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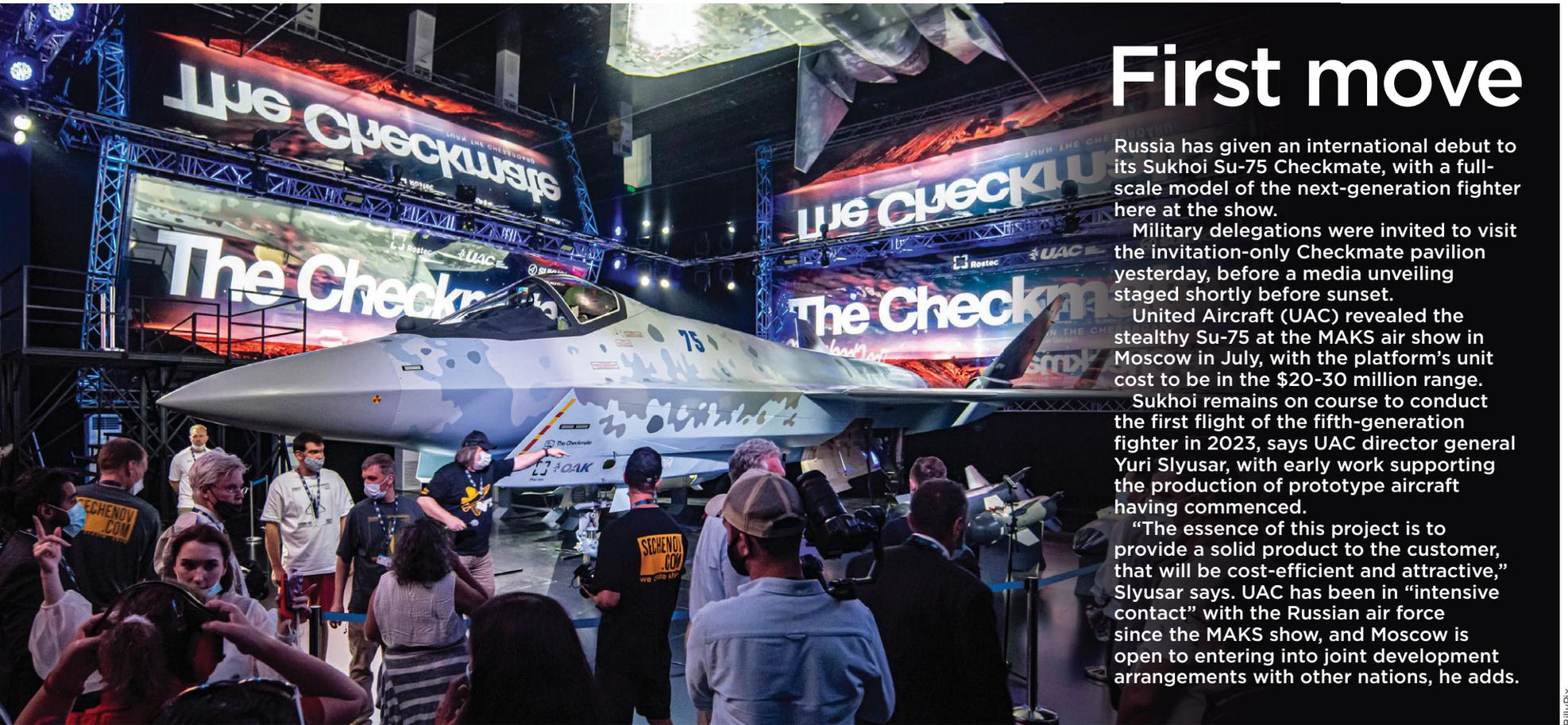
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MONDAY  
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# FLIGHT DAILY NEWS



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## First move

Russia has given an international debut to its Sukhoi Su-75 Checkmate, with a full-scale model of the next-generation fighter here at the show.

Military delegations were invited to visit the invitation-only Checkmate pavilion yesterday, before a media unveiling staged shortly before sunset.

United Aircraft (UAC) revealed the stealthy Su-75 at the MAKS air show in Moscow in July, with the platform's unit cost to be in the \$20-30 million range.

Sukhoi remains on course to conduct the first flight of the fifth-generation fighter in 2023, says UAC director general Yuri Slyusar, with early work supporting the production of prototype aircraft having commenced.

"The essence of this project is to provide a solid product to the customer, that will be cost-efficient and attractive," Slyusar says. UAC has been in "intensive contact" with the Russian air force since the MAKS show, and Moscow is open to entering into joint development arrangements with other nations, he adds.

BillyPix

# Indigo banishes the blues

Low-cost airline holding company sets show alight with Airbus order for 255 aircraft

David Kaminski-Morrow

**A**irbus opened the show with a powerful recovery signal by unveiling a huge order for 255 aircraft to be taken up by the airlines of Indigo Partners.

Its agreement for single-aisle aircraft appears to quash any suggestions, voiced ahead of the show, that the air transport crisis might mark the end of triple-figure orders for the foreseeable future.

The agreement, for A321neo variants, is an injection of optimism

for the airframer which - like the whole of the aerospace sector - has been battling to contain the impact of the pandemic on its operations.

Indigo Partners has several component low-cost carriers including Central European budget giant Wizz Air, US-based Frontier Airlines, Chile's JetSmart and Mexico's Volaris.

Executives from all the carriers were present - Wizz and Frontier's chiefs at the show, those of JetSmart and Volaris joining virtually.

Airbus says 102 jets are destined for Wizz, among them 27 of the

long-range A321XLR, 91 for Frontier, 39 for Volaris and 23 for JetSmart. JetSmart will take two A321XLRs.

Wizz Air head Jozsef Varadi said the aircraft would advance the carrier's plans to build a 500-aircraft fleet by the end of the decade. He adds the airline's new Abu Dhabi operation will probably be one of the recipients of the A321XLR.

Indigo Partners was previously behind another record order, for 430 A320neo-family jets, unveiled at the Dubai air show in 2017. Wizz Air signed for over 140 of those aircraft while Frontier took over 130.

Airbus took orders for only 27 aircraft in the last nine months of 2020. The airframer slashed its A320-family production rate by a third, to just 40 aircraft per month, and also cut back long-haul output.

But its A320-family activity has now been picking up, accounting for 257 of the 292 aircraft ordered over the first 10 months of 2021. Indigo Partners' order reinforces chief executive Guillaume Faury's justification for increased rates of production - Airbus is looking to take monthly output to 65 aircraft by summer 2023.



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# Boeing signs up new converts

Icelease and DHL Express commit to buy more aircraft as airframer steps up capacity

Graham Dunn

**B**oeing has unveiled converted freighter deals covering 20 more aircraft and announced plans to open another three conversion lines, as the flurry of demand in the sector continues.

Aircraft lessor Icelease signed for 11 737-800BCFs on the first day of the show, and details of a commitment for nine more 767-300BCFs from DHL Express will be announced this morning.

"We have spent a considerable amount of time researching various options in the freight market and we are convinced the 737-800 converted freighter is the one that fits our need and our customers' needs," says Icelease senior partner Magnus Stephenson.

He believes structural changes in the market during the pandemic mean that dedicated freighters will remain needed even with belly capacity on passenger aircraft returning to the market as international travel restrictions

continue to ease. "E-commerce has entirely changed the outlook in our opinion. The regional air cargo market will continue to expand... and is probably there to stay," he says.

Icelease will also be the launch customer at the new freighter conversion line that Boeing is opening at its London Gatwick MRO facility. Boeing will open the conversion line in 2022. Boeing is also adding two conversion lines in Canada in 2023, at KF Aerospace MRO in Kelowna, British Columbia.

Ted Colbert, chief executive of Boeing Global Services, the division responsible for conversion activity, says: "We believe that from a market perspective, over the next 20 years there are going to be up to 1,200 narrowbodies converted into freighters and about 20% of that demand comes out of the European region."

DHL Express, meanwhile, has placed a firm order for nine more 767-300 Boeing Converted Freighters, having so far taken delivery of seven of the eight of the type it previously ordered.



Ted Colbert (left) and Magnus Stephenson signed a deal for 11 737-800BCFs



## UAE orders two A330 MRTTs

Airbus Defence & Space has been awarded a contract to supply the United Arab Emirates with a further two A330 multi-role tanker transports (MRTTs).

Announced on the opening day of the Dubai air show, during the UAE defence ministry's daily contracts briefing, the deal is valued at almost Dh2.5 billion (\$680 million).

In addition to supplying the new aircraft, the deal also covers "upgrading our systems" on three in-service examples, a defence

ministry official says. Airbus says this work will take the aircraft to the MRTT's "latest enhanced version".

Deliveries of the new-build tankers will begin in 2024, the airframer says.

Two years ago at the Dubai air show, the UAE had announced its intention to potentially double the strength of its current MRTT fleet.

Based on the A330-200 widebody airliner, the MRTT has been in UAE air force service

since 2013. Its current examples are powered by Rolls-Royce Trent 772 engines.

One of its refuelling boom-equipped aircraft is on display at the show, and took part in an opening flypast on 14 November.

The follow-on contract award represents the second MRTT deal for Airbus within a matter of days.

On 12 November, Madrid finalised a deal to modify three ex-Iberia A330s to the military standard for the Spanish air force.

## ATR lands Binter and Tarom deals

European carriers Binter Canarias and Tarom have placed follow-on orders for ATR 72-600s, in deals disclosed by the manufacturer at the show yesterday.

Gran Canaria-based Binter Canarias has placed a firm order for four ATR 72-600 turboprops, with an option for one more of the type.

The aircraft will complete Binter's fleet modernisation, ATR notes, by replacing the regional airline's remaining ATR 72-500 turboprops.

If the option is exercised, the carrier will eventually have 23 72-600s in its fleet.

"The ATR 72-600 has become our flagship aircraft and... provides the backbone of air connectivity throughout the Canary Islands," says Binter president Rodolfo Nunez.

Cirium fleets data shows Binter has 17 72-600s in service, with one still to be delivered from an order for six of the type placed in 2016.

Romanian carrier Tarom has signed for three ATR 72-600s, taking to seven the number of the type it will operate.

Tarom chief executive Catalin Prunariu says: "When we began to modernise our fleet, it made perfect sense to choose the ATR."

# Moon man dreams of return

Apollo 16 astronaut Charlie Duke says private spaceflight encourages smaller firms to think big and develop technologies the whole world could benefit from in future

David Kaminski-Morrow

Almost 50 years since he became the youngest of the moonwalkers, Apollo 16 lunar module pilot Charlie Duke would be willing to return to space as an octogenarian.

"I'd do something like [Blue Origin] or SpaceX," he says in the Southern drawl familiar to anyone who heard Duke speaking to the Apollo 11 crew from mission control – "You got a bunch of guys about to turn blue, we're breathing again" – seconds after Neil Armstrong's dicey landmark touchdown.

