception of the Covid pandemic, we've had fewer opportunities to showcase our aircraft and meet face-to-face with customers. They've had fewer opportunities to "kick-the-tyres." So we considered it well worth the investment to be at the air show this year.

Q What infrastructure do you have in this part of the world to support customers? Related to this, what difference has the addition of the ExecuJet MRO business made?

A It's key to our sales strategy to have factory service close to the customer. ExecuJet MRO brings Dassault factory service to Australia, Malaysia, Dubai (which also provides convenient service to many Asia-Pacific operators). Just up the street from Singapore, so to speak, we're building a major new regional service hub in Kuala Lumpur, which will replace the current ExecuJet facility there. This facility has reached an outstanding level to perform heavy maintenance, including C-check inspections.

Q The pandemic devastated commercial aviation in A-Pac and in some parts of the region, including Hong Kong, it is still effectively grounded. Has business aviation prospered here as it has in other parts of the world, providing business travelers with a secure and reliable way of getting from A to B?

A China has been significantly impacted. The traffic varies by country. We're optimistic we'll revert to the long-term regional growth trend over time. Business aviation is being widely embraced. We're supporting aircraft now in The Philippines, Thailand, Vietnam, and Bangladesh, among other countries across the region.

Q The Chinese market has traditionally been the strongest in A-Pac. But as well as the government's strict zero-Covid approach affecting travel, the economy has also been slowing down from its breakneck growth seen for most of this century. How is this affecting your business?

A To some extent, I think the market is telling us to be



Doing
the
business

ready for increasing demand as Covid recedes and travel recovers. That's why we need to be here in Singapore with current products and talking about new ones, while investing, as we have discussed, in more service capacity.

Q The first 6X has just flown for completion at Little Rock. How important is this type for the A-Pac market?

A The 6X has at least five things that will be attractive in this region: advanced technology (arguably the most advanced fly-by-wire system in a business jet today); comfort—the biggest cabin cross section; range, which is 5,500 nautical miles and takes you from Paris to Hong Kong; fuel efficiency; and maintainability—the Pratt & Whitney Canada PW 812D engines, for example, require 40 percent less maintenance than other engines in their class. What the customer is going to notice first, of course, is a magnificent cabin.

Q What sort of response have you had among A-Pac customers to the Falcon 10X and does this now fill a gap in the range that you were missing against competitors such as the Bombardier Global 7500 and Gulfstream G700/800?

A The 10X will reside at the top of our line, basically matching the others on range, and upping the ante with a bigger cabin cross section and the most advanced technology. We're just starting to introduce this aircraft in detail to customers. The cabin is the first thing that gets people's attention. But we're also pointing out military tech transfer such as the 10X's Smart Throttle and automatic upset recovery mode. We're in a unique position to move these military-derived safety technologies into business aviation.

Q What sort of requirement is there in A-Pac for government and special mission variants of business jets, and what is Dassault's approach in this segment?

A I'll go back again to military tech transfer. All the OEMs offer special mission capabilities, but Dassault has unique experience in integrating certain special mission packages, for example surveillance and electronic warfare. France and Japan are prominent customers for maritime patrol. Australia uses the 7X for VIP transport. Of all the special mission aircraft in the region, we're especially proud of Beijing 999's Falcon 2000LX air ambulance, which travels the world offering the capabilities of an

intensive care unit. It has an ECMO heart-lung bypass machine aboard. Its lifesaving capabilities are nothing short of amazing.

Q Finally, a more general question. Sustainability is going to be a huge theme for the whole industry over the next five to 10 years (and beyond). Business aviation is often criticized as being one of the biggest carbon culprits. What efforts is Dassault making to both reduce the company's carbon footprint, but also to counter some of that negative publicity?

A I think the best thing one can do to counter negative publicity is to implement real emissions reducing technologies. We're doing that. At our factories, CO2 emissions are down about 20 percent in the last five years. Regarding our aircraft, we are well known for manufacturing the most frugal aircraft in our segment of aircraft. We are also promoting sustainable aviation fuel and our customers are deeply engaged in this effort. The 10X will be 100-percent SAF capable.

We're not going to see a 7,500 nm electric jet in our lifetime, so SAF has to be a key focus in addition to flight trajectory optimisation and many others initiatives currently implemented. ■

SELETAR AEROSPACE PARK

HOME TO LEADING AEROSPACE COMPANIES

Home to a vibrant ecosystem of 60 aerospace firms and over 6,000 aerospace professionals, Seletar Aerospace Park (SAP) is an integrated hub where aerospace ambitions take to the skies. With a wide spectrum of space solutions, recreational amenities, and training opportunities in one location, the integrated hub is where you can take your aerospace ambitions to new heights. Soar with us today.



jtc

BUILDING INDUSTRIES



Scan to find out more

Promoting regional services between Southeast Asia's five main airports is a critical step to restoring the sector to pre-Covid health, says a new study

Why ASEAN hubs need to reconnect



Greg Waldron

A new white paper about air travel in Southeast Asia contends that the region's Covid-hit hubs should look to boost regional connectivity.

The study observes that Southeast Asia's connections with long-haul routes have been restored faster than regional routes. This, however, should start to change in 2022.

Sponsored by the Aviation Studies Institute at the Singapore University of Technology and Design, the white paper was penned by independent aviation consultant Brendan Sobie.

It focuses on the five biggest hubs within Association of Southeast Asian Nations (ASEAN) before 2019: Singapore Changi, Bangkok Suvarnabhumi, Kuala Lumpur International, Jakarta Soekarno-Hatta, and Manila Ninoy Aquino. These five airports accounted of about 40% of passenger traffic before the pandemic.

While 50% of long-haul routes to ASEAN hubs have been restored, just 25% of international routes

within the region and just 20% of international routes between ASEAN and the rest of Asia-Pacific have come back.

"As more markets in Asia-Pacific reopen the regional international segment – excluding China – is expected to start recovering faster than the long-haul segment," writes Sobie.

"The recovery within ASEAN should be particularly fast once borders reopen and travel restrictions are lifted. There are close cultural and economic ties between ASEAN countries and there is huge pent-up demand for travel within ASEAN."

There is, however, little hope of an imminent return of the strong China traffic that the region enjoyed in the pre-pandemic era. One way to help offset this is through improved regional connectivity.

"ASEAN hub airports need to recognize the importance of regional connectivity, particularly growing and establishing connections with secondary destinations in ASEAN along with – to a lesser extent – secondary destinations in other sub-regions of

Asia Pacific," writes Sobie.

"ASEAN connectivity is their competitive advantage over hubs in other regions and is critical for driving overall growth in the post-pandemic era."

Unfortunately, opening up thinner, short-haul routes poses challenges. Sobie observes that ASEAN's big hub airports cater to larger aircraft at the expense of narrowbodies and turboprops – in essence the aircraft most effective at opening up new short-haul destinations.

Further, before the pandemic major airline groups had focused on up gauging aircraft sizes to better

take advantage of limited slots. This dynamic is still in effect owing to the large residual orderbooks held by carriers such as AirAsia, Cebu Pacific Air, Lion Air, Singapore Airlines, and VietJet Air.

"Over the medium to long term airlines may be able to adjust their fleet strategies, but such adjustments are not likely unless slot and pricing policies at hub airports are adjusted accordingly," writes Sobie.

"Capacity increases at hub airports could help facilitate such adjustments if airport slots were prioritised for new connections to secondary destinations in ASEAN." ▶

40 YEARS OF MAKING A DIFFERENCE
ATR

RESPONSIBLE*

* When you fly an ATR aircraft you burn 40% less fuel than regional jets, which means 40% less CO₂ emissions. Along with reduced noise levels, they offer a more responsible alternative, minimising the effect air travel has on the environment.

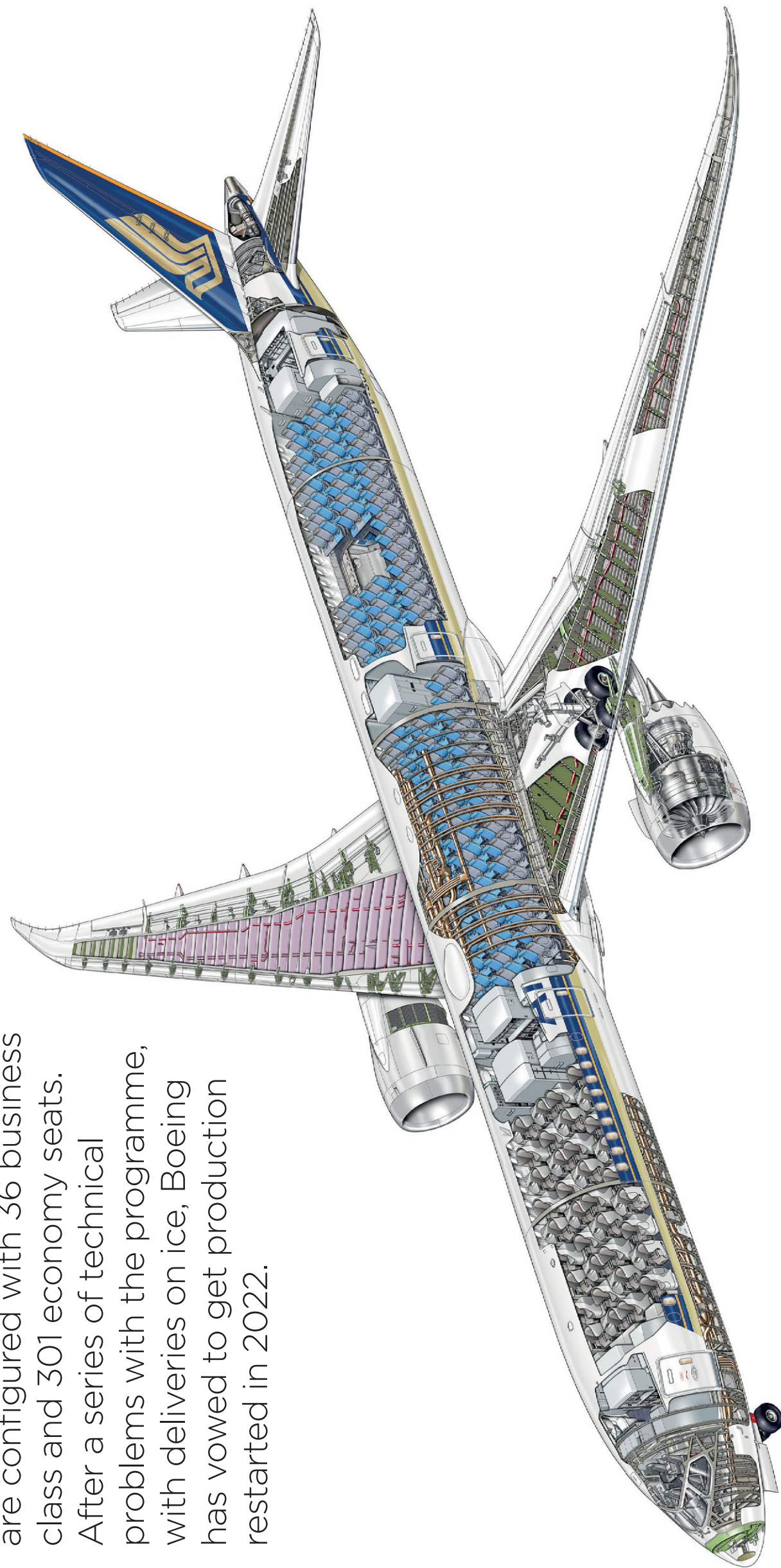
Find out more at atr-aircraft.com

into life

Boeing 787-10 Dreamliner

For the full range of *Flight International* cutaway posters and prints available for purchase, go to flightglobalimages.com

The largest variant of Boeing's 787 family is depicted by our cutaway artist Tim Hall in the colours of launch customer Singapore Airlines. The flag-carrier's Dreamliners are configured with 36 business class and 301 economy seats. After a series of technical problems with the programme, with deliveries on ice, Boeing has vowed to get production restarted in 2022.



Where are your next pilots coming from?

Right here.

Every year, we train 135,000+ pilots in our 60+ training centers worldwide. Add the 1,200 experienced pilots on assignment with airlines, placed by our aviation recruitment team, and the 1,500 new pilots graduating from our aviation academies yearly, and answering the question has never been so easy.

Follow us [#caepilot](https://twitter.com/caepilot)



Your worldwide
training partner
of choice



With two of its four passenger terminals shut indefinitely, and traffic only now beginning to pick up, a pandemic-battered Changi Airport has had to come up with other ways of making money

Alfred Chua

Most Decembers, the departure hall of Changi Airport's Terminal 4 would be abuzz with scores of travellers, eagerly waiting to depart on a Christmas or new year break.

Last year, as it was in December 2020, the snaking queues and carts have been absent. However, for a few weeks of this festive season, there was intense activity in the terminal, as scores of go-karts zipped around darkened check-in counters, with neon-lit dinosaur figurines lining parts of the track.

Further inside the terminal's transit area, a row of giant tents lined the once-busy departure gates, offering Singaporeans unable to travel the chance to stay overnight within the terminal building.

The novel attractions formed part of the Changi Festive Village, and were among the ways operator Changi Airport Group (CAG) has been tapping into alternative revenue streams to cushion the impact wrought by Covid-19.

At the onset of the pandemic, when international borders slammed tightly shut, Changi Airport quickly emptied out into something resembling a ghost town.

Traffic in May 2020 hit an all-time low: just over 25,000 passengers during the month.

In the immediate aftermath, CAG shut two terminals – Terminals 2 and 4 – amid a collapse in passenger traffic, and consolidated airline operations into remaining terminals.

With Terminal 2, CAG said then it would use the downtime to accelerate planned upgrading works. The operator said in April 2020 that it would shut the terminal for 18 months for upgrading, which would increase its overall handling capacity by five million to 90 million passengers per annum by 2024.

As for Terminal 4, which only opened in 2017, the place has seen its halls play host to a myriad of activities. When Singapore first kicked off its vaccination drive,



Greg Waldron/FlightGlobal

The departure hall of Changi Airport's Terminal 2 on 5 April 2020

it was at Terminal 4 that aviation sector workers were inoculated.

CAG said that the shutting of two terminals would help "optimise resources in tandem with the sharp decline in flight movements because of the global Covid-19 pandemic".

Perhaps CAG says it best in its full-year results for 2020, when it described the "enormous turbulence" wrought by the coronavirus pandemic. For the year ended 31 March 2021, the airport operator reported an operating loss of S\$736 million (\$548 million), reversing the S\$866 million profit it reported the previous financial year.

Said CAG chairman Tan Gee Paw then: "This has been the most difficult time in Changi Airport's history. The enormous turbulence brought about by the global Covid-19 pandemic has decimated

Changi's air traffic and severely jolted the airport's operations and future development plans."

Indeed, it is a stark reality to befall the airport, which has been constantly ranked among the world's best.

But with a lack of a domestic market, there was little the operator could do but hunker down.

Other than shutting Terminals 2 and 4, the pandemic has also forced CAG – and to some extent, the Singapore government – to reconsider airport expansion plans.

Terminal 5 was to be the airport's largest terminal – and most significant expansion project to date – and had been slated to be completed by 2030.

The pandemic, naturally, called into question the viability of the mega-project. In May 2020, then-transport minister Khaw Boon Wan announced the project would be delayed by at least two years, as his ministry conducted "a thorough study" on post-pandemic air travel demand and how it would impact the design of Terminal 5.

Singapore's transport ministry, in comments to national broadsheet *The Straits Times* on 18 January, says the project is still under review.

The ministry is "reviewing these plans as we continue to rebuild our air hub", it told the paper.

Terminal 5 forms part of the Changi East project, which also comprises a third runway which is an extension of an existing military runway, and other support and industrial facilities.

The Changi East project will also

include an expansion of cargo facilities to increase its handling capabilities to 5.4 million tonnes per annum upon completion.

In the same report in *The Straits Times*, CAG says operations from Terminal 2 will continue to be suspended in light of slower recovery.

CAG director of corporate and marketing communications Dennis Yim told the broadsheet that the airport will resume operations at Terminal 2 "in phases in tandem with traffic recovery". The operator also did not disclose a timeline for reopening Terminal 4 to passenger flights.

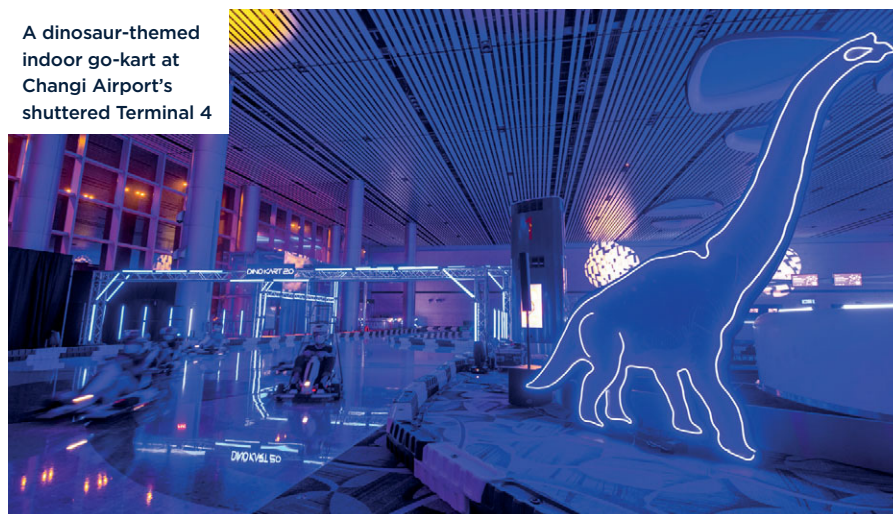
Still, there is some optimism that the airport has turned the corner, especially with the Singapore government pressing ahead with border reopening plans.

Traffic data from CAG shows the airport recorded slightly more than three million passenger movements in 2021. While this was a 74% decline year on year, and significantly lower than 2019's record 68 million passengers, traffic has been steadily – albeit still slowly – increasing in the final few months of 2021. December's figure of 817,000 passengers represents a five-fold jump compared to 2020, and is more than twice the passenger numbers reported in November.

While this is still way off pre-pandemic levels, it is an optimistic sign that Changi Airport's worst days are behind it. With the length of the pandemic still relatively unknown, it remains to be seen how different Changi will look in the not-too-distant future. ▀

Adapting to survive

A dinosaur-themed indoor go-kart at Changi Airport's shuttered Terminal 4



Changi Airport Group



UNMANNED & UNMATCHED

The new era of UAS is here. Combat-proven systems reimaged through cutting-edge technology, from AI and Automation to electronic warfare, delivering an unmatched approach to multi-domain situational awareness.

See it at #SGAirshow22

ga-asi.com

©2022 GENERAL ATOMICS AERONAUTICAL SYSTEMS, INC.



Airborne Situational Awareness
24/7, Worldwide

GENERAL ATOMICS
AERONAUTICAL



Singapore Airshow 2022

Exclusive Subscription Offer

Save
25%



FlightGlobal Premium gives you the knowledge & insight you need to make key business decisions. A subscription keeps you fully up-to-date with the latest global aviation news, insight and analysis.

Subscribe today, save 25% and receive:

- › Unlimited access to all FlightGlobal content
- › Premium Daily News Alert sent direct to your inbox
- › *Flight International* magazine in print or digital format

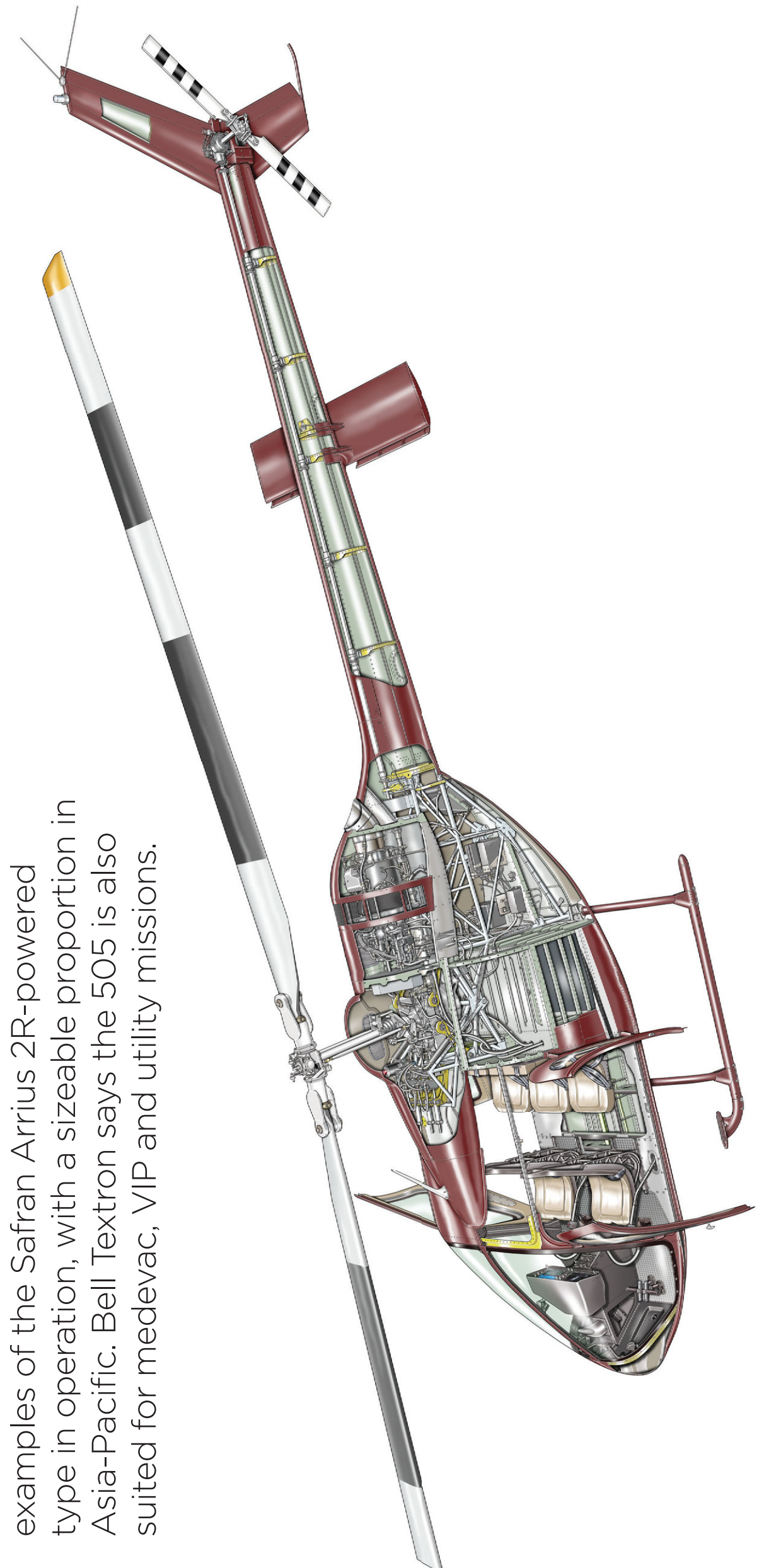
Subscribe today
www.flightglobal.com/airshow

FlightGlobal
PREMIUM

Bell 505

The Bell 505, on display at the show, has proved a market success for the Textron subsidiary since the introduction to service of the light single in 2017, including in the military pilot training sector. There are more than 300 examples of the Safran Arrius 2R-powered type in operation, with a sizeable proportion in Asia-Pacific. Bell Textron says the 505 is also suited for medevac, VIP and utility missions.

For the full range of *Flight International* cutaway posters and prints available for purchase, go to flightglobalimages.com



WE'RE CREATING A MORE CONNECTED EVERYTHING.

For today's aerospace and defense industries, data is everywhere. At Collins Aerospace, we've made it our mission to help customers harness that data to address some of the world's greatest challenges. We're giving airlines the digital tools they need to improve passenger experiences and operate more sustainably. And with our defense customers, we're helping to empower armed forces of the future with solutions that bring enhanced connectivity and situational awareness all the way to the forward edge of the battlespace.

Get in touch with us today to see how we're redefining aerospace by creating a more connected ecosystem for our customers – and a more intelligent and sustainable world for generations to come.

collinsaerospace.com



AEROSPACE REDEFINED