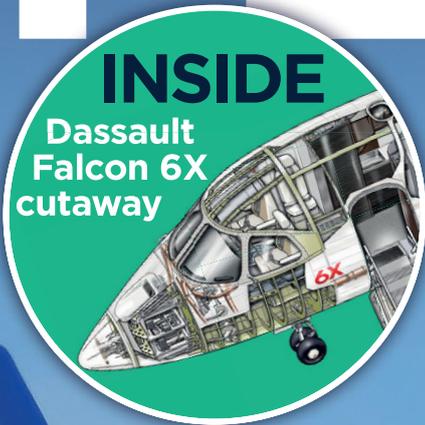


FLIGHT INTERNATIONAL



Neo prospects

Why Airbus expects A320 to soar after pandemic **p39**

Supersonic charger Boom unveils demonstrator **p18**

Let our training guide set your career path **p50**



Survival mode
Can Predator builder adapt for new fight? **p22**



On the up
How Boeing will manage 737 Max delivery backlog **p36**



E4.99

E2 PROFIT HUNTER

A different animal for a different world

- Rightsize your fleet
- Match capacity with demand
- Rebuild business profitability
- Achieve true sustainability

#E2ProfitHunter
[E2ProfitHunter.com](https://www.embraer.com/e2profithunter)



 **EMBRAER**

CHALLENGE.
CREATE.
OUTPERFORM.

No silver bullet

There are reasons to think that next year may offer more cheer than 2020, but optimism should still be tempered



The distance between us

Patrick J. Neison/Shutterstock

Most airlines are resigned to the next few months being flat at best in terms of international air travel demand amid widespread restrictions, quarantine requirements and rising coronavirus cases in many regions.

Impatient carriers will continue to burn through cash and resize operations, in the hope that next year will bring some better news. It seems highly likely that more bankruptcies are ahead, whatever the coming months deliver.

But when this crisis reaches the 12-month mark around February/March 2021, are there any reasons to believe that things will look vastly better than they do today?

The cautious answer is: yes, but there are no guarantees.

Every optimistic forecast must be tempered by a recognition that the airline industry's fortunes are inexorably linked to how quickly the virus is brought under control - a factor it cannot influence.

International air travel cannot enter a full recovery phase while the virus is as big a threat as it is today. Quite simply, most people will not commit to crossing borders while it still comes with a genuine threat of catching Covid-19, plus rapid-

ly changing travel restrictions and quarantine requirements.

That point stands despite commercial air travel being relatively safe. But within that context, there is still a reasonable chance that better news for airlines will be forthcoming in the next few months - particularly in terms of medical developments.

Important data on the final-stage trials of several vaccines should be available soon, and perhaps one or two candidates might already be in circulation come early 2021. Concurrently, progress could be made on treatments and the care of those infected with Covid-19. And come early next year, more of the world will have a better idea of what does and does not work in terms of keeping case numbers low.

More "travel bubbles" may also open up, allowing some international connectivity. Schemes such as the EU's traffic light system for tracking cases might make it easier for carriers to serve certain routes. And perhaps IATA and ACI World will get their way and a widespread pre-flight testing regime will open up more international markets.

In combination, those and other factors might put the airline industry on a much stronger footing come

the northern hemisphere spring.

But there are also plenty of developments that could further delay the significant opening up of international markets well into next year, and perhaps beyond.

The benefits of any vaccines will not be seen overnight; coronavirus reinfections could prove more widespread than first thought and immunity could be much shorter; treatments may only bring incremental benefits, not a cure; moreover, without significant medical breakthroughs and/or the virus retreating, governments might further tighten their borders next year.

The bleak economic picture - with millions of jobs lost worldwide and corporate travel demand severely depressed - must also be baked into the outlook, whatever progress the new year brings in other areas.

Ultimately, while cautious optimism about improving conditions next year is justified, pent-up demand for international flying going into 2021 is most likely to be converted into actual travel by a much improved health picture, underpinned by medical advancements.

Nothing should be taken for granted. ▀

See p6

In focus

How protests and pandemic pushed Cathay to the brink **6**

Testing times for BA boss **8**

Max closer to return **10**

Staying top of the props **12**

Subsidy row rumbles on **16**

Embraer sees bright future for regional jets **20**

From Predator to survivor **22**

Airbus shows clarity of ACJ TwoTwenty vision **24**

Starling spreads its wings **26**

Reports highlight long-term FAA fears **28**

No confidence crisis at ST Engineering **32**

Endangered species **34**

Max factors **36**



Going the distance:
Gulfstream's G600
put through its paces



Regulars Comment **3** Straight & Level **74** Letters **76** Jobs **81** Women in aviation **82**

Features

An industry on hold Assessing the position of commercial airliners in today's market **38**

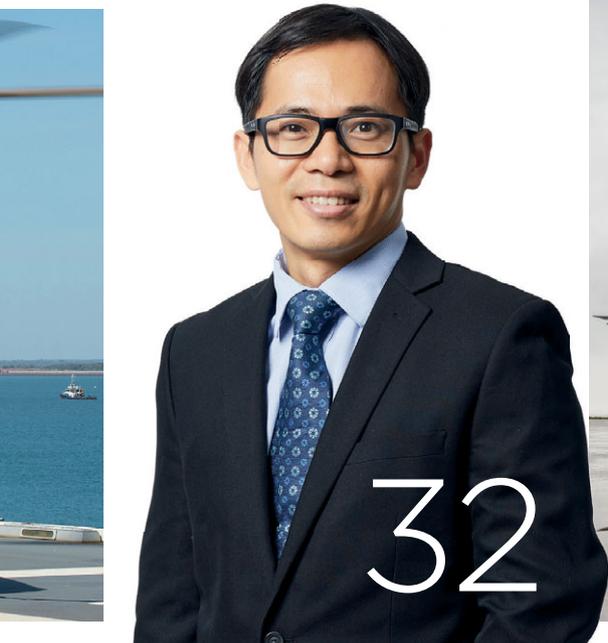
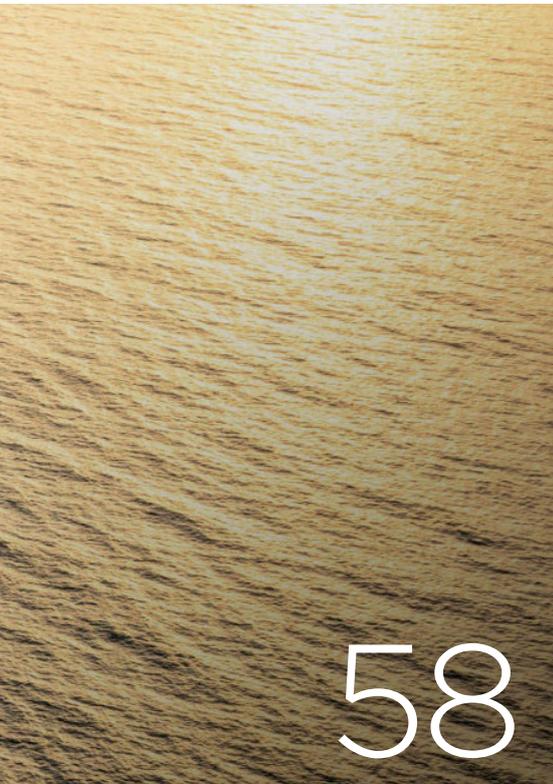
Hard lessons Progress still required in sharing pilot training performance data **46**

Train in vain? Training and development standards come under the spotlight **50**

Long ranger Gulfstream's long-legged G600 comes in for a flight test **58**

6X appeal Anticipating the arrival of Dassault's latest, most advanced business jet **64**

Always ready Our annual report on military flight simulators worldwide **70**



How protests and pandemic pushed Cathay to the brink

Anti-government demonstrations together with Covid-19 have meant a double whammy for Hong Kong's flag carrier

Alfred Chua Singapore

Cathay Pacific's 21 October announcement that it is shedding 8,500 posts and closing its Cathay Dragon brand is the culmination of more than a year of strife at the Hong Kong carrier, with the industry-wide upheaval of the coronavirus crisis adding to the financial pain already caused to the airline by local political unrest.

At the beginning of last year the carrier appeared to be turning a corner: yields were on an upward trajectory, passenger demand was healthy, and its transformation efforts appeared to be paying off.

The success of the restructuring was reflected in Cathay's full-year results for 2018, which showed a swing back into the black. It acquired HK Express in March 2019, allowing it to expand into the low-cost market.

Six months later, Hong Kong was veiled in clouds of tear gas as anti-government protesters took on the authorities, and any momentum Cathay had ebbed away.

As the protests – demonstrations against an unpopular proposed ex-

tradition bill – wore on, Cathay began to feel the heat.

In early August, the carrier announced a significant number of flight cancellations out of Hong Kong, initially caused by an air traffic control strike.

“Rather than growing, for the first time in a long time our airlines will reduce in size”

Augustus Tang
Chief executive, Cathay Pacific

But on 12 August, protests hit fever pitch, with demonstrators occupying swathes of Hong Kong's airport. That meant that all flights, including Cathay's, were cancelled.

Days later, in yet another unexpected twist, the airline's chief executive Rupert Hogg and chief cus-

tommer and commercial officer Paul Loo announced their resignations, caught up in a controversy over crew members taking part in the anti-government protests.

August was also when the first signs of financial stress became apparent, with Cathay warning that the demonstrations could dent its revenue for the month. August also marked the start of a decline in traffic that the carrier has been unable to arrest.

Inbound traffic fell by 38% year on year in August 2019, traditionally a strong month for the carrier. Yields, which months earlier had been climbing, also took a hit.

The carrier trimmed its capacity growth for the rest of the year in order to cope with the impact of the protests.

A month later, Cathay flagged weaker financial results for the second half of the year, as continued unrest dragged its revenue down. September saw lower load factors and passenger numbers than August, and marked the third straight month of weaker traffic.

By November, the carrier said it was pushing back the delivery of four Airbus A320neo-family aircraft that were originally set to join its

Deferrals and job cuts needed to staunch financial bleeding

In addition to the lay-offs, Cathay Pacific has announced that the delivery of its on-order Boeing 777Xs has now been pushed back until the second half of the decade.

Cathay has 21 777-9s on order, dating from a 2013 agreement under which deliveries were scheduled from 2021 to 2024.

However, the airline now says that the widebody twins will not begin to be delivered until “beyond 2025”.

The fate of the widebodies has been uncertain in recent months:

in July Cathay said it was in “advanced negotiations” with Boeing to defer the 777-9s, but gave no further details.

Cathay Pacific group chairman Patrick Healy adds that there are no changes to other already disclosed deferrals.

This means that an agreement it reached with Airbus in July to delay the delivery of A350s and A321neos by up to two years is still in effect.

Healy says the latest restructuring, together with previous cutbacks, will trim

monthly cash burn by around HK\$500 million (\$64 million). Cathay estimates its monthly cash burn to be in the region of HK\$1.5 billion to HK\$2 billion.

With Cathay Dragon ceasing operations, the airline's fleet will be “incorporated into the Cathay Pacific fleet”. Those aircraft will include the A321neos that are due for delivery this year.

Healy says the closure of the Cathay Dragon operation is part of a shift towards a “more focused, more efficient and more competitive group”.



Kevin On Man Lee/Penta Press/Shutterstock

In March this year the carrier reduced its network to just 15 destinations

subsidiaries HK Express and Cathay Dragon in 2020 – the first of many deferrals to come.

The following month, the carrier announced it would cut seat capacity by 1.4% year on year in 2020 as Hong Kong's political troubles and trade tensions hurt the airline in key markets.

“Rather than growing our airlines in 2020, for the first time in a long time our airlines will reduce in size,” said newly installed chief executive Augustus Tang.

While the protests abated by the end of the year, they meant that Cathay ended 2019 in an already weakened state. Without the cushion of a period of sustained profitability, what came next would threaten the airline's very existence.

Halving capacity

Cathay, and its associate carriers, entered the new year amid the growing prominence of a novel coronavirus outbreak originating in mainland China.

By end-January, the mainline carrier, along with its Cathay Dragon and HK Express units, had halved capacity to 24 points in mainland China, as part of special arrangements made by the Hong Kong government.

Traffic figures, already impacted by the protests, plunged further – gradually in January, then rapidly from February.

HK\$2.2 billion

Extent of latest restructuring at Cathay Pacific

By March, Cathay was only flying a “bare skeleton” network of just 15 destinations, as it hunkered down to weather the crisis.

The carrier warned that its financial results for the first half of 2020 would be significantly impacted by the outbreak, disclosing an unaudited loss of over HK\$2 billion (\$260 million) for February alone.

Things got bleaker as the months rolled by: in April, Cathay despondently admitted it was “impossible to predict” when passenger demand would recover from the coronavirus crisis. The following month, the carrier said it did not “anticipate a meaningful recovery for an extended period”.

A sliver of hope came in June, when the Hong Kong government stepped in with a financial lifeline, as part of the airline's group HK\$39 billion recapitalisation plan.

Cathay group chairman Patrick Healy said that the recapitalisation was crucial for the carrier's surviv-

al, without which the airline would have collapsed.

The carrier's financial results for the first half of this year were disastrous, as it reported a staggering operating loss of HK\$8.7 billion.

Traffic has continued to remain at extremely low levels in recent months, particularly given that the airline had no domestic market to fall back upon. Cathay deferred delivery of new Airbus and Boeing aircraft and parked about 40% of its fleet in long-term storage overseas.

Business review

In addition, the carrier embarked on a business review that would determine the “final shape and size” of the group.

That process culminated when Cathay announced the job losses – 2,600 unfilled posts would be cut, along with 5,900 redundancies – and the closure of Cathay Dragon, an operation which began life as Dragonair in 1985, as part of a HK\$2.2 billion restructuring.

These measures will help the carrier reduce monthly cash burn further, says Healy, with the axing of Cathay Dragon allowing the group to better align its product offerings.

But the carrier remains pessimistic of any recovery in the coming year, disclosing that it will probably only operate at up to half capacity in 2021, given the sluggish pace of rebound globally. ▀

Testing times for BA boss

New airline chief executive warns of industry's collapse without Covid-19 screening plan

Lewis Harper London

In his first appearance since his appointment as British Airways chief executive, Sean Doyle has called for the urgent introduction of pre-flight coronavirus testing to save the UK's airline industry. Doyle told the Airlines 2050 online conference on 19 October that the "stakes could not be higher", warning that there is a "risk we will not see beyond this crisis if we do not get people flying again".

Highlighting the huge reduction in travel being seen in BA's markets, Doyle says that quarantines are not the solution to reigniting demand for international flights.



Quarantines are not the answer, says Doyle

British Airways

Even halving the current 14-day quarantine requirement - which is in place for the majority of international arrivals to the UK - would mean the country gets "left behind", Doyle believes.

Citing BA's once lucrative and extensive US network, Doyle notes that the UK flag carrier was flying to 30 cities pre-crisis but is now serving less than half that number. A recovery is unlikely without "reliable and affordable" Covid-19 testing before passengers travel, he states.

Doyle was appointed chief executive of BA in early October following the sudden departure of Alex Cruz. He had been leading IAG-owned Aer Lingus since January

2019. He complains that BA has received no information from the UK government about its strategy for restarting the sector.

Speaking during the same event, UK transport secretary Grant Shapps said the government is developing proposals for the routine testing of international passengers. Measures under consideration, however, include testing arrivals several days after they land in the UK. "We need a period of isolation and a single test," Shapps states.

A taskforce is due to report to UK prime minister Boris Johnson on testing proposals in early November, Shapps adds. He hopes that a testing regime can be rolled out for inbound travellers by 1 December, with the aim of reducing quarantine times to one week.

Shapps says that under the government's plan, passengers would pay for a private test to be taken a week after their arrival in the country, halving the required time spent in quarantine. He is hopeful the new testing plan can happen "extremely quickly", but it will be reliant on the private sector's manufacturing of sufficient tests.

An international testing regime will involve significant co-operation with other governments, so is likely to take much longer to establish, Shapps adds. ▶

No quick return for Qatar's A380s, says Al Baker

Qatar Airways does not expect to operate its Airbus A380s for at least two years, according to the Middle Eastern carrier's chief executive Akbar Al Baker.

"I don't think the A380 will get back into the skies in the short term," Al Baker told the Airlines 2050 conference, citing the type's unfavourable economics amid the coronavirus crisis.

The carrier would need to see the "growth we achieved in 2019" for it to consider reintroducing its examples of the type.

A decision to bring the superjumbo back sooner would therefore be "very foolish", Al

Baker believes. "There will not be that kind of demand, and if demand starts to increase and people start deploying the A380, you will only be able to achieve the reintroduction by dumping the price of tickets," he says. "And once you dump the price, you become unsustainable."

Airlines instead need to focus on recovering the losses incurred during the crisis, Al Baker explains.

That means "we don't think we are going to operate our A380s for at least the next couple of years", he says.

Qatar Airways has 10 A380s in storage.

The Airlines 2050 event, launched last year, is hosted by FlightGlobal in partnership with industry groups Airlines UK, BAR UK and IATA. A replay of the event can be found at: <https://flightglobalevents.com/airlines20502020>



GO BEYOND

ENGINEWISE

TOMORROW'S MAINTENANCE SOLUTIONS. AVAILABLE TO YOU TODAY.

ADVANCING THE PERFORMANCE, RELIABILITY AND HEALTH OF YOUR ENGINES.

Pratt & Whitney's complete EngineWise® service platform combines predictive technologies, tailored solutions and shared expertise to deliver unprecedented levels of support to your fleet. Reducing your costs and providing greater insights – it's how we help you operate your engines worry-free.

EXPLORE OUR DIGITAL SOLUTIONS AT [ENGINEWISE.COM](https://www.enginewise.com)

Max inches closer to return

Even as regulators prepare ground for troubled narrowbody's recertification, Boeing is shedding more orders for the twinjet

Jon Hemmerdinger Tampa

Boeing's 737 Max continues to inch its way towards a return to service, with regulators on both sides of the Atlantic preparing the conditions for that crucial milestone.

However, in the meantime, Boeing is continuing to lose orders for the re-engined narrowbody from its backlog.

In October, the US Federal Aviation Administration (FAA) released a draft report proposing training requirements for 737 Max pilots.

The FAA is accepting comments on the Flight Standardization Report through 2 November, after which it will issue final recommendations. The draft document outlines changes aimed at helping pilots better understand and respond to inputs from the Max's Maneuvering Characteristics Augmentation System (MCAS).

Specifically, it says that pilots must be taught about MCAS and "associated failure conditions", and experience, in a flight simulator, activation of the controversial system.

They must also be trained to recognise and deal with a runaway stabiliser - a condition occurring when an aircraft's horizontal stabiliser moves without pilot command.

Training must also emphasise procedures for using electric and manual stabiliser trim during non-normal conditions, and "the effects of the air loads on the stabiliser".

The draft training outlined incorporates recommendations from a Joint Operations Evaluation Board - a panel composed of regulators from the USA, Brazil, Canada and the EU.

The FAA has already issued its draft airworthiness directive for the Max, but the European Union Aviation Safety Agency (EASA) has yet to follow suit. However, the regulator confirms that it will publish the document in early November, ushering in a 28-day comment period.

In addition, EASA will by 2022 require the addition of a third



FAA chief Dickson piloted aircraft in test

Elaine Thompson/AP/Shutterstock

angle-of-attack sensor - a software-based system to work alongside the current pair of mechanical sensors. This will form part of the certification requirements on the 737-10 and will be retrofitted onto the existing fleet.

The regulatory moves followed the piloting of the twinjet by FAA chief administrator Steve Dickson. After the 2h sortie, conducted over the Seattle area and including two landings, he declared that the experience made him "comfortable" with the Max's systems, but insisted his agency will certificate the jet only when convinced it is safe.

Flight scenarios

Dickson flew 10 "flight scenarios" that involved experience with the jet's MCAS and he also experienced "all the changes made to the flight-control computers and autopilot systems", he says.

He had no difficulty maintaining safe flight, even during scenarios in which the aircraft "was significantly out of trim", he adds.

Boeing has said it expects regulators will certificate the Max in time for deliveries to resume in the fourth quarter.

But even as it readies for the resumption of deliveries, the backlog for the Max continues to shrink.

Boeing stripped 51 737 Max aircraft from its backlog in September

and received no commercial aircraft orders in the month. Year to date, excluding deliveries, Boeing has removed 1,041 jets from its backlog, including 1,006 737 Max.

The latest 51 Max aircraft deleted from the backlog include three cancellations: two from lessor BOC Aviation and one from an undisclosed customer.

An additional 48 of the type were removed to align with accounting standards. Although Boeing still holds firm contractual orders for those aircraft, it has less confidence the sales will close.

The company argues the cancellations will help maintain aircraft values and "provide Boeing with more flexibility to address the 737 Max-family backlog".

Cancellations enable the company to shuffle delivery schedules, helping ensure it can deliver Max jets as quickly as possible to other customers once regulators lift the type's grounding.

Lessors have accounted for an outsized share of Max cancellations this year, though Boeing notes it still holds orders for some 900 Max jets from the sector.

Regulators grounded the 737 Max in March 2019, following the crash of a Lion Air jet in 2018 and that of an Ethiopian Airlines aircraft in 2019 - accidents that killed a combined 346 people. ■

Staying top of the props

ATR chief Stefano Bortoli explains why support for regional airlines can play vital role in keeping communities connected

Dominic Perry London

It is indicative of the times we are living in, and the nature of the individual, that Stefano Bortoli, chief executive of ATR, both starts and finishes his interview with a plea for regional aviation.

Bortoli – now in his second year in charge of the Airbus and Leonardo-owned turboprop manufacturer – is worried that amidst the talk of billion-euro bailouts for the world's major carriers, regional aviation's voice is being drowned out.

Large airlines, he says, “have been on the radar” of all governments, and consequently at the front of the queue for financial help, while their regional counterparts “have not been supported to that extent”.

Because regional airlines are typically smaller and lack the “sophisticated” communications and lobbying teams of their larger brethren, the “critical role” they play in providing connectivity – from both social and economic perspectives – goes unrecognised, he argues.

“Regional aviation has been important in the development of many communities and this must not be forgotten,” he says, adding that: “It has been an engine of growth” globally.

“It plays an important role and needs to be supported to the same extent as national airlines,” he says.

Of course, there is a huge element of self-interest in this – without a thriving regional aviation industry, ATR does not sell any aircraft.

Bortoli readily admits the “vested interest”, noting that ATR is part of the “ecosystem of regional aviation”. However, that does not make his call to action any less valid: for those reliant on the all-weather, year-round connections those operators provide, a healthy and functioning market is vital.

“Regional aviation needs support to the same extent as national airlines”

Stefano Bortoli Chief executive, ATR

Although the world's flag carriers have been supported with large capital injections, Bortoli thinks regional airlines require “more tailored solutions”, potentially linking funding to product or performance improvements “to help them keep up with industry standards”.

While on the one hand that could include reducing the cost of train-

ing flightcrew, it also inevitably encompasses fleet renewal.

“If you look at the aircraft in operation there are a number of ageing aircraft to be replaced with those that are more efficient, more affordable, have a lower environmental footprint and which give passengers a better experience,” he says.

“Better” need not simply mean a nicer cabin, however; for regional passengers travelling relatively short sectors, better could mean a more reliable or quicker service, or one able to operate in a greater range of weather conditions. Those latter gains, argues Bortoli, could be achieved through aircraft with the most up-to-date avionics.

“As I said, [ATR] has an interest, but it's an interest that connects with the interests of local communities and a number of other stakeholders,” he says.

Covid-19 has upset the plans of each and every aerospace chief executive this year and Bortoli is no exception. Whatever strategy was to be rolled out has been replaced by firefighting, including the loss of over 200 jobs at the company.

“If you look at 2020 it has been a year of significant changes that have not been brought by me, but by a need to address the situation we are in,” he says.

An economist by training, Bortoli was appointed to lead ATR in September 2018, joining from Leonardo's aircraft division where he had held the position of senior vice-president of strategy and sales since 2017, as well as president of ATR's board. Although he also had a four-year stint at Leonardo Helicopters, he also previously worked for Alenia – one of several businesses that would eventually go on to form the aircraft division.

But once the pandemic has abated, perhaps the biggest concern for airlines, particularly for those more visibly serving local communities, will be an environmental one. Like it or not, a carrier's green credentials will in future be another performance benchmark. And, in many

ATR 72-600 offers better fuel efficiency than jet for short sectors, argues Bortoli





Former Leonardo executive has been in charge of turboprop maker since 2018

cases, government bailouts are also contingent on an airline cutting its greenhouse gas emissions.

To an extent, the introduction of new aircraft will help achieve that goal, and Bortoli is also quick to point out that a turboprop burns less fuel than a comparably sized jet. But given the focus on a post-Covid-19 reset of aviation, this seems unlikely to placate those treating aviation as a polluting punchbag.

So what can ATR offer? In the short term, little beyond “incremental improvements”, admits Bortoli, noting that the engines and aerodynamics of its aircraft are already “very efficient”.

However, that is not to say the airframer is content with the status quo: discussions are under way between the company and its joint shareholders over plans to develop low-emission technologies on the twin-turboprop, with a roadmap hopefully agreed by early 2021.

Bortoli believes the ATR 42 and 72 are ideal platforms on which to trial new technologies, likely some form of hybrid-electric propulsion, although this could also cover a hydrogen fuel-cell-based powertrain.

But with such a new propulsion system likely to be 10-15 years away, ATR faces the dilemma of how to markedly improve the air-

craft’s environmental performance in the interim.

One solution could be sustainable aviation fuel (SAF), which the manufacturer has previously trialled, blended 50/50 with kerosene, during test flights in Sweden.

While the environmental benefits of SAF are clear, uptake is hampered by it costing three or four times as much as conventional jet fuel. “We have to make SAF available at a reasonable price,” says Bortoli.

Interim steps

If the decision is made to go for a new propulsion system, it also makes it unlikely that any conventional replacement of the ATR’s Pratt & Whitney Canada PW127Ms will be contemplated as an interim step due to the investment required.

“You cannot invest in a new engine and then also think of a hybrid aircraft. They are alternative options: one or the other,” he says.

ATR’s engineering resources are not infinite: current developments include a new-build freighter variant of the ATR 72-600 and a short take-off and landing derivative of the ATR 42-600. “Over the next two to three years we have enough on our plate and would not have the engineering capability to develop more than this,” he says.

The freighter is gaining “significant interest” and the manufacturer is hopeful that it can add to its launch order from FedEx Express for 30 firm and 20 options. “We are coming to the market at the right time,” he adds.

First shipment of the ATR 72-600F will be this year, and should help to bolster the airframer’s performance in 2020. However, Bortoli declines to offer a delivery forecast, beyond noting that it will be short of the previous year’s total.

“It is not as it was in 2019, but we are continuing our efforts.”

While ATR’s current market dominance is likely to continue in the short term, albeit with fewer deliveries than previously, there are a number of start-ups looking to enter the segment. And while the cost of bringing a new aircraft to market remains considerable, developing a new regional turboprop is arguably cheaper, and more achievable, than trying to do the same with a 150-seat jet.

Bortoli points out that new market entrants will have to “suffer a little bit in terms of time” before they gain traction and, he says, ATR is already considering what its next move should be.

“We are uniquely placed to face any competition,” he says. ▶

INTERNATIONAL FLIGHT

Training Next Generation Fighter Pilots

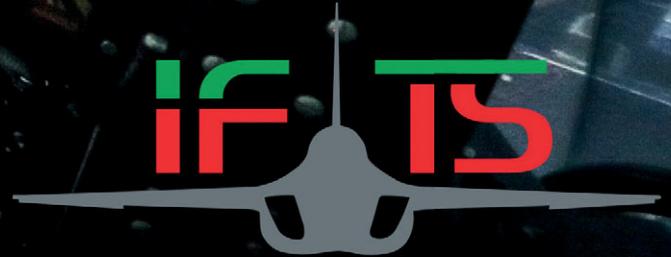
Experience, Excellence, and Effectiveness

The Italian Air Force's world-renowned excellence in flight training and Leonardo's leadership in delivering proven integrated training solutions, come together to create the International Flight Training School (IFTS).

Based on the Italian Air Force training syllabus the IFTS offers, to each Air Force Training Partner, customized teaching modules further optimizing the download of flight hours from frontline fighters in the Operation Conversion Unit (OCU).

The Italian Air Force brings to the new IFTS its longstanding expertise, while Leonardo brings its proven M-346 advanced jet trainer and Ground Based Training System (GBTS) with Live, Virtual and Constructive capabilities.

HT TRAINING SCHOOL



AERONAUTICA MILITARE

Powered By  LEONARDO

Subsidy row rumbles on

Although WTO permits EU to level \$4 billion in duties on US goods, including aircraft, figure is smaller than it hoped for

David Kaminski-Morrow London

EU authorities have secured the right to impose almost \$4 billion in tariffs on US imports, including aircraft, in retaliation for harm arising from US government subsidies to Boeing.

The decision from the World Trade Organization (WTO), issued on 13 October, states that the level of countermeasures “commensurate with the degree and nature of the adverse effects determined to exist” amounts to \$3.99 billion.

This figure is only half the permit for \$7.5 billion in tariffs awarded to the US side in its similar subsidies case in October last year – but no decision has been disclosed on the scale of EU tariffs to be directed specifically at US civil aircraft.

The WTO assessment is the latest development in the long-running transatlantic dispute over state support and launch aid for civil aircraft programmes.

Airbus has been having to cope with a 15% duty imposed by the US government on imported European aircraft.

The EU has been awaiting its own chance to implement tariffs after the WTO supported its claims that a number of instruments, including Washington state tax programmes, were unlawfully subsidising Boeing.

The European side had been confident it would obtain WTO authorisation for a penalty even harsher than the US award, but the \$4 billion figure is substantially lower – which could be spun by the Trump administration as a technical victory.

Quantifying impact

A senior European industry source says the scale of the European award “doesn’t matter” because the case against Boeing has already been proven, with the penalty validating it and quantifying its impact.

“There is nothing to suggest the EU won’t impose the tariffs,” the source adds. Last year the EU initiated a consultation on US goods to be included on the tariff list.

But the preference of the European side is to “retaliate but not escalate”, a stance intended to encourage negotiations to settle the dispute rather than inflict un-

necessary damage on businesses. The source claims a previous WTO authorisation for \$4 billion in sanctions, relating to a dispute over Foreign Sales Corporation provisions, has remained “in the cupboard”.

Given that the dispute has been running for 16 years, there seems little chance that a change of administration arising from November’s US election will increase the prospects for a swift resolution.

Boeing does not have a European aircraft assembly site equivalent to Airbus’s facilities in Mobile, Alabama, capable of supplying tariff-free A320-family and A220 jets to US customers.

Significant Boeing customers in the EU include Ryanair, which has a large fleet of 737s and is waiting for 737 Max deliveries.

“Airbus did not start this dispute, and we remain ready to support a negotiation that leads to a fair settlement,” says Airbus chief executive Guillaume Faury. “The WTO has spoken, the EU can implement its countermeasures. It is time to find a solution so tariffs can be removed on both sides of the Atlantic.”

‘Aeronautical research’ finding slashed size of penalty decision

While the EU had sought WTO authorisation to impose a higher penalty than the \$7.5 billion awarded to the US government, it ultimately failed to convince the body of its case.

Over the course of the long-running dispute the EU has submitted various claims for the total countermeasures penalty – including figures of \$12 billion in September 2012 and just over \$10 billion in July 2019.

The EU had calculated its figure based on two primary sources of adverse effects on Airbus’s business.

These comprised a tax break for Boeing in Washington State – leading to lost sales

to Air Canada, Flydubai and Icelandair, and the “threat of impedance” of imports to the USA and exports to the United Arab Emirates – plus aeronautics research and development subsidies, which led to lost A330 and original A350 sales to Ethiopian Airlines, Icelandair, Kenya Airways and Qantas.

The EU argued that the tax impact took place over 33 months from 2013-2015, and that from the aeronautics research over 36 months from 2004-2006. According to the WTO the EU’s ultimate value for the penalty, combining these effects, amounted to just under \$8.6 billion.

The US side had raised several objections to the claimed level of countermeasures, notably arguing that the impact of the aeronautics research fell outside the scope of the proceedings.

It also challenged other aspects of the valuation, saying that Airbus would not necessarily have won each contested sales campaign.

Crucially the WTO accepted the aeronautical research objection, ruling that its impact did “not... fall within the scope” of the adverse effects under consideration.

Its calculations ultimately reduced the size of the penalty award to \$3.99 billion.



Thor Jørgen Udvang/Shutterstock

The A350 and 787 have both been subject of claims relating to illegal financial support

However, the US Trade Representative's office argues that the penalty award to the EU should be reduced further, and that the bloc has "no lawful basis" to impose tariffs on US imports, including civil aircraft.

This is because, the office claims, the WTO "did not take into consideration" the legislative measure on 1 April 2020 through which Washington State raised a business tax rate to the "generally applicable level", eliminating the controversial tax break at the centre of Airbus's case.

US Trade Representative Robert Lighthizer says the EU's case largely fell apart under scrutiny, with the

WTO's arbitrator declining to authorise any retaliation for subsidies other than the Washington State tax situation.

Counter-complaint

While the US side fired the first shot in the dispute, and the EU has attempted to encourage negotiation while simultaneously pursuing its own counter-complaint, both parties may be prepared to find a way of settling the long-running spat.

"We are waiting for a response from the EU to a recent US proposal and will intensify our ongoing negotiations with the EU to restore

fair competition and a level playing field to this sector," says Lighthizer.

EU trade commissioner Valdis Dombrovskis similarly hints at prospects for a settlement, stating that he has been "engaging" with Lighthizer on the matter. The EU, he says, is open to seeking a "fair and balanced" settlement and an agreement on disciplines governing future civil aircraft subsidies.

But Dombrovskis also warns that the EU is prepared "reluctantly" to impose its own counterstrike, through tariffs on imported Boeing aircraft, if it does not see evidence of a US rethink. ▶

Listen. Understand. Innovate.



Driven by an everything-is-possible attitude, CMC Electronics has embraced innovation for over a century. Listening to our customers, understanding their needs and delivering innovative solutions is what we do best. Contact our avionics experts today at info@cmcelectronics.ca

CMC
Electronics



The J85-15 turbojet-powered XB-1 is expected to fly for the first time in 2021

Boom Supersonic

Boom reveals prelude to Overture

Start-up supersonic aircraft developer unveils one-third-scale demonstrator of its future all-business-class Mach 2.2 airliner

Jon Hemmerdinger Tampa

Boom Supersonic has publicly unveiled its XB-1 demonstrator, which will be used to develop a future supersonic passenger aircraft called Overture.

Denver-based Boom revealed the XB-1 on 7 October at a virtual roll-out event, when executives spelled out production plans and highlighted the jet's design features.

"At supersonic speeds, cities rarely visited can become major destinations," Boom founder and chief executive Blake Scholl says. "We've begun to pave the path to a mainstream supersonic future."

The Overture will carry 55-75 passengers in an all-business-class cabin, reach Mach 2.2, and have ocean-crossing range, Boom says.

But first up is the XB-1, effectively a one-third-scale demonstrator of the Overture, which is powered by three afterburner-equipped 12,000lb (53.4kN)-thrust GE Aviation J85-15 turbojets. The powerplants are part of an engine family that entered service in 1959 and are used on the US Air Force's Northrop T-38 Talon trainers.

Boom plans to fly the XB-1 for the first time in 2021, with flight tests occurring from Mojave Air & Space Port in California. It will allow Boom to evaluate technologies and features it expects to implement on the Overture.

Those include the XB-1's engine inlets, which Scholl describes as among the most technologically challenging aspects of the design.

On supersonic jets, inlets have the critical job of slowing (and compressing) supersonic airflow to the subsonic speeds that the engines require.

Chief engineer for the XB-1 Greg Krauland says the jet has a "long, slender fuselage" - 21.6m (71ft) - a carbon-composite airframe and a narrow, swept wing. The wing combines high-speed efficiency with low-speed stability, he says.

Carbonfibre components

Using carbonfibre enables Boom to mould large, strong and complex airframe components, and to make those components thicker and stronger in specific areas as required. Carbonfibre also expands less than metal when exposed to the high temperatures created by supersonic flight, says Krauland.

Boom is outfitting the XB-1 with a forward-looking vision system consisting of a high-resolution camera, which will help pilots better see outside the aircraft, particularly during landings. Such a system allows for the jet's nose-high approach, which can obscure views outside the cockpit.

In 2021, as XB-1 flight tests commence, Boom intends to begin windtunnel trials of the Overture, and in 2022 it plans to start work

on a manufacturing facility for the type. It aims to unveil the first Overture in 2025 and achieve certification by 2029, executives say.

The planned Overture production site will have capacity to build five to 10 jets monthly.

"It is very likely we will have to build a second factory and double that up," Scholl says. "We think we are going to make more Overtures than Boeing has made 787s."

Boeing has already delivered nearly 1,000 787s, and its production continues.

Boom has said it will price the Overture at \$200 million, excluding options and interiors.

Unlike the XB-1, the Overture will have modern jet engines without afterburners - something like a "medium-bypass turbofan with the latest technologies", Scholl says.

Boom has not announced which engines the Overture will use, but the company has been working for five years with Rolls-Royce to "define and refine" a potential powerplant, he adds.

Such an engine could make use of "an existing large Trent-based core", R-R says.

Boom says the Overture's fuel efficiency (measured per business-class seat) will be comparable to that of subsonic airliners.

So far, the fledgling company has announced "pre-orders" from Japan Airlines for 20 Overture jets, and from Virgin Group for 10. ▶



Martin-Baker



7633 aircrew lives saved from 90 operators over 75 years

Engineering for Life

MB
Martin-Baker
America

SNB
Safran Martin-Baker
France

MB
Martin-Baker
Australia

Embraer sees bright future for regional jets

Populations shifting away from cities after coronavirus pandemic will spur need for smaller aircraft, says manufacturer

Jon Hemmerdinger Tampa

Embraer expects regional airports and smaller passenger aircraft will emerge on top in the wake of the coronavirus pandemic due to population shifts away from big cities.

"We do believe that the small airplane will have more relevance in the airline business model in the future," Embraer strategic marketing director Daniel Galhardo tells FlightGlobal. "Demand will come back, but it will come back in a different way."

Galhardo bases his prediction on factors including the recent widespread adoption of remote working, which is allowing people and companies to relocate from big cities to smaller towns.

"We will see people looking for other places to live. They don't have to live in big centres any-

more," Galhardo says. "Companies actually will also be able to establish their headquarters away from big centres."

Anti-globalisation sentiment has also caused some manufacturers and suppliers to return to their home countries, centralising operations there.

Post-virus environment

In the post-virus environment, factors like these will drive more demand for regional and inter-regional travel - benefiting those companies, such as Embraer, that are making aircraft to serve those segments, Galhardo predicts.

"There will be more business connections domestically and inter-regionally," he adds. "It is definitely a matter of adjusting the [airline] business model."

Such trends were already under way before the pandemic but have since accelerated, Galhardo says.

Delta Air Lines senior vice-president of network planning Joe Esposito said much the same in mid-October.

"Now big cities are getting smaller," Esposito told Boyd Group's International Aviation Forecast Summit. "The forecast of where people live and move has changed."

Embraer largely dominates the regional jet market. Bombardier had been a competitor, albeit a struggling one, until finalising in June the sale of its CRJ programme to Mitsubishi Heavy Industries (MHI). No further examples of the regional jet family will be built beyond those in the current backlog; at the deal's conclusion, Bombardier expected the final delivery in the second half of 2020.

That sale followed the earlier divestment of the CSeries family to Airbus, where it has since been rebranded as the A220.

MHI subsidiary Mitsubishi Aircraft is developing its own regional jet - the SpaceJet. But the company has delayed that programme amid the coronavirus downturn.

Galhardo expects the pandemic will also lead airlines to focus on chasing profits, not market share.

By contrast, in recent years carriers had rushed to acquire new, larger jets and expand their networks - an effort to match competitors. Profits slumped, Galhardo says.

"Our size of aircraft is important because [it] helps airlines to right

Airframer sees new dawn in eVTOL as it spins off Eve programme

Pilar Wolfsteller Las Vegas

EmbraerX, the Brazilian airframer's innovation subsidiary, has spun off Eve, its first electric vertical take-off and landing (eVTOL) project.

Eve, says the company, is a "human-centred eVTOL design [which] represents an actual, certifiable product development".

EmbraerX has for four years been incubating Eve, which is working in the urban air mobility (UAM) segment, and has now "graduated" the operation into its own company.

"We value the vast potential of the UAM market, as it represents a new business segment where

we see significant opportunities for Embraer," says chief executive Francisco Gomes Neto.

"Innovation and diversification are key pillars of Embraer's new strategic plan, which will increase revenue and improve profitability over the next few years. Eve is primed to create a new frontier in transportation with intelligent, environmentally friendly, autonomous-ready aircraft and associated support and urban air traffic management solutions."

Andre Stein, former head of strategy for EmbraerX, will lead the new company, which is located at the airframer's US base in Melbourne, Florida.

EmbraerX is among several aerospace companies that are

working within Uber Elevate's network - the others being Aurora Flight Sciences, Bell, Joby Aviation and Pilipistrel, alongside automotive firm Hyundai. Uber has partnered with companies building aircraft that it plans to deploy on its network. The rideshare giant is also developing related support infrastructure.

Eve joins a crowded field of potential UAM vehicles fighting for attention. More than 200 eVTOL concepts are currently in some state of development, ranging from relatively advanced programmes from start-ups such as Germany's Volocopter and China's eHang, to those from the world's largest airframers, including Airbus and Bell.



Markus Mainka/Shutterstock

E175's maximum take-off weight is below US 'scope clause' limit

size in terms of load factor and cost management," he says. "It will be important in the future when the demand will be changed."

Embraer's line-up includes the E175 (76-88 seats) and the three-strong second-generation E2 family: the E175-E2 (80-90 seats), E190-E2 (97-114 seats) and E195-E2 (120-146 seats).

The E190-E2 and E195-E2 are already in operation, though Embraer has pushed back service-entry of the E175-E2 to 2023, citing difficult market conditions.

The E175-E2 has been essentially cut off from the US airline market, owing to so-called "scope clauses" within contracts between the three major US network carriers and their pilot unions. The E175-E2's maximum take-off weight (MTOW) exceeds a limit of 39,000kg (86,000lb).

Unlimited appeal

For now Embraer has continued manufacturing its first-generation E175 as its MTOW is below the scope clause cap.

US airlines have expressed inter-

est in acquiring E175-E2s, though first they must renegotiate contracts. For years, there has been speculation about when airlines might succeed in reaching an agreement with unions. Galhardo thinks the time may soon be right.

Factors such as industry turmoil and the advent of new products typically drive scope changes, he notes. "What we are seeing now is both things happening," he says. "We are at a moment when airlines have to rethink their business." ▶

See p42

Navigate your way back to the flight deck.



Supported. Current. Connected.

For more information visit:

resilientpilot.com

or email:

RPFlightPlan@resilientpilot.com



Resilient Pilot

Mentoring and Licensing Solutions for the Pilot Community.

From Predator to survivor

Its unmanned armed reconnaissance platforms dominated the 'War on terror', but now General Atomics Aeronautical Systems is adapting its portfolio for tougher opponents

Garrett Reim Los Angeles

General Atomics Aeronautical Systems' MQ-1 Predator unmanned air vehicle (UAV) is perhaps the most symbolic aircraft of the USA's 'War on terror', launched following the 9/11 terrorist attacks of 2001. The public grew familiar with the platform via black and white footage as it circled and fired its Lockheed Martin AGM-114 Hellfire missiles at targets in Afghanistan and Iraq.

Today, Washington has new enemies and future conflicts to prepare for. That has put the Predator's larger successor - the General Atomics MQ-9A Reaper - on the chopping block. In February, the US Air Force (USAF) revealed in its budget proposal a plan to stop buying the UAV in fiscal year 2020.

The US Department of Defense is in the middle of a massive shift in spending priorities, as it moves to deter aggression by China and Russia. That is forcing the maker of its most-famous armed reconnaissance UAVs to rethink its business.

San Diego, California-based General Atomics has reacted in the past couple of years with a flurry of initiatives intended to hold on to

existing business, seize near-term opportunities and ultimately maintain its position into the 2030s.

But it faces challengers, and lost two important next-generation UAV development contests late last decade. In April 2018, it was edged out by Dynetics in the US Defense Advanced Research Projects Agency's (DARPA's) Gremlins programme, which is designed to demonstrate the launch and recovery of intelligence, surveillance and reconnaissance (ISR) drones from the back of a Lockheed C-130 transport. Four months later, Boeing won the US Navy's MQ-25 Stingray deal to develop an aircraft carrier-based unmanned tanker.

Eyes wide open

The MQ-25 defeat particularly stung. It cost about \$200 million in internal research and development funds, General Atomics Aeronautical Systems president Dave Alexander said in 2018.

"MQ-25 was a sad day for us because we worked it almost 10 years," Alexander recounted to *Flight International* in an October interview. "But you win some, you lose some. I think the lesson learned is that we just keep our eyes wide open."

In August, General Atomics confirmed plans to lay off about 6% of its workforce, reportedly more than 600 employees. It rebuffed speculation that the measure was directly linked to the end of Reaper production for the USAF.

The Predator and Reaper once flew with impunity above terrorist or insurgent targets with no means of shooting them down, but UAVs are today vulnerable to surface-to-air missiles, particularly the sophisticated batteries fielded by China and Russia.

For now, the USAF says it is planning MQ-9A missions using "unpredictable" flight paths, and General Atomics is developing its first purpose-built countermeasures pod.

But while Washington is shifting its budget focus to investing in technology for future conflicts with so-called great power rivals, the company believes there is still an opportunity to sell its armed reconnaissance UAVs to international customers.

Previously, the company's ambitions were frustrated by US government export restrictions linked to the international Missile Technology Control Regime (MTCR) agreement, which classifies large, long-range UAVs as a form of cruise missile.

"Trying to compete with a Chinese or Israeli company, that's pretty difficult to win on price. Just knowing they're going to be low cost means we [have] really got to bid tight," Alexander says. However, "Our customers are willing to see the advantage of going with a US platform that can be interoperable," he adds.

"My big concern is the Chinese. Once they're in, they're going to be in for 20 to 25 years, just due to the logistics trail of bringing a system like that to bear."

A new interpretation of the MTCR framework taken by the Trump administration - which reclassifies slow-moving UAVs like the MQ-9 as being exempt from restrictions - appear to be opening the door to foreign sales.

Export drive

"A big piece of our strategy going forward is international sales. It's really picked up with the new unmanned aircraft export policy and MTCR changes," says Alexander. "We have a bright future in international sales right now. Really, really good."

In September, the USAF granted General Atomics an Agile Reaper Enterprise Solution contract, allowing it to sell up to \$7.4 billion worth of aircraft at pre-set prices, eliminating costly and time-consuming negotiations.



Alexander knows priorities must shift with geopolitics

General Atomics Aeronautical Systems



US Air Force

Armed with AGM-114 missiles, the MQ-1 was deployed in Afghanistan and Iraq

General Atomics has also expanded its company-owned-and-operated UAV leasing programme to seven military services, Alexander says, without identifying the customers involved.

Expanded airspace

Meanwhile, a second iteration of the Reaper is being advanced as the MQ-9B SkyGuardian: a model compatible with operations in civilian airspace, thanks to a detect-and-avoid system.

General Atomics is pitching the UAV at missions ranging from border and maritime patrol to fire detection and firefighting support, law enforcement, search and rescue, disaster assistance and resource monitoring.

The UK Royal Air Force will be launch operator of the type, locally named Protector, while Belgium has ordered four SkyGuardians.

General Atomics is bullish about its prospects with a SeaGuardian maritime patrol variant, which was demonstrated to European nations off the coast of Greece in December 2019 and from 15 October is also being showcased to Japan's coastguard. The design is intended to be flown on sorties lasting up to 40h.

"A long-endurance, affordable aircraft like an MQ-9 is perfect for the maritime mission," says Alexander, with General Atomics citing a per-hour operating cost of around \$5,000.

The airframer also is developing artificially intelligent software to help quickly make sense of the

wealth of data gathered by on-board sensors.

In February 2020, General Atomics showcased the US Army's MQ-1C Gray Eagle Extended Range UAV using an L3Harris Technologies communications intelligence system to cross-cue its Lynx synthetic aperture radar on targets at a range of over 32.4nm (60km). And in June, it demonstrated the platform's ability to launch Area-I Altius-600 small reconnaissance UAVs: "air-launched effects" designed to fly into enemy airspace and relay information as far back as 162nm.

"A big piece of our strategy going forward is international sales"

Dave Alexander President, General Atomics Aeronautical Systems

Using internal research and development funds it is also testing a jet-powered UAV. Called Sparrowhawk, this would be air-launched from and air-recovered by the USAF's MQ-9A. Based on its rejected offer for DARPA's Gremlins programme, it would perform ISR and electronic warfare (EW) missions over a range of up to 174nm.

General Atomics also is developing half a dozen new mission pods, including a Scalable Open Architecture Reconnaissance payload to identify, characterise and geolocate radar emissions, the Sledgehammer EW payload and an Airborne Laser Communications System.

Broader integration

An Integrated Intelligence Center, designed to integrate with any ISR platform, will make sense of the data gathered from such sensors and air-launched effects. Some of its software applications were earlier this year demonstrated as part of the USAF's experimental Advanced Battlefield Management System activity.

"We're getting to the point now where we have all this data and we need to get it into one place where we can action it, and have it all integrated together," Alexander says. "We're doubling down on that because we see that as the future."

Perhaps the ultimate prize for General Atomics will be the USAF's MQ-Next programme to replace the Reaper in 2030, where it faces competition from Lockheed and Northrop Grumman.

In September, the company revealed a stealthy flying wing proposal it claims will have "ultra-long endurance".

"We have to really provide something compelling," Alexander says. "If we can keep the cost down - make it MQ-9-like in cost - [give] it eye-watering endurance, I think we will have something." ▀

Airbus shows clarity of ACJ TwoTwenty vision

Airframer set to convert A220-100 into 'Xtra Large Bizjet', adding five extra fuel tanks that will take its range to 5,650nm

David Kaminski-Morrow London

Somewhat inevitably, given the popularity of its narrowbody airliners as corporate jets, Airbus has finally launched a VIP version of the A220-100.

Able to operate across a range of up to 5,650nm (10,500km), the ACJ TwoTwenty – a deviation from prior corporate jet designations – will be able to operate sectors such as London-Los Angeles and Tokyo-Dubai.

Airbus's performance documentation for the standard A220-100 indicates that the variant typically has a range of 2,760nm with 120 passengers, and that the range tops out at some 4,250nm with

minimum payload and maximum fuel. Its fuel capacity is 21,805 litres (5,760USgal), about 17.2t.

But Airbus Corporate Jets president Benoit Defforge says the twin-jet will have five additional tanks, allowing it to carry another 5.6t of fuel. The jet will take advantage of a planned increase in maximum take-off weight for the A220-100, to 63t, which has been scheduled for the second half of 2021.

Direct routes

Defforge adds that the aircraft will also be certified for 180min extended twin-engined operations, "allowing more direct routes".

Airbus says that the ACJ TwoTwenty will create a "whole new market segment" – which it terms



the "Xtra Large Bizjet" – positioning it as an alternative to traditional large-cabin executive aircraft.

"This offer includes for the first time a flexible cabin catalogue, addressing the requirements of the heavy and long-range business jet categories," it adds.

Executive jets claiming a similar range include the Gulfstream G500

Comlux completes deal for pair of new jets, as operator backs a 'winner'

Specialist corporate aircraft operator Comlux Aviation is the launch customer for the Airbus ACJ TwoTwenty, opting to take two of the new business twinjets.

It will receive the initial aircraft as early as December 2022, and plans to offer it to charter customers from 2023.

Four other TwoTwenty aircraft have also been ordered by undisclosed customers, Airbus has revealed.

Comlux chief executive Richard Gaona says the aircraft is "creating a new segment" between traditional executive jets and large corporate-configured airliners, offering a wide cabin combined with "extremely" long range.

"You don't need any more to choose between speed, range and cabin comfort," he states.

Airbus Corporate Jets is intending the aircraft to operate

on sectors with durations of up to 12.5h.

Gaona tells FlightGlobal the aircraft will be flexible, and have "very impressive performance", able to conduct a take-off run of 1,300m (4,270ft) fully-fuelled.

Comlux's completion division, located in Indianapolis, has an exclusive contract to outfit the first 15 ACJ TwoTwenty jets.

"We're working very closely to redefine the cabin," says Gaona, stating that the cabin will feature modernised in-flight entertainment, in-flight wi-fi communications, and cabin environmental systems, as well as electronically dimmable windows and LED lighting.

"You can control almost everything with your [smartphone]," he adds.

Gaona says the aircraft has "so many different options" for configuration, through an

extensive cabin catalogue, that customers will be able to "customise it as they want".

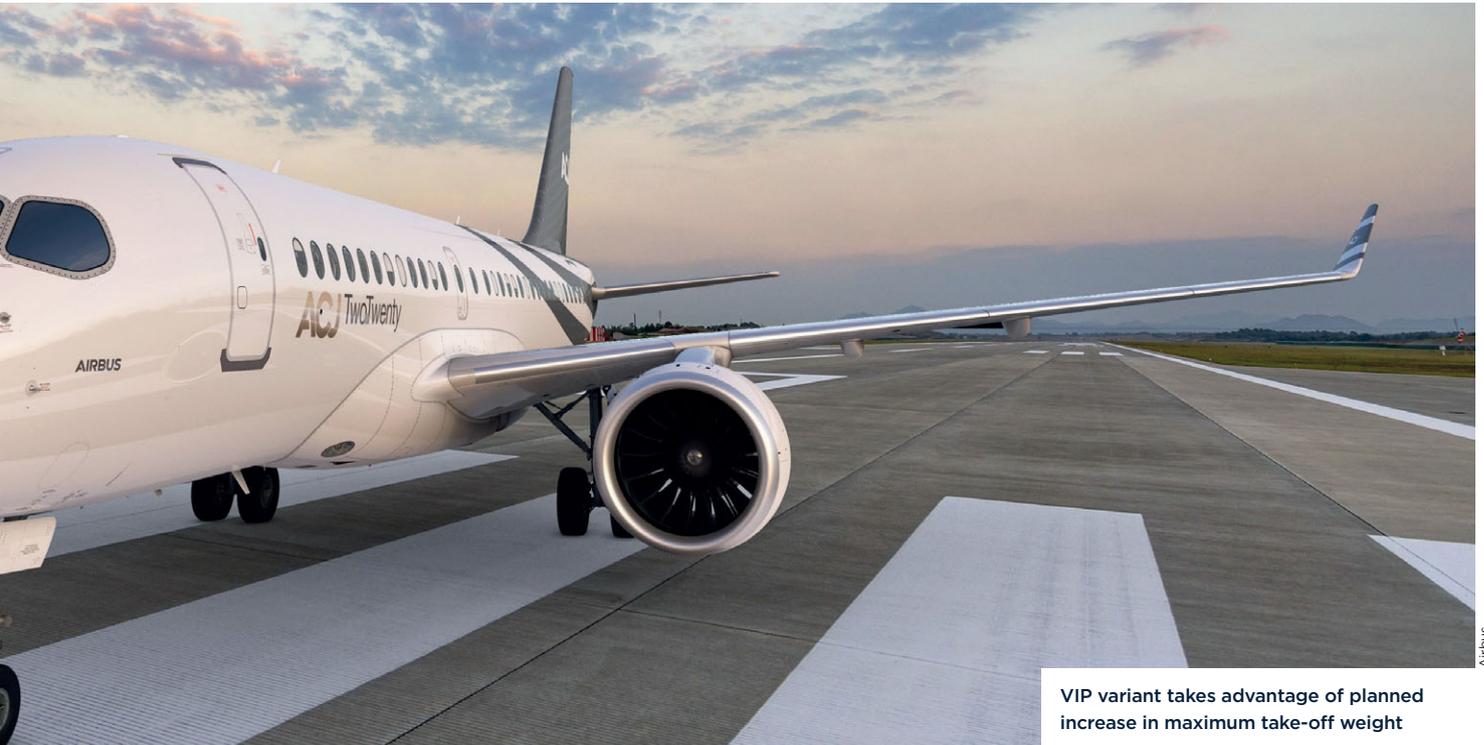
"We looked at each and every detail of the cabin," he adds.

Comlux has selected a business and guest lounge, private entertainment zone, bathroom, and private suite. The aircraft will have large lie-flat seats, a king-size bed, and standing shower.

Gaona says the ACJ TwoTwenty will benefit from the "second-to-none" economics of the A220-100, which is powered by Pratt & Whitney PW1500G engines.

"We are convinced the aircraft will be a winner in the business aviation market," he adds.

Comlux operates a diverse fleet ranging from smaller executive jets up to large corporate airliners including the Boeing 777-200LR and 767-200ER, the ACJ319, and Sukhoi Business Jet.



VIP variant takes advantage of planned increase in maximum take-off weight

and the Dassault Falcon 6X, with maximum range figures of 5,200nm and 5,500nm, respectively.

VIP aircraft specialist Comlux, which has a completion centre in Indianapolis, will be the exclusive outfitter for the first 15 cabins of the TwoTwenty programme.

Other interiors specialists have previously shown off potential VIP configurations for the twinjet.

Lufthansa Technik displayed a concept in 2019 with a cockpit fully visible from the cabin, while earlier this year two North American firms – Camber Aviation Management and Kestrel Aviation Management – showed off a design proposal for the larger A220-300 variant.

Defforge says that, for the time being, Airbus is focusing on the -100 for the corporate market.

Airbus has been looking to broaden the capabilities of the A220 family since acquiring the programme, formerly the CSeries, from Bombardier in mid-2018. It has been tweaking the take-off weight, payload and range performance of the aircraft for airline customers.

Promising demand

Defforge says the ACJ TwoTwenty has “compelling market appeal” and that the company sees “promising demand” for the twinjet in the business jet sector.

While the A319neo had been a competitor to the CSeries, he argues that the TwoTwenty will not undermine the ACJ319neo but instead be “very complementary”.

He says the aircraft will amount to a “new value proposition”, of-

fering intercontinental range capability, “unmatched” personal space and comfort, and “unbeatable economics”.

The interior will feature 73sq m (785sq ft) of floor space across six zones providing accommodation for up to 18 passengers.

Airbus claims that the aircraft will be able to use the same airports as competing business jets, but will provide three times the cabin space at one third of the operating cost.

Defforge insists the business jet market is proving “very resilient” in the face of the air transport crisis, with no postponements of orders requested. He says “newcomers” are turning to the idea of private jets, while “people already flying are thinking of flying differently”. ▶



KomyMirror®

for Stowage Bins

**Shorten Aircraft Turns
Passenger Convenience**

www.komy.com

Starling project spreads its wings

UK start-up reveals latest hybrid-electric development, with two-seat personal jet scheduled for service entry in 2023

Dominic Perry London

UK-headquartered start-up Samad Aerospace has unveiled its latest hybrid-electric aircraft development – a two-person vertical take-off and landing (VTOL) personal jet for the luxury market that is targeted for service entry in 2023.

The Q-Starling is an all-composite aircraft that will be powered by two modified turboshaft engines that double as turbogenerators and turbojets. These are currently sourced from Czech Republic-based PBS.

Lift for take-offs and landings is provided by a single electric-powered ducted fan in the centre of the fuselage, while stability and control come from four smaller fans in the wing-tips and horizontal stabilisers. The turbogenerators providing the electrical power become regular turbojets in conventional flight.

Samad Aerospace is developing its larger, seven-person e-Starling aircraft and the new model is, in part, a spin-off from the half-scale S5 demonstrator that has been built to support that programme.

Although the fuselage shape and overall configuration of the two aircraft differ, the company believes that lessons learned from the Q-Starling, notably around the central lift-fan and the control system, will smooth the certification path for the follow-on programme.

Founder and chief executive Seyed Mosheni says the Q-Starling is aimed at ultra-high-net-worth individuals and believes the company can deliver 500 of the \$2 million aircraft every year. “If somebody is happy to purchase a super-yacht, they will be willing to spend \$2 million on an aircraft that they can also use for commuting,” he says.

“It is safer, more comfortable and goes further than a helicopter.”

Test flights of the S5 scaled-prototype should begin shortly, he says. These will be in an undisclosed Asian country where it has been manufactured by one of Samad’s industrial partners, although it will subsequently be transferred to the UK for further test flights.

Affordable version

A prototype of the Q-Starling will begin certification flights in 2022, Mosheni says, leaving a one-year window before scheduled service entry. In addition, a more affordable version will follow, which will dispense with the luxury finish of the Q-Starling.

So far, Samad has raised approximately £10 million (\$13 million) of a targeted £15 million during its series A funding round. Mosheni estimates that another £30 million will be required to complete the Q-Starling and begin serial production.

Despite the company’s UK headquarters, there is no guarantee that the aircraft will ever be built in the country. Initial certification is like-

ly to be handled by the European Union Aviation Safety Agency, says Mosheni, implying a production site on the continent.

“The UK is good for technology, but it is not the best place for vehicle development,” he says, citing the low levels of possible government backing for any programme. “But we have not 100% decided whether we want to stay in the UK or go elsewhere.”

In addition, Samad hopes to create a network of strategic partnerships around the globe that will licence-build aircraft for their region, as well as providing a percentage