"I wouldn't want to go to the space station for a year. But I'd like to go back again."

Duke is unhesitating as to whether returning to the Moon is important.

"Yeah," he says. "The new technology we've got, we can build a moonbase up there that's a tremendous platform for basic science, mostly in the geophysical realm. [There's] a lot of resources on the Moon. Maybe we could learn how to mine those and bring them back in a reasonable way.

"And then we can learn how to operate for long durations on another body. Whether that's going to be important for Mars, I don't know – Mars is an order of magnitude harder than the Moon."

He says the argument over whether spaceflight is worth the cost is as old as his 1972 mission. "It was basically, 'Why are we spending so much money on the Moon?'"

"We didn't spend a nickel on the Moon. It was all spent on Earth. There were 400,000 good-paying



jobs in the Apollo programme. To support [those] you had to have grocery stores, laundry, gas stations."

He says much of modern technology, now taken for granted,

is "rooted in the space programme". "It was a good investment for our country and economy."

Duke admits he had reservations about private spaceflight. But no more. "I'm all for it. I've changed my

mind. When it first started, I thought it was a waste of time and money.

"But that changed real quickly for me. Because I see the advantage of small companies doing big work. They can make decisions real quick. They have low overheads, they are making good gear, some good programmes. I think it's going to end up revolutionising space tourism, and a lot of people will want to do that."

Even before his own lunar exploration, Duke altered spaceflight history by catching rubella, exposing astronaut Ken Mattingly, and forcing a change of crew for Apollo 13 – the mission famously aborted after an in-flight explosion.

"I didn't know I had never had the measles," says Duke. "It put me to bed for a week – measles for adults isn't an easy thing to get over."

Duke credits the engineering skills of Mattingly's replacement, Jack Swigert, with playing a crucial role in the successful and ingenious rescue of Apollo 13.

"He had more knowledge of that spacecraft than anybody else in the [astronaut corps]," he says. "He knew his job."

Inspiring such engineering and exploration skill, as the aerospace industry recovers from its own prolonged battle with disease, is Duke's focus at the Dubai air show.

He is continuing the work of his late test pilot classmate, and Apollo 15 astronaut, Al Worden, supporting Kallman Worldwide's Endeavour Scholarship scheme, which sends students and teachers – including a group from the UAE – for a week's hands-on astronaut training at Space Camp in Alabama.



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## JetClub, Jetex form a jet set

Jetex has signed a memorandum of understanding with fractional ownership business aviation specialist JetClub, as the latter seeks to expand into the Middle East.

The MoU was signed on the eve of the show at the Jetex VIP terminal in Dubai.

JetClub Group founder and chief executive Vishal Hiremath says that, after developing its operations in Europe, it is exploring the Middle East as its next strategic opportunity.

"Business and leisure travel has resumed, and private aviation is a fast, hygienic, safe, efficient option. Our agreement with Jetex allows us to explore the market, gain feedback from clients and expand our service offering," he says.

Jetex founder and chief executive Adel Mardini describes co-operation with JetClub as a "natural evolution of our service offering".

He says: "Within the current

context, as we emerge from the health crisis and see a recovery in the global economy, I believe that the two companies are in an excellent position to continue to grow and further strengthen our lead in the global aviation market."

JetClub and its sister company, Jet It, operate a fleet of 14 HondaJet aircraft, one of which is on display at the show (*below*).





# Pilatus ready to reveal latest version of PC-7

Airframer unveils 'the world's smartest basic trainer' at show

Craig Hoyle

Pilatus has flown a new version of its proven PC-7 basic trainer, with a launch event for the "MKX" product due to be staged at the Dubai air show today.

Branding its update as "the world's smartest basic trainer", the Swiss airframer is displaying a prototype in the static display area. Registered HB-HHH, the single-engined trainer has a raft of enhancements over the company's most recent PC-7 Mk II.

Key updates include a new cockpit featuring three high-definition, multi-functional displays, including a large primary flight display screen.

This configuration will deliver "an easy entry into the world of modern avionics", says the company, which also highlights the airframe's "benign and forgiving flying characteristics".

Other avionics options available beyond this baseline configuration include a synthetic vision system, autopilot and traffic advisory system, Pilatus says.

Additionally, the MKX model features "improvements in the area of crew comfort, and other technical innovations".

By drawing on what it describes as a "solid certification foundation" via its earlier PC-7 models, the company says its new airframe will have a service life of at least 30 years.

Offering the PC-7 in an updated guise provides Pilatus with an enhanced product beneath its faster and more agile PC-21, which has enjoyed considerable sales success, including with Jordan, Qatar, Saudi Arabia and the United Arab Emirates.

The company has previously supplied Mk II trainers to the air forces of Botswana, Brunei, India, Malaysia and South Africa, but has no remaining orders for the model.

The UAE also has 31 earlier-model PC-7s in its current inventory.

Pilatus says its update "is now available to take on a new generation of student pilots and turn them into first class military aviators".

## Bahrain back for 2022 with 'boutique' show

The organisers of the biennial Bahrain Airshow are here to sign up exhibitors for next year's event after the pandemic caused its cancellation in 2020.

The show - which takes place on 9-11 November - has booked up 11 of the 15 biggest aerospace companies and plans to sign "at least 10 agreements" this week, says His Excellency Kamal Bin Ahmed Mohammed, minister for transport and telecommunications, who is responsible for the event.

2022 will be Bahrain's sixth iteration. The event - co-organised with Farnborough International - is a "boutique airshow" where exhibitors and delegates can meet in a relaxed environment, says Mohammed.

Since the last event in 2018, Bahrain has invested in the infrastructure of the show, which is held at an air base. "We have completely refurbished the chalets to create a modern feel," adds the minister.

Though small, Bahrain positions itself as a regional financial hub and a gateway to the Gulf's largest military and business aviation market, Saudi Arabia. The island is connected to its neighbour by a causeway - an added reason to visit the show, says Mohammed.

Along with the UAE, Bahrain signed the Abraham Accords last year, which saw the Arab country formally recognise the state of Israel for the first time.



Mohammed: Event offers relaxed atmosphere



## Towards a SAF future

The past six months has seen a surge in interest in sustainable aviation fuel (SAF) around the world, including in the Middle East, according to Air BP, which is at the show as a sponsor with the message that SAF can play a key role in reducing the industry's carbon footprint.

The aviation fuel products firm's global aviation sustainability director Andreea Moyes is speaking at today's Aviation Sustainability Conference, where one of the big questions might be when airports in the region will see an increase in SAF availability; most SAF is

currently stored in Europe and North America.

Working with local energy suppliers ADNOC and Masdar to make SAF available to airlines and other operators, Air BP plans to set up "decarbonized air corridors" between the UK and the UAE.

"SAF still represents a small amount of overall jet demand, but we are moving in the right direction - and recent months have seen us move on from a one-off, testing phase towards much more longer-term commitments," says Laura Bowden, Air BP's global marketing manager.

## Emirates displays third from last A380

The Airbus A380 on the static display is Emirates' newest example – and the third from last it will ever receive.

A6-EVQ was handed over to the carrier on 7 October, according to Cirium fleets data.

The Rolls-Royce Trent 900-powered aircraft is one of several jets in the airline's fleet to feature a special livery marking the UAE's 50th anniversary.

Emirates' final two A380s – which are also the final examples from the Airbus programme – are due to be delivered later this year.

Emirates announced in September that it was accelerating deliveries of its last three A380s, eventually bringing to six the number of its superjumbos to be equipped with a new premium-economy cabin in a four-class layout. At the same time, the carrier is beginning to retire some of its older examples.

The Dubai-based carrier also said in September that it is aiming to have more than 50 of its A380s in service by the end of the year, under plans to restore 70% of its overall pre-crisis capacity.



Airframer says demand for 'new generation' types such as the A350 will be strong in the cargo market

# Four in 10 airliners will be replaced by 2041: Airbus

**A**irbus is expecting a substantial shift in the trend to replace older aircraft types over the next 20 years, predicting that 40% of new aircraft demand will be for fleet replacement – noticeably up from its previous estimate of one-third.

Speaking ahead of the Dubai air show, Airbus chief commercial officer Christian Scherer said the airframer expects new-build demand for 39,000 aircraft over 2021-40.

He says the market has essentially lost two years of growth, and that the company's forecast consequently shares similarities with its pre-pandemic 20-year outlook.

Airbus is projecting a “corridor of recovery” of global traffic, returning to pre-crisis levels over 2023-25 – and argues that the recovery track is following the more optimistic scenario.

But Scherer emphasises that only 13% of the global fleet comprises “new generation” types such as the A320neo and A350, and that there is a “financial thirst” to replace the high proportion of older airframes.

Airbus is predicting a market for 29,700 small aircraft, plus 5,300 in the medium-sized sector and 4,000 large airframes.

It is expecting e-commerce to lift freight traffic, forecasting general

cargo growth of 2.7% annually and express freight growth of 4.7%.

Airbus puts the demand for freighters at 2,440 aircraft over the next two decades. Of these, about 880 will be new-build aircraft.

New-build demand will focus on larger aircraft, because smaller cargo jets are more likely to be conversions.

“That’s why we are excited about the A350 freighter,” says Scherer.

Airbus believes the overall demand for large freighters – carrying 80t or more – will amount to 540 aircraft, with mid-size and small freighters accounting for 900 and 1,000 aircraft, respectively.

## Universal Hydrogen to supply conversion kits to ACIA

ACIA Aero Leasing on 13 November signed a letter of intent with Universal Hydrogen to take up to 30 of the latter's hydrogen conversion kits for turboprop aircraft.

ACIA said during a briefing at the Palm Jumeirah in Dubai that it expects to place 10 firm orders for ATR 72 conversion kits “with additional purchase rights for 20 more” for “various turboprop types”.

“ACIA's diverse customer base allows us to have a major decarbonisation impact on regional aviation globally,” says Paul Eremenko, Universal Hydrogen co-founder and chief executive. “ACIA's passenger and cargo aircraft leasing customers

will be able to move to true zero-emissions operations as early as the mid 2020s, putting them in the vanguard of clean aviation.”

ACIA chief executive Mick Mooney adds: “Our lessees are actively looking for ways to decrease overall costs and reduce their carbon footprint. Collaborating with Universal Hydrogen will have a lasting impact on the environment, encouraging our customers and the communities they touch to increase efforts towards environmental sustainability.”

Universal Hydrogen is aiming to have its turboprop conversion kits in service by 2025.

Following the aircraft conversions, Universal Hydrogen and ACIA say they will collaborate on marketing



ACIA Aero Leasing and Universal Hydrogen executives sign letter of intent for retrofit kits

hydrogen fuel services to the latter's leasing customers.

Cirium fleets data suggests ACIA has a fleet of around 54 aircraft that include Embraer regional jets, ATR 72s and ATR 42s.

Universal Hydrogen is developing its conversion kit to retrofit existing regional aircraft with a hydrogen-electric powertrain that replaces the existing turboprop engines.

The conversion also accommodates, in the rear of the fuselage, Universal Hydrogen's “proprietary, lightweight, modular hydrogen capsules that are transported from green hydrogen production sites to the airport and loaded directly into the aircraft using the existing intermodal freight network and cargo handling equipment”.

The company is aiming for the turboprop conversion to be in passenger service by 2025.



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# Emirates farewell to first A380

Airbus superjumbo was delivered in 2008 and flew final service last year

David Kaminski-Morrow

Emirates is to recycle a large proportion of parts from its first Airbus A380 following the aircraft's retirement, just 13 years after delivery.

The aircraft (A6-EDA) was delivered to the carrier in July 2008, during a ceremony attended by FlightGlobal.

It flew its last commercial service from Singapore to Dubai in March 2020, just as the pandemic began to cripple global air transport.

Serviceable components from the aircraft – including its Engine Alliance GP7200 powerplants, landing-gear and flight-control systems – have been retained.

But the aircraft was subsequently deregistered and has been handed to Falcon Aircraft Recycling, with which Emirates has signed a contract to re-use much of the jet's structures and components.

Emirates says the bar and other cabin features will be converted



Delivery of the first A380 to Emirates took place at Hamburg in July 2008

into “bespoke furniture” as well as “aviation memorabilia” and retail items to be sold in a few months' time – with part of the proceeds benefiting the carrier's associated charity Emirates Airline Foundation.

The airline says the agreement with Falcon is intended to “dramatically” reduce the environmental impact of aircraft

scrappage and cut landfill waste. All the material recovery will take place in the UAE.

“Increasingly, retired aircraft are flown to remote locations and left to languish after being stripped for parts,” says the carrier.

“Traditional salvage and recycling projects focus on recovering only profitable components, thereby

leaving behind a substantial portion of the aircraft and materials that go into landfill or sit idle indefinitely for years.”

Falcon Aircraft Recycling director Andrew Tonks says the A380 programme is the company's “most ambitious project”, involving the first A380 disassembly outside of Europe.

Tonks says about 190t of material – including metal, plastic and carbonfibre – will be removed for repurposing and recycling.

He says the recovery initiative will ensure that a “majority” of the aircraft's structure will have a “second life”, adding: “Our teams are currently busy with the breakdown and final concepts for the first batch of unique upcycled items.”

The carrier's first A380 carried out 6,319 flights over its lifetime. Emirates became the primary A380 customer and is preparing to receive the final A380s to be produced, following the decision to end manufacture of the type.

Emirates Airline president Tim Clark says: “Through this initiative, our customers and fans can take home a piece of aviation history while saving valuable materials from landfill and contributing to a charitable cause.

“It's an elegant and fitting retirement solution for this iconic aircraft and our flagship.”

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## Tiltrotor stays in touch

AW609 makes Dubai show debut, as Leonardo Helicopters says flight test programme is due to be completed next year

**Dominic Perry**

Leonardo Helicopters expects to wrap up certification flight testing of its AW609 by August next year, as the tiltrotor nears the end of a decades-long development cycle.

And despite the pressures to finalise the test campaign, the manufacturer has managed to find time in the schedule to give the

AW609 its Dubai air show debut, hot on the heels of an appearance at the nearby Dubai Expo 2020 site.

"Flight testing is more than half done," says Gianfranco Cito, head of AW609 flight testing. "We expect to finish next year. Our plan is to finish in August."

But Leonardo is staying quiet on when it expects to achieve certification. "It is event based, not date based," says William Sunick, head of tiltrotor segment marketing.

"We are working methodically through the test points."

Leonardo chief executive Alessandro Profumo has previously said it would obtain US Federal Aviation Administration approval for the AW609 in 2022.

Work on the AW609 began in the late 1990s, initially in partnership with Bell, and a first flight took place in 2003. However, delays have repeatedly pushed back service entry, which now looks set for 2023.

Leonardo has accumulated more than 1,600 flight hours across four prototypes, including an aircraft (N609AG) that was destroyed in a fatal crash in 2015.

There are now three prototypes flying, split between sites in Italy and Philadelphia, plus aircraft five, which is being used for ground-test activities, including electromagnetic effects trials, before joining the flight-test effort.

Although aircraft five is a serial example, it will be retained by the company as a demonstrator, says Sunick.

The aircraft at Dubai (N609PH) arrived in the country on 13 September, having performed a 16h, multistop flight from Italy.

Cito says the visit to the Middle East is the first time the aircraft has been exposed to the region's operating conditions.

"We landed at a very sandy airport and we were not impacted by this type of environment," he says.

In all, the aircraft will be exposed to around 50 flight hours in the region, he says, providing valuable additional data for the test programme – and demonstrating that the aircraft "has very powerful air conditioning".

Aircraft six, which is destined for launch operator Bristow Group, is currently in production and should arrive by March next year, says Cito.

Sunick describes Bristow, which inherited a two-unit order via its acquisition of Era Group, as a "wonderful launch customer".

"The missions they fly are all the missions we are targeting with this aircraft; they are keen to use the aircraft and help develop that value proposition for the AW609."

However, he declines to disclose the size of the AW609's backlog and also remains tight-lipped on the status of a tentative commitment for three aircraft from the UAE's armed forces that was unveiled at the Dubai air show in 2015.

## UAE marks 50 years with flying colours

The 50th anniversary of the UAE's founding is being marked by special liveries on aircraft from four of the federation's airlines at the show.

Three Airbus jets on the static display – Emirates' A380, Etihad Airways' A350-1000 and Air Arabia's A321neo – have special paint jobs marking the occasion, as does the Boeing 737 Max 8 from FlyDubai.

The official celebrations to mark the anniversary began in April and will last until 31 March 2022. Events ramp up around the 2 December National Day holiday.

The holiday marks the day that six emirates joined together to form the UAE, with Ras Al Khaimah joining as the seventh emirate the following year.





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# Boeing widens aim for ATS

US airframer says its attritable, modular loyal wingman UAV will allow air forces in Middle East to develop capabilities that will advance their 'sovereignty objectives'

Greg Waldon

**B**oeing has been pitching its Airpower Teaming System (ATS) loyal wingman unmanned aircraft to global air forces ahead of the show. The unmanned air vehicle (UAV) was developed with the Royal Australian Air Force (RAAF) in mind, but Boeing believes there is a "significant market" internationally for the new aircraft type.

The manufacturer declines to name specific countries that it believes could become customers, although it made its case for the ATS during an October pre-Dubai air show press briefing, indicating the company sees Middle Eastern nations as potential clients.

The Boeing ATS is designed as an "attritable" loyal wingman UAV. It is being developed and funded in partnership with the RAAF, which has ordered six aircraft.

Attritables are a new class of unmanned aircraft that are designed to be so inexpensive that an air force could afford to lose many examples to combat attrition and then affordably replace them. The concept originated with the US Air Force, which defines attritable UAVs as priced between \$2 million and \$20 million apiece.

Loyal wingman vehicles are UAVs that would use artificial intelligence and other software to fly autonomously in co-ordination with manned aircraft. For example, a loyal wingman UAV might fly forward



The Boeing ATS is being created for the RAAF, but it could be sold internationally

of manned fighters, scanning the horizon for enemy aircraft and even firing air-to-air missiles in defence of its human teammates.

Boeing advertises the ATS as having "fighter-like flight performance", reaching speeds greater than 600kt (1,111km/h) and with a range of more than 2,000nm (3,700km).

The ATS has a modular nose cone that can be rapidly swapped

in the field. The nose cone can house intelligence, surveillance and reconnaissance equipment, as well as training and tactical early warning payloads, says Boeing.

At the core of Boeing's ATS pitch to global air forces is the ability to use that modular nose cone to field country-specific payloads.

"It allows an individual nation to develop their own key capabilities that help them with their own

national prosperity and sovereignty objectives," says Greg Ferguson, Boeing's director of the Airpower Teaming System programme.

Buyers of foreign military kit often require a certain percentage of an ordered product's value to be created locally, a carve-out known as an "offset".

Nations also often demand sovereign control over sensitive technologies, such as communications and computer equipment, to guard against sabotage and infiltration. Boeing says the modular nose cone on its ATS could help fulfil those objectives.

The modular nose also "gives you a lot of flexibility for how you might package your force and also how you might reconfigure that when you have a different mission to be done on the next day", Ferguson adds.

And, an attritable loyal wingman might allow an air force to grow its combat fleet for less money.

"We see customers around the world facing a similar challenge: the need to increase the force mass to match and overmatch future threats, and to do so affordably, with less risk to manned systems," says Ferguson.

Though the ATS was designed with the RAAF fleet in mind, it ought to be able to integrate with a wide variety of manned combat aircraft. "We have complete flexibility to use whatever data link or communications mechanism is needed to integrate back into the air vehicle," says Ferguson.

## FLIGHT DAILY NEWS

### HOW TO CONTACT US

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## 'Shark skin' shaves off drag



A "nature-inspired" surface film for aircraft that is claimed to improve efficiency by reducing aerodynamic drag is one of the centrepieces of Lufthansa Technik's display at Dubai.

The product - called Aeroshark - has been developed by the German maintenance, repair and overhaul specialist with BASF, and will be launched on sister business Lufthansa Cargo's 10 Boeing 777 freighters from early next year.

With 50-micrometre riblets that improve airflow, the coating "mimics the fine structure of a shark's skin", says Lufthansa Technik, which estimates that it will lead to a 1% reduction in drag for the 777 fleet.



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CFTs now globally available for Block III variants of fighter, according to Boeing

# Fuel tank fix for Super Hornets

Greg Waldron

Boeing says conformal fuel tanks (CFTs) will be available for F/A-18E/F Block III Super Hornets on the international market, and it has also resolved a 'wing-rock' issue with the T-7A advanced jet trainer.

The airframer made the remarks during a series of virtual presentations that it held ahead of the show. The presentations focused on the F/A-18 E/F Block III, F-15EX, and T-7A.

Jennifer Splaingard, vice-president and programme manager for the F/A-18E/F and its EA-18G electronic warfare variant, says that all Block III Super Hornets come with the plumbing to take CFTs.

CFTs were originally part of the original US Navy requirement to upgrade the type, but the navy suspended this element of the programme early in 2021 – the first operational Block III was delivered in September without CFTs.

"All Block III Super Hornets are plumbed for conformal fuel tanks," says Splaingard. "We're working with the navy still on the decision

of how we go forward or not with building tanks. They will be available for international customers.

"Most of the design work has been done on the tank... and all the plumbing inside the jet... we'll work with any country that has an operational need for conformal fuel tanks on how to integrate that into the platform."

Splaingard adds that the full complement of F/A-18E/Fs has been built for the Kuwait air force, and that the aircraft are now in testing with the US Navy.

Cirium fleets data suggests that Kuwait's F/A-18E/F fleet will comprise 22 single seat F/A-18Es and six two-seat F/A-18Fs.

Speaking alongside Splaingard, Prat Kumar, vice-president and programme manager for F-15 programmes at Boeing, highlighted the heavy payload and advanced capabilities of the F-15EX, including a new open mission system and a fibre optic digital backbone. The US Air Force will acquire 144 examples of the iconic type.

"There is a lot of interest in [the F-15EX] around the world," says Kumar. "The future is bright in the near-term."



In late September Boeing delivered the operational Block III Super Hornet to the US Navy

Speaking from the floor of Boeing's T-7A factory in St. Louis, Missouri, Paul Niewald, vice-president and programme manager for T-7 programmes, highlighted the trainer's digital design and engineering, which greatly simplifies production.

Niewald also says that a 'wing-rock' issue discovered in mid-2021 has been resolved. In flights with the two T-7A prototypes, it was found that the wings tended to rock left and right at high angles of attack.

"We collected more data, were able to bring that down, model it, fly some updates in our manned hardware simulator to model our simulation efforts," he says.

Following this work, a software fix was devised and loaded onto a test aircraft. A series of flights was conducted under different conditions to ensure the issue was resolved.

Niewald adds, however, that supply chain disruptions owing to the coronavirus pandemic are still to challenge for the programme, mainly due to the impact on suppliers.

He also says that Boeing will consider pitching the T-7A following a recent US Air Force request for information (RFI) for at least 100 new advanced tactical trainers. The RFI calls for an aircraft to provide initial tactical training, adversary air support, and "serve as a tactical fighter surrogate of existing and future" USAF fighters.

"This aircraft was designed with growth in mind and being able to do things besides the basic training mission," says Niewald. "What's been released is something we'll take a look at to see if we can support that need as well."

The USAF already has a programme of record to acquire 351 T-7As to replace the Northrop T-38.

## Al-Sharqiya debuts region's first five-bladed Airbus H145

Airbus Helicopters has delivered the first five-bladed H145 to Al-Sharqiya Aviation, which will operate the helicopter in Oman for helicopter emergency medical services (HEMS) missions. It is the first five-bladed H145 in the Middle East region.

Al-Sharqiya Aviation will use the helicopter to expand its onshore and offshore passenger transport and HEMS services throughout the sultanate.

Axel Humpert, head of the H145 programme at Airbus Helicopters, says the type's "excellent hot and high performance and the increased useful load the new five-bladed version offers make it the perfect choice for those missions in the Middle East".



Helicopter will be used for emergency medical services

## Wahaj partners with Honeywell on parts

Saudi company Wahaj has become the country's first "strategic supplier" of commercial aerospace parts to US manufacturer Honeywell.

Under the seven-year agreement, Wahaj will produce parts for Honeywell's wheels and brakes, power systems, engines, air and thermal systems, and auxiliary power units for a range of Airbus, Boeing and Dassault Falcon platforms.

Mike Madsen, president and chief executive of Honeywell Aerospace, says the partnership is the Phoenix-based company's first "manufacturing deployment" in Saudi Arabia.

"Wahaj's understanding of complex aerospace machining interactions, its deep engineering expertise, and its agile, collaborative approach are exceptionally aligned to the Honeywell Aerospace strategy," he says, adding that the cooperation is "aligned with the Saudi Vision 2030 project, which aims to further strengthen Honeywell's local commercial aerospace capabilities in the Kingdom of Saudi Arabia".



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# INNOVATING TOGETHER



T-7



The freight market was a bright light for lots of airlines during the crisis as demand for air cargo soared. But now as the world reopens, carriers are battling with supply chain and other challenges

# Feeling the load



Some 70% of Qatar Airways' revenues came from freight during 12 months of the pandemic

**Lewis Harper**

The air cargo sector has been a rare positive story for many carriers amid the devastating impact of Covid-19 on passenger traffic - and the Middle East is no exception. As economies reopen, however, servicing that demand is proving to be a significant challenge amid supply-chain issues around the world.

Cargo revenues quickly became a lifeline for many airlines in the Middle East and elsewhere in the early days of the pandemic, with dedicated freighters being joined by dozens of temporarily converted passenger jets.

The transportation of Covid-19 vaccines and pandemic-related medical equipment gave carriers rare positive news stories at the height of the crisis, while the grounding of most of the world's commercial fleet left the buoyant demand for air freight in the hands of those still operating aircraft.

Amid that environment, the hub-focused operations of the Middle East region's biggest airlines put operators in a strong position to take advantage of the cargo boom, in sharp contrast to their fortunes with passenger travel.

Many airlines have since spoken

of cargo becoming central to their network-planning decisions for the foreseeable future.

Today, however, as economies bounce back quickly from Covid-19, logistics chains are being tested to the limit. Continuing pandemic-related restrictions in certain markets are happening alongside labour shortages, among other factors, complicating the freight journey.

Cargo demand remains strongly

in airlines' favour, but there are now plenty of headaches along the way.

As a case in point, Dubai International airport was forced to restrict air freight imports for a few days in mid-October amid what handling specialist Dnata describes as "unprecedented levels of cargo movements through Dubai".

The import restrictions ended on 19 October and Dnata says that Dubai is now "ready to meet

the requirements of the global air logistics community over the coming peak season", having implemented "additional measures including accessing supplementary warehousing capacity".

That is important, Dnata says, because "with global cargo capacity constrained due to pandemic related restrictions, shippers and freight forwarders have been increasingly opting to transport cargo through Dubai, a major global hub with strong infrastructure and global connectivity to ensure their goods reach customers on time".

## Challenges

Dubai is by no means alone in having experienced challenges as it tries to service booming air freight demand. And those supply-chain issues are likely to be a feature of the market for some time yet.

"Hopes for an end to disruption around Chinese New Year look unlikely to be realised," wrote analysts at Bernstein in a late-September report on the global market. "Supply chains have been under immense pressure, transportation demand is relentless, ports are unable to cope, and a bullwhip effect continues to reverberate globally."

The "emerging view" is, therefore, that the market will normalise "more



DNATA described cargo movements through Dubai this year as 'unprecedented'

# 9.1%

Global air freight demand measured in cargo tonne kilometres was up 9.1% compared with September 2019

likely in the second half of 2022", according to Bernstein.

In theory, as airline association IATA said in early November, supply-chain congestion around the world is a positive driver of air freight demand, as businesses with low inventory-to-sales ratios seek faster transportation methods.

IATA also states that despite already-high air cargo fares trending upwards in recent weeks, they remain historically favourable versus shipping costs.

"In September, it was on average three times more expensive to send a kilogram of chargeable weight using air compared to ocean, compared to 12.5 times more prior to the crisis," IATA says.

The conundrum for airlines is the more air freight they handle, the more exposed they are to the supply-chain chaos.

Indeed, the International Air Cargo Association (TIACA) - which represents airlines, shippers, freight forwarders, ground handlers and airports - warns that the sector faces "unprecedented challenges" in terms of logistics as it heads into the final weeks of the year.

## Pressure

The pandemic had already put "relentless pressure" on air cargo providers, TIACA explains, as the industry worked to meet high demand for shipments of PPE, e-commerce products, vaccines, perishables and other critical cargo, "while economies and society went into lockdowns then reopened".

Air cargo operators have met that demand while grappling with work and quarantine restrictions for crew, handling staff and other key workers. Crucial parts of the wider logistics chain have battled similar issues, further complicating the operating environment.

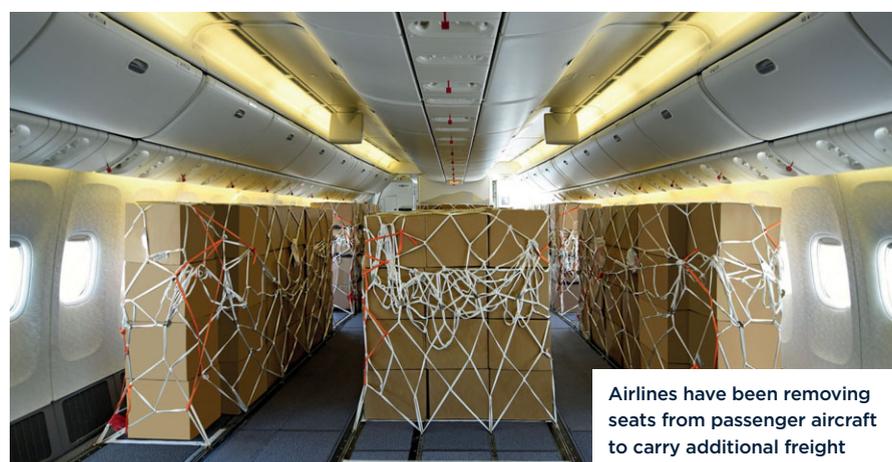
As the year-end approaches, even higher e-commerce demand, among other market drivers, is expected to put more stress on the system, particularly amid Covid-related worker restrictions in countries such as China, which TIACA says are "causing cargo to be disbursed across neighbouring countries and airports, causing further challenges".

The air cargo association also notes that with passenger demand still depressed in many markets, the sector is unable to rely on the 45% of freight capacity that came from such services pre-Covid.

"This will create further operational challenges, with freighter networks currently operating at unprecedented



Emirates supplemented its freighters with modified 777-300ERs



Airlines have been removing seats from passenger aircraft to carry additional freight

levels of efficiency, utilisation and optimisation," TIACA states.

IATA concurs, saying that the "biggest constraint" on airlines meeting air freight demand is likely to be a lack of capacity - particularly in bellyholds, as parts of the passenger fleet remain grounded.

At the same time, TIACA notes that the maritime industry is facing its "own issues with ever growing port congestion, hinterland transfer delays, blank sailings and rising costs of shipping".

As a result, the cargo body says, "many shippers, faced with such challenges to traditional supply chains, are exploring air cargo to ensure customer demands can be met", further stress-testing the airline system.

If the air cargo sector can handle the logistics challenges, however, the rewards might continue to be rich, as shown in IATA's most recent traffic data for the Middle East.

Among the global regions, only North America and Africa - a tiny market to begin with - have seen stronger growth in air cargo demand in 2021.

For January-September 2021, freight traffic among Middle Eastern carriers - measured in cargo tonne kilometres (CTKs) - was up some 13% against 2019 levels. Capacity was down 10.4%, pushing load factors to 58.1%.

For September, the Middle East's

airlines saw a particularly strong performance, with CTKs up 17.6% versus pre-crisis levels, on capacity 4.1% lower.

Global air freight demand measured in cargo tonne kilometres was up 9.1% compared with September 2019, with capacity 8.9% below pre-Covid levels.

## Performance

In their most recent financial reports, several of the Middle East region's carriers reported huge contrasts in the performances of their cargo units against ailing passenger operations.

For the year ending 31 March 2021 - which essentially covers the height of the Covid-19 crisis - Emirates described its SkyCargo unit as having "put in a stellar performance by rapidly responding to new demand in a changed global marketplace, contributing to 60% of the airline's total transport revenue".

Emirates SkyCargo's 10 Boeing 777 Freighters were supplemented by 19 modified 777-300ERs, from which the seats in the economy cabin were removed to make room for more cargo.

In its report covering the same period, Qatar Airways notes that its cargo division continued to operate its full fleet of freighters - 26 777Fs and two 747-8 Freighters - alongside "bellyhold flights and passenger freighters" to maintain

global supply chains at the height of the pandemic.

Some six 777-300ER jets were converted into temporary freighters to augment the carrier's capacity.

At times, Qatar Airways more than tripled its daily services, "operating a record 183 cargo flights a day in the month of May 2020", it states.

All told, of Qatar Airways' transport revenue, around 70% came from cargo services during the 12 months, compared with 21% in the previous fiscal year.

For those carriers and others, indications are that the strong demand for air cargo is likely to be a continuing trend - if the wider economy holds up.

Of some concern as 2021 draws to a close is the "strong increase in prices, both for businesses and consumers", which could eventually put the brakes on demand around the world, IATA says.

The association highlights input costs paid by producers in August, which saw the largest increase since records began in 1983, at 10.8% year on year. Moreover, consumer price inflation for all goods was at 4.3% in September, the biggest rise since 2008.

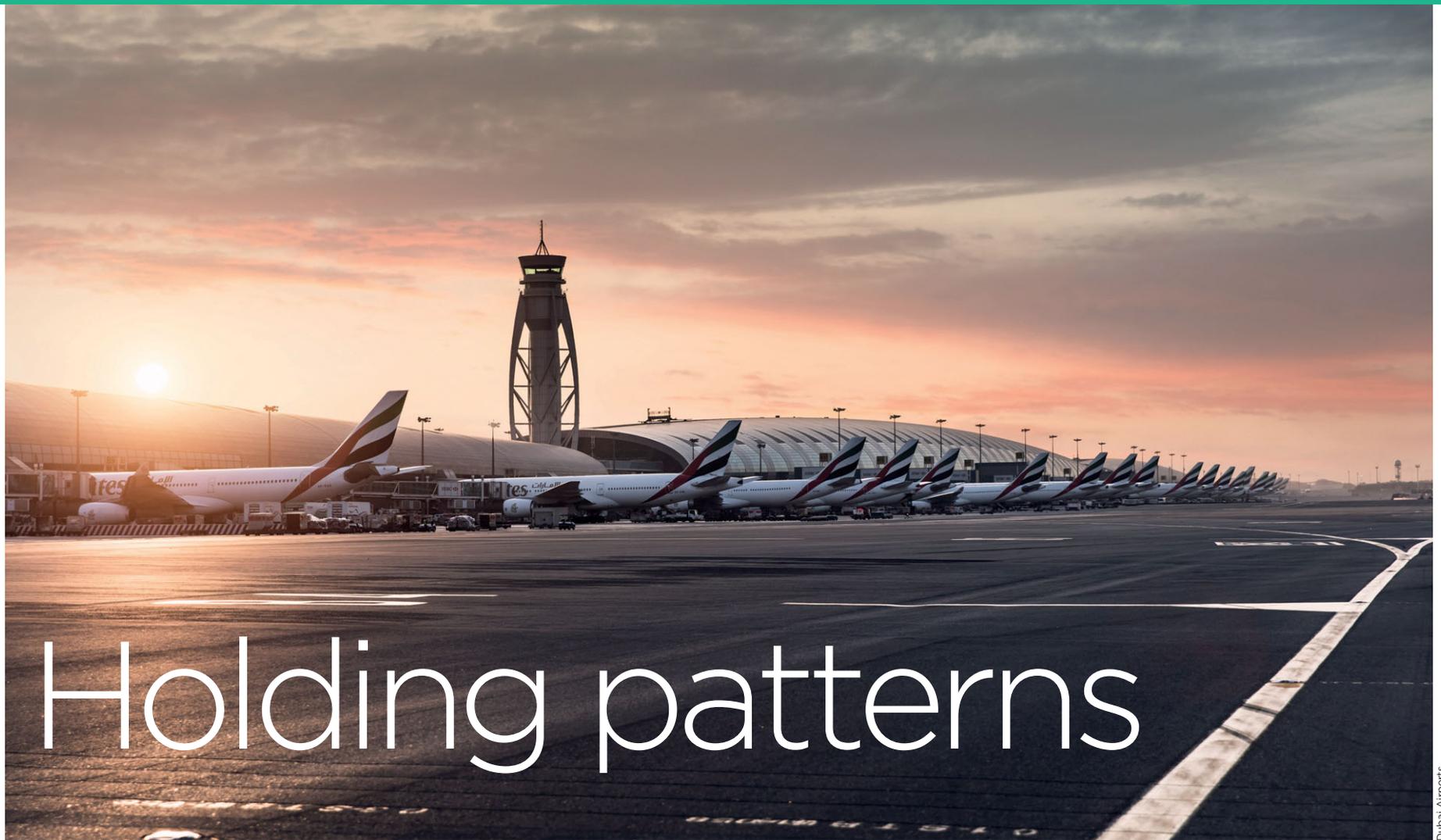
While purchasing managers index data has still been positive, "the pace has slowed, and the peak of the recovery has passed", according to IATA.

Ultimately, this "tangled situation" means that while "air cargo benefits from its speed and relative affordability, which will allow it to continue to over-perform overall goods trade", growth could weaken "if global demand falls significantly", it says.

Such observations are making airlines cautious about excessive investment in air cargo expansion when underlying drivers of high demand are likely to be temporary phenomena.

For Middle Eastern carriers and those around the world, servicing the air cargo sector during the Covid-19 recovery has become very much about taking the rough with the smooth. ▀

The pandemic put a hard stop to the expansion plans of the Gulf's big airports. But there had been indications that things were slowing down before March 2020



# Holding patterns

Dubai Airports

**Murdo Morrison**

Before the Covid-19 crisis, there were signs that the seemingly relentless growth of the Gulf's giant hubs may have been peaking, despite the rulers of Qatar and Abu Dhabi pouring billions of dollars into expansion projects at their own main gateways in a bid to match the success of Dubai International.

DXB had, during the 2010s, captured the title of busiest international airport from London Heathrow. However, in 2018, passenger numbers increased by just 1% to 89.1 million – the weakest rate in a decade. This fell to 86.4 million in 2019. Dubai's ambitions to create an even bigger replacement for DXB at the city's second airport, Al Maktoum International, had for several years been slipping to the right of the original mid-2020s target.

Meanwhile, less than an hour's drive from Al Maktoum airport in the south of the city, the opening of Abu Dhabi's showpiece Midfield Terminal – originally scheduled for 2017 – had stalled as a result of construction delays and the collapse of domestic airline Etihad's strategy of building a global alliance of affiliated carriers.

Then came the global aviation shutdown in April 2020. That, of course, was a near-killer blow for

airport businesses whose models were based largely on providing long-haul transit connections. Only now, with the likes of the USA opening its borders to most countries, and Asian states making tentative steps back to normality, have Dubai, Doha and Abu Dhabi begun to recover.

All three airports continue to face challenges. Dubai Airport's forecast for 2022 sees traffic recovering to roughly two-thirds of pre-pandemic levels. Abu Dhabi's Midfield Terminal is still not open, although a new contractor has been given the task of finishing the job. And the authorities in Qatar are hoping for a substantial traffic – and profile – boost from next year's football World Cup.

Paul Griffiths, the chief executive of Dubai Airports, has been able

to change his focus from “managing a downturn to managing a recovery” in the past few months. Dubai's “progressive strategy” of opening its economy to tourism as soon as was practical in 2020 meant that traffic began returning for DXB much earlier than for many of its international counterparts, he says.

### Controlling Covid

A rapid vaccine rollout, a system of giving rapid PCR tests to arriving passengers, and high levels of compliance with measures to control the spread of Covid-19 also helped restore confidence in the hospitality sector, with visitor numbers back to 80% of pre-pandemic levels by the fourth quarter of 2021. That bounce in inbound tourism has certainly helped DXB's recovery, Griffiths believes.

Re-establishing DXB's reputation as an intercontinental crossroads has been harder. “The biggest problem has been the insecurity of regulation changes,” he says. “Many of our customers faced complying with three sets of travel regulations – from their home country, their eventual destination, and Dubai itself.”

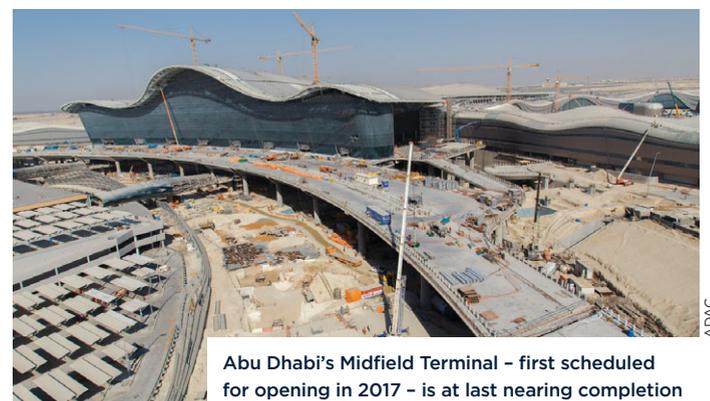
While the early establishment of “travel corridors” with the likes of Italy helped open international routes, the reluctance of many Asian countries to relax border restrictions – inbound passengers often face quarantining for up to two weeks – means traffic to and from that region “remains sluggish”.

However, “the recovery is giving us great cause for optimism”, says Griffiths. DXB is likely to finish 2021 at around 27.3 million passengers.



Ras Al Khaimah airport

In September, Ras Al Khaimah International airport announced its 'largest expansion strategy since 1976'



ADAC

Abu Dhabi's Midfield Terminal – first scheduled for opening in 2017 – is at last nearing completion

He admits that the 57 million forecast for 2022 may be “too conservative, and I may have to eat humble pie”. Likewise, Dubai Airport’s outlook for a return to 2019 numbers by 2024 “may be earlier if things continue in the direction they have been going”

Abu Dhabi Airports did not respond to our request for an update on the opening of the Midfield Terminal, but said in 2019 that construction was 97.6% complete. A few weeks ago, Abu Dhabi-based project company Trojan Holding was awarded the contract to finish it, after the 2012 agreement with the original consortium was cancelled.

#### Football fever

In Doha, Qatar Airways’ base Hamad International - which opened in 2014, replacing the city’s older airport - is undergoing an expansion that will see its capacity increase to 58 million passengers before the FIFA World Cup begins in November 2022. A second phase will see capacity grow to 60 million per year.

There have also been significant investments elsewhere in the Gulf. The emirates of Sharjah, Fujairah and Ras Al Khaimah all operate their own international airports. The latter in September announced its “largest expansion strategy since 1976” under new chief executive Atanasios Titonis, based on bringing tourist flights directly into the city and expanding cargo.



Dubai Airports chief executive Paul Griffiths says he is now managing a recovery, instead of managing a downturn

In January, Bahrain - home to Gulf Air - opened its passenger terminal, four times larger than the 1970s-era one it replaced. As “the most modern boutique airport in the region”, it will support “long-term economic and tourism goals” by attracting more airlines and flights, says the operator. Oman completed

a similar move in 2018 with a new terminal at its capital, Muscat.

With some of the most modern, passenger-friendly facilities in the world, and a tourism sector that is expanding from the traditional destination of Dubai to the likes of Abu Dhabi, Ras Al Khaimah, Oman, and even now Saudi Arabia, the

Gulf’s airports are clearly positioning themselves for the recovery.

And Griffiths is especially proud of one statistic during what has been the toughest period he has had to face during his 14 years in Dubai: at no point during the crisis did DXB relinquish its crown of world’s busiest international airport. ▶



*Seamless<sup>1</sup> is just the surface*

# Saab chief executive says UAE customer is delighted with performance of Bombardier Global 6000-based surveillance system, as company broadens prospects for Gripen fighter and commits to net-zero initiatives

Craig Hoyle

Saab's Micael Johansson is attending only his second Dubai air show as chief executive, but the United Arab Emirates (UAE) and Middle East market are by no means new ground for the former head of its surveillance business area.

Johansson – who assumed the top post at the Swedish company less than a month before the last show – was present when the UAE announced a surprise launch order for the company's GlobalEye surveillance aircraft at 2015's event, and again in November 2019 when it set out plans to grow the fleet to five aircraft.

Three of the heavily-adapted Bombardier Global 6000 business jets have now been delivered, with the remainder in modification at Saab's Linköping site.

While the UAE air force has so far revealed little about the operational pedigree of its new model, Johansson says feedback received by the company indicates that "generally speaking they are very pleased with the capability and the performance of the system".

## Special delivery

"We have delivered on time and to their expectations," he adds.

Johansson's most recent previous visit to the region was to attend February's tri-service IDEX event in Abu Dhabi. "It's going to be really nice to back be at an air show again, meeting people in person," he told FlightGlobal during a 2 November interview.

Abu Dhabi-based Saab Ltd has grown to around 125 employees, including "a few Swedes", other foreign nationals and Emiratis. "We are growing that company, and focusing on sensor capability, electronic warfare equipment and training capability related to GlobalEye," he says.



Johansson: Saab is growing in Middle East



## GlobalEye wins favour in Gulf

Additional support comes from Saab Middle East, which also oversees the delivery of offset obligations for the procurement.

Johansson signed an agreement at IDEX under which Saab Ltd will commence research and development work on sensors for military and civilian applications. This activity will be performed at the Tawazun Industrial Park site, where it has had a presence since 2018.

Also in February, Saab pledged to participate in the UAE's Sustain and Enhance Emiratization in Defence and Security – or SEEDS – programme, which strives to further develop domestic capabilities. It also supports the YES! mentorship programme, in partnership with the Dubai Women Establishment.

## Positive outlook

Further good news is expected for the GlobalEye programme, after the Swedish government on 1 October put in motion an acquisition of the type to replace Saab 340-based Erieye airborne early warning aircraft. A contract – potentially for two units – might not take too long to materialise, Johansson believes.

Finland is also being offered a pair of GlobalEyes, along with 64 Gripen

Es, with an HX programme decision expected late this year or early in 2022. Saab also is awaiting the outcome of a Canadian contest, for a potential 88 new fighters, by the middle of next year.

Nearer-term, the company is getting set to present Brazil's next four Gripens later this month, as they near production completion in Linköping. Its first export buyer for the Brazilian-designated F-39 received a lead test example in 2020. The milestone will be followed by the shipment of the aircraft in pairs: respectively scheduled before year-end and early in 2022.

Sweden's next two Gripen Es also should be handed over before the end of 2021, Johansson says.

Between them, Sweden and Brazil have ordered 96 aircraft, with production to ramp up from 2023.

As the Covid-19 crisis took hold in early 2020, Saab took steps to protect its fighter programme, including opting to bring some outsourced manufacturing activities back in-house. "It was definitely the right thing to do," he says. "We couldn't have got the military type certification [otherwise]."

Separately, with its T-7 development partner Boeing

promoting the Red Hawk advanced jet trainer at the show, Johansson is clearly very happy with Saab's decision to invest in the programme. In mid-October, he opened a new factory in West Lafayette, Indiana, where rear fuselage sections will be built for at least 351 production aircraft for the US Air Force (USAF).

## Environmental impact

Meanwhile, Johansson is championing Saab's steps to reduce its environmental impact. The company recently signed the Race to Zero pledge, promising to halve its carbon emissions by 2030 and achieve net-zero status by 2050.

It has reported a 15% reduction so far this year, via the use of renewable energy and solar panels on its buildings, adapted transportation and staff travel plans, and the increased use of simulation during testing.

"It was absolutely a no-brainer for me to sign up to this," Johansson says. "We are in an industry that is as committed when it comes to [reducing] environmental impacts as any other. We protect societies, people and borders, and we do that in a professional way." ▀

  
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Gael Meheust is chief executive of GE Aviation- and Safran-owned CFM International. He talks to *Flight Daily News* about the 737 Max's return and the commitment to sustainable fuel and clean-burn technologies



# The Max factor

**Q** The Boeing 737 Max coming back to operations is obviously a great boost for CFM International, which is its sole engine provider. How is the return to service going?

**A** The return to service of the Max has been a great success, with 220,000 flights since the grounding was lifted and our [Leap-1B] engine is doing really well. The fleet globally is performing about 1,200 flights daily. During the grounding, CFM put in place a return-to-service strategy with Boeing, including all the best elements of our EIS [entry into service] process for new operators, as it was in many ways for them like getting a new aircraft. We also put in place actions for preservation of the fleet, with a huge focus on data analytics. Over this whole period, I have to say that Boeing and the airlines have been superb partners.

**Q** Safran chief executive Olivier Andries spoke recently at the Safran results of CFM output hitting around 900 units this year, up from a previous forecast of around 800. Can you give us the reasons behind this new confidence, and how you see the trajectory of recovery next year?

**A** Last year, CFM was a bit cautious, given the depth of the crisis and the uncertainty of recovery. Since the recovery has proven to be strong, our output plan has been adjusted. As from the end of October, single-aisle traffic was around 75% of pre-pandemic. In April 2020 we were lower than 20%. So there is already significant confidence that we will see traffic back to 2019 levels in 2023. Leap-powered aircraft have, in fact, returned to pre-pandemic rates faster than the global fleet

overall. We have been discussing our production plan with airframers and suppliers beyond 2023 – until then, we are confident that our supply chain can deliver. It has been a lot of work, especially given that we had to virtually stop production at the beginning of the pandemic, and then ask them to restart, but our suppliers have been fantastic throughout all this.

**Q** In June you launched a study programme called RISE (Revolutionary Innovation for Sustainable Engines), which will mature disruptive technologies for engines that could enter service by the mid-2030s. Can you bring us up to speed with progress?

**A** The RISE programme includes 300 different tests across 150 test modules. We are testing technologies from front to back and

have completed several already. Some are in progress and others will begin in development phase. Wind tunnel tests for the fan and hybrid electric system have already been demonstrated. Full engine run and flight tests are scheduled for the middle of the decade. We are now focusing on the open fan architecture. We have conducted exhaustive overviews and briefings to customers all over the world, includes Middle Eastern airlines, to get their feedback. All that input has gone into our technology roadmap.

**Q** What role is CFM International playing in the advance of sustainable aviation fuel (SAF)?

**A** CFM was a pioneer in SAF. We started ground-testing SAF on CFM56 engines in 2006. Today, CFM, together with our parent companies, GE and Safran, is in the lead on this. On 28 October a Leap-1A-powered A320 was flown with 100% SAF, and we have carried out a similar test with United Airlines. These tests are essential to promote the wider use of SAF and convince the authorities to expedite approvals of higher blends of SAF [Currently aircraft can only be flown commercially with a maximum 50% SAF blend]. With industry looking for quick wins on sustainability, SAF is a drop-in, an immediate solution.

**Q** You have a number of key customers in this region. Can you talk a bit more about the way you support these operators throughout the life of their engines?

**A** CFM has a significant footprint in the Middle East and North Africa, with 2,000 engines in service or on order with nearly 60 airlines, militaries and VIP aircraft operators. While our parent companies have their own approved service networks, CFM has always had an open network strategy, which means that anyone can offer maintenance, so long as they meet our standards. We feel this openness is important as it fosters competition and gives our customers a range of solutions.

**Q** Finally, GE Aviation and Safran this year agreed to extend the CFM International partnership, which was established in 1974, to 2050 [it was 2040]. How significant is this move?

**A** We did this because 2050 is the horizon for the world to reach net zero, so that is what we are all looking at. CFM is a major actor towards that goal with our RISE technology and other initiatives. The shareholders wanted to send a strong message to align our agreement with that timeframe. It also illustrates how committed our parent companies are to CFM remaining a driving force in the industry. ▀

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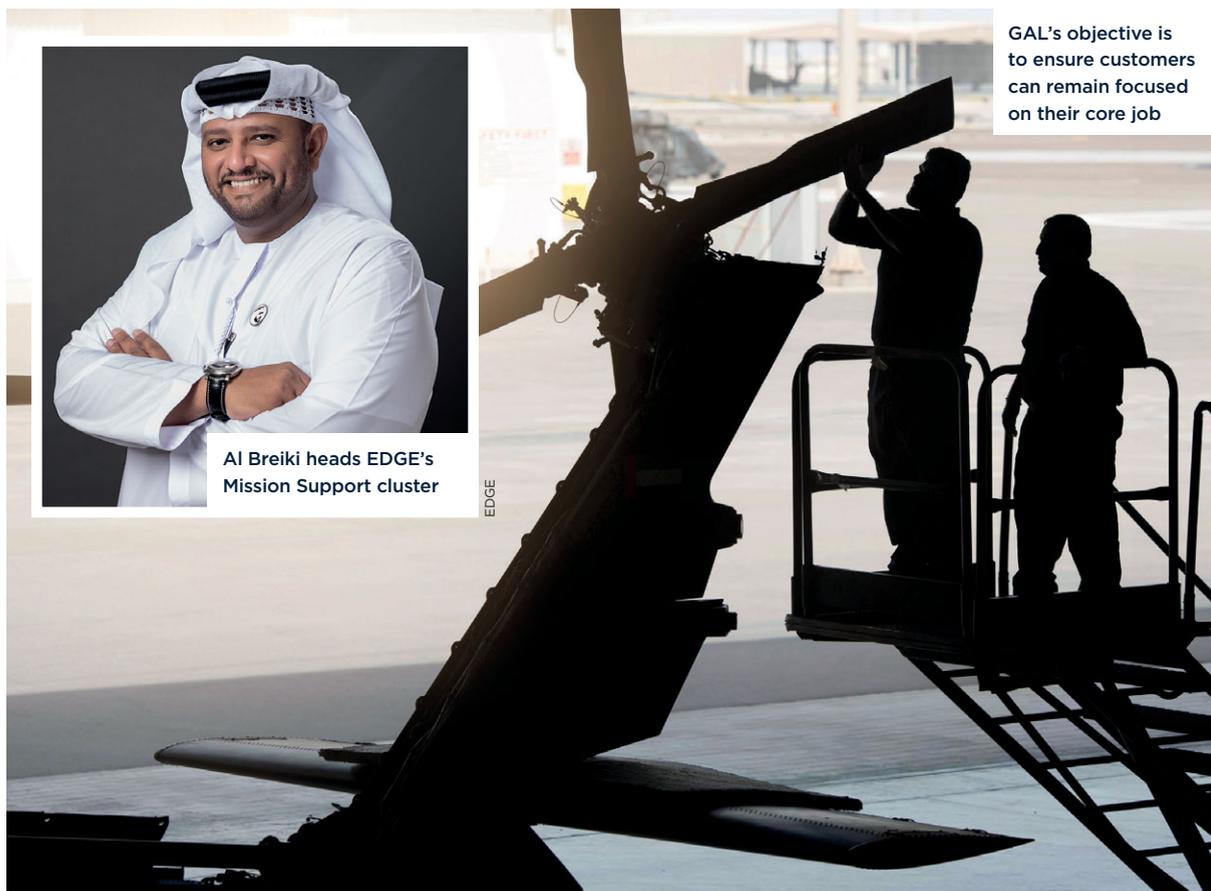
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**SAAB**

Over the three issues of *Flight Daily News* at Dubai, we look at EDGE – the new consolidated aerospace and defence group based in Abu Dhabi



Al Breiki heads EDGE's Mission Support cluster

GAL's objective is to ensure customers can remain focused on their core job

A 90-minute drive from the bustle of downtown Abu Dhabi, near the Oman border, is the oasis city of Al Ain. On the far side of its quiet airport, surrounded by red desert mountains, sits the newest and one of the most impressive independent military maintenance, repair and overhaul facilities in the industry.

EDGE's flagship infrastructure project, AMMROC's 1km sq site opened for business last year, inducting its first aircraft just as the pandemic broke out in March 2020. Since then, despite the challenges of Covid-19 restrictions, it has worked on many more. Its scale, as you approach the site from the highway that encircles the airport, is significant.

The complex comprises five, multi-purpose hangars backed by 30 workshops including a paint hangar and the most sophisticated helicopter blade repair facility outside the USA. It has airside access to the airport's runway. The main buildings total 140,000 sq m.

The site is already a centre of excellence for the Lockheed Martin C-130H, Sikorsky UH-60 Black Hawk, two types operated by the UAE and in the wider region, the Dassault Mirage 2000 engine and components, as well as the F16 engine and components. It is also a Lockheed Martin Authorized Hercules Center and has huge potential to increase its capabilities and customer base, maintains Hareb Thani Al Dhaheri, AMMROC's chief executive. He notes that the business is able to support more than 35 platforms.

"We are open to all aircraft types operating in this region and a little bit beyond, and we are gearing up our workshops and our team to be ready for expansion," he says.

#### GROWING REPUTATION

The rotorcraft opportunity is a key focus. AMMROC's experience with the Black Hawk – it is the world's only authorised armed integrator of the type – and its investment in state-of-the-art blade repair and engine testing machinery means this expertise can be "leveraged onto other platforms, with just some modifications", continues Al Dhaheri.

While the Al Ain facility is new, AMMROC has been slowly gaining a reputation in the industry since being established in 2010, initially as a joint venture with Sikorsky and Lockheed Martin, to support the UAE military with its fixed wing and rotary types.

Previously operating from hangars at Abu Dhabi's main

# Close support

GAL employees work hand-in-hand with its customers to ensure aircraft and their crews are always ready when called into action

**G**AL and AMMROC are the bedrock MRO businesses of EDGE's Mission Support cluster, but there are key differences between the two. While AMMROC carries out heavy maintenance and specialist upgrades under one roof, GAL provides on-base, first and second-line mission support to the UAE military and other agencies, managing their supplies and logistics, and keeping aircraft in the air.

A labour intensive organisation with more than 5,000 employees representing 71 nationalities, GAL is "very much embedded with the customer", says Khalid Al Breiki, president of the Mission Support cluster. Set up in 2007, initially with a focus on supporting the UAE's rotary-wing fleets, GAL has since combined both rotary and fixed-wing and has diversified into other areas of air defence.

It is based at around more than 10 customer locations, and has expertise on almost 40 platforms. Since its inception, the business has supported more than 400,000 flying hours. Among GAL's services, it provides logistics support, including managing parts inventories and other supply chain services. These can be delivered as a "stand-alone offering or part of an integrated lifecycle solution", says Al Breiki.

GAL is also looking to offer outsourced support beyond UAE borders, explains Al Breiki. "We are considering other opportunities, including countries in Africa, and others, where we can add value. Every country wants to have the sovereign capability to maintain their own platforms. We say that we can come and build that capability in-country, and then move back and provide expertise remotely," he says.

One of GAL's most interesting ventures in this field

is a joint approach with a strategic international partner, under which the EDGE business manages a bonded warehouse to speed and simplify the distribution of components for aircraft built by the OEM, whose types are flown by a number of nations in the region.

#### WELL PLACED

By having spares positioned in the Middle East, repair times on these aircraft are reduced from months to weeks, says Al Breiki. Customers save not only by avoiding having to have their own expensive inventories of spare parts, but also not having the cost and time delays of sourcing spares from the OEM's country of origin.

GAL also provides some services to the commercial sector. However, Al Breiki maintains that military MRO is a very different beast to its commercial counterpart, and not just in terms of volume. "In commercial, you often know your schedule for the year," he says. "In military, you are always reacting to threats. That makes our side of the business much harder to predict."

That is why GAL has been investing heavily in data analysis to drive efficiencies in its operations. "AI [artificial intelligence] in this business is a must," he says. "You cannot rely on what has happened in the past to predict when the next [component] failure will be. We are very focused on building data and using AI and deep machine learning, where applicable, as part of our everyday routines."

GAL's ultimate aim, says Al Breiki, is to remove all the stress of sustaining equipment in the field from the military or other operator, leaving them to concentrate on their core mission – flying the aircraft. It is also to be close at hand whenever needed. "Wherever the customer is," he says. "We are there with them." ▶

# Metal master

EPI has become a trusted producer of complex components. Its CEO explains how investing in the latest equipment has led to it rapidly rising up the value chain

# Maintaining excellence

AMMROC has constructed one of the most modern MRO facilities in the world, with the aim to becoming one of the industry's leading providers of specialist services this decade



AMMROC is able to support more than 35 platforms from the Al Ain facility

Al Dhaheri: AMMROC's relationship with former shareholder Lockheed Martin remains strong

international airport, the move to dedicated premises in Al Ain, with room to expand, is part of a strategy to become one of the world's top 15 military MROs within "the next few years", says Al Dhaheri.

Since 2020, AMMROC has been exclusively owned by EDGE, although Al Dhaheri says the relationship with Lockheed Martin (now the parent of Sikorsky) "remains strong", with OEM approvals in place for most repairs and modifications.

Aside from the main hangars, the site - which employs just under 600 staff, from 24 nationalities, but with a growing 31% contingent of Emirati nationals - contains two secure US ITAR [International Traffic in Arms Regulations] controlled buildings, strictly out of bounds to all except those with special clearance.

While AMMROC is the region's only certified MRO centre for the C-130 and its civilian counterpart the L-100, it has also carried out work on other transport types, including the Airbus Military CN-235 and A330 MRTT (Multi-role Tanker Transport).

Its work for the domestic customer means the business is one of the world's only third-party MRO service providers that has the experience and capability to execute a national air force fleet-wide performance-based logistics (PBL) programme, says Al Dhaheri.

The expanse of the AMMROC complex is matched by the scale of EDGE's ambition to become a major player in military, and commercial, MRO over this decade, with the capacity and capabilities to attract customers from all over the Middle East and further afield. Its location in the UAE means much of Africa and Asia is within easy reach. Those hangars and workshops could be even busier in the coming years. ▶

EPI has been in the aerospace industry just 10 years, but in that time has become one of the Middle East's foremost precision engineers of build-to-print aluminium and titanium components. Based, like several of its fellow EDGE companies, in a factory on the large Tawazun Industrial Park in Abu Dhabi, EPI is unique among the group's defence- and security-oriented businesses in that it focuses mainly on commercial aircraft parts. Airbus, Boeing, Dassault and Stelia are among its customers.

Founded in 2007 and producing its first shipsets for Airbus four years later, chief executive Christian Ziehe says EPI is well placed to meet the demands of the OEMs - including its biggest customer, Airbus - as they emerge from the crisis and boost output to beyond 2019 levels. "We were fortunate in not having to release a single staff member due to the Covid-19 economical impact, and instead were able to invest," says Ziehe. "Now we are in a great position to ramp up with the manufacturers."

That investment is clear to see during a tour of EPI's deceptively-expansive and highly-automated production plant, where fewer than 150 staff, working up to three shifts, operate more than 50 CNC machines and other high-tech industrial kit. That includes what must be one of the supply chain's most impressive surface treatment and paint facilities. It went into operation in 2019 and has been approved by Airbus, Boeing and Dassault.

EPI, which is part of the Mission Support cluster within EDGE, has been striving to shift up the value chain since it began making Airbus components as part of an offset requirement a decade ago. The installation in the past few years of medium-bed and then long-bed cutting

equipment, as well as the surface treatment capability, increased the range and size of products that EPI could offer, and the company is moving into sub-assembly, delivering complete structures to its customers.

#### INTEGRATED OFFERING

"This is the growth part of the business," says Ziehe, who, after spending 20 years in the defence industry in Germany, has worked for Tawazun in Abu Dhabi for the past decade. The company's long-bed CNC machine, which is able to shape parts up to 6m long, is the only one in the region, he says, and helped the company win contracts.

While EPI is a build-to-print manufacturer and does not design engineer parts, its investments in specialist equipment and talent - both home-grown and drawn from the wider aerospace industry - mean it now has a capability beyond simple machining components, says Ziehe. It can offer design enhancements and modifications, or even re-engineer existing components, with "quality and precision at every step".

With experience manufacturing military components for the likes of BAE Systems, and a business maintaining and repairing specialised drilling rigs for the oil and gas sector as part of its repertoire, EPI has a full, vertically-integrated offering, from taking delivery of raw material, to painting and treating finished products and providing non-destructive testing. "We work with our customers as one team, operating around the clock to provide state-of-the-art engineering services," says Ziehe.

Abu Dhabi's commercial aerospace manufacturing industry may be young. But EPI proves EDGE's com-



EPI chief executive Christian Ziehe says the company is well placed to meet OEM demands

mitment to invest in the highest quality products and service. In just a few years, the company has become a vital link in the global supply network of Airbus and other aircraft manufacturers, able to compete on quality terms with established producers from all over the world, and with a clear ambition to push even further up the value chain.

Already, every A320neo flies with parts built in EPI's Abu Dhabi plant. Ziehe hopes that, within a few years, several more aircraft types will be doing the same. ▶

Canadian manufacturer now makes business jets only – but many of these are converted for distinctive roles, from surveillance platforms to air ambulances: a versatility it will be emphasising at the show

**Murdo Morrison**

**A** slimmed-down Bombardier is at Dubai for the first time as a pure-play business jet manufacturer having divested its final non-core activities in aerostructures, regional jets, and railway equipment to Spirit AeroSystems, Mitsubishi Heavy Industries and Alstom respectively during the time since the 2019 event.

However, while the business aviation market in the Middle East remains hugely important for Bombardier and its big-jet competitors, the Canadian firm is keen to stress its Global, Challenger and Learjet brands are more than upscale time machines for wealthy travellers.

Some 550 of Bombardier's aircraft have been converted for special missions over the years, ranging from head of state transports and airborne surveillance platforms to air ambulances, says Steve Patrick, vice president of specialised aircraft, who adds: "The Middle East is a very important market for us in this area."

In fact, an example of a Bombardier aircraft-based defence asset is at the show, with the UAE air force displaying one of its Saab GlobalEye airborne early warning and control (AEW&C) aircraft, which is based on the Global 6000 long-range, large-cabin type.

The Gulf nation in January ordered a further two GlobalEyes to add to the three it already operates. The UAE signed its original GlobalEye contract in 2015 and took delivery of its third example in February this year.

Saab is also close to concluding a deal with domestic customer Sweden for two further GlobalEye aircraft to replace Saab 340-based Erieye AEW&C types, after Stockholm recently made clear its intention to acquire them, Saab chief executive Micael Johansson said in a recent company presentation.

The Swedish manufacturer has also offered two GlobalEyes to neighbouring Finland alongside 64 Gripen E fighters, as part of its



Patrick: Middle East is a very important market for us

# Bombardier's special mission



Wichita will become centre of excellence for specialised aircraft conversions

HX programme package, with a procurement decision expected later this year.

The Nordic deals would represent a boost for Bombardier's reputation as a platform partner for sophisticated surveillance aircraft. The UK Royal Air Force's Raytheon Sentinel airborne battlefield and ground surveillance aircraft, which served between 2007 and March this year, including in Afghanistan, was based on the Global Express.

"Globals are very adaptable aircraft," says Patrick. "First, there is their persistence; they can stay on station, effectively loitering for a very long time at 45,000ft. Secondly, the size of the cabin means you can get a decent-sized crew on board in comfort. Finally, the reduced cabin altitude, lower vibration and excess power capacity, plus its outstanding reliability, all make for a compelling ISR [intelligence, surveillance and reconnaissance] platform."

Bombardier has also long experience of adapting Globals

as official government aircraft. A decade ago it partnered with Lufthansa Technik on a contract to supply four Global 5000s to the German defence ministry's special mission wing for VIP transport. The German government has operated Bombardier business aircraft since the late 1980s.

Bombardier has designated Wichita as its centre for specialist conversions after announcing earlier this year that it was stopping production of its Learjet light jet family in Kansas. "As Learjet winds down, it has created capacity, so we are bringing work in [from Canada]," says Patrick. "We will be aiming to have the nucleus of our operation here, offering conversions from medevac up to AEW&C aircraft, and able to make full aerodynamic, airframe changes."

Patrick maintains that one of Bombardier's "strong points" when it comes to converting special mission aircraft is its "collaborative approach" to projects. "Our mantra is 'let's do this together', either

as workshare or us in a support role for a prime. We find that is appealing to major mission houses, and also opens the possibility of doing work overseas."

Aside from the Global, Bombardier's other brands also play major roles as specialised aircraft. The US Army uses a Challenger 650 a demonstrator for the its Aerial Reconnaissance and Targeting Exploitation Multi-Mission Intelligence System, or Artemis programme. Canada deploys Challengers as VIP transports and Swiss air rescue service REGA as air ambulances.

And, although production of the brand is ceasing, Bombardier will continue to support its extensive fleet of medevac-configured Learjets, says Patrick. "Because they are able to accommodate multiple stretchers, there is a trend for Learjets to become air ambulances in a second or third life," he adds.

Bombardier has a Global 7500 and Challenger 650 on the static display at the show. ▀

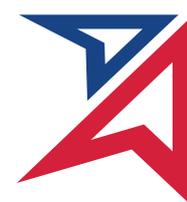


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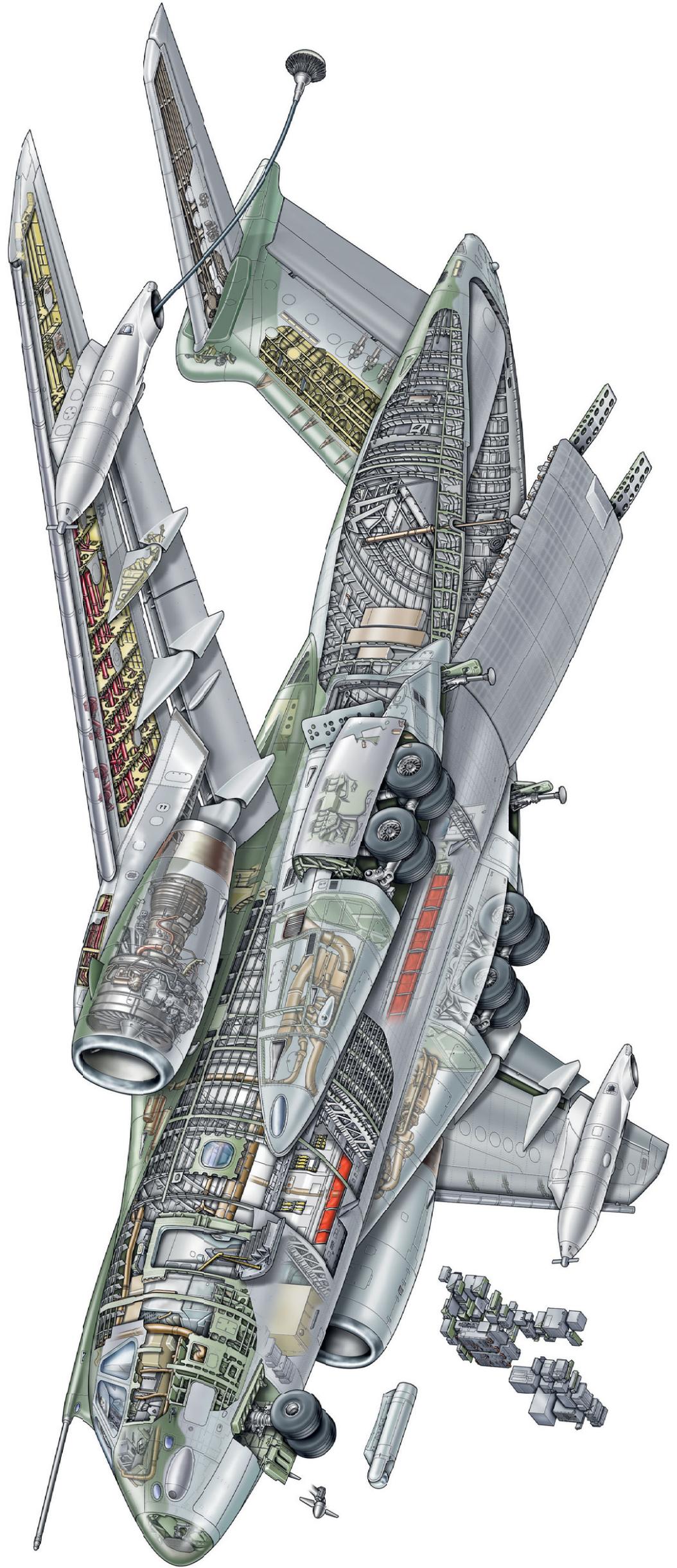
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# Embraer KC-390

Embraer's KC-390 – the largest aircraft built by the Brazilian airframer and its flagship defence product – went into service in September 2019 with the Brazilian air force, which has sponsored the development of the International Aero Engines V2500-powered transport since it was conceived more than a decade ago. This drawing was made by senior technical artist Tim Hall in 2014, a year before the type made its first flight

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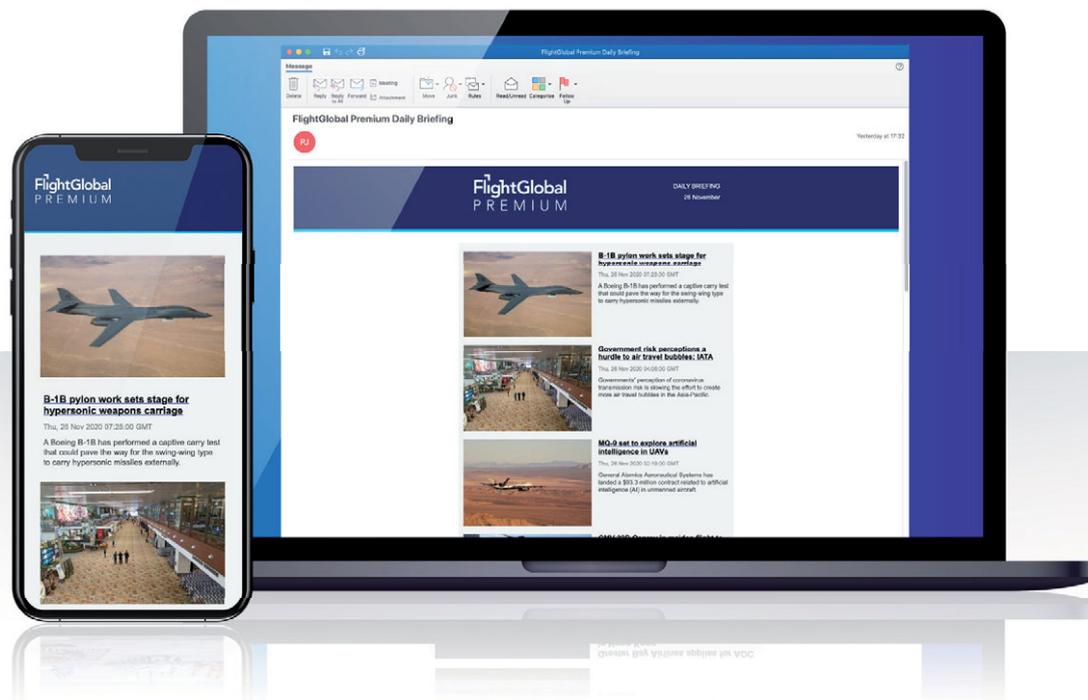


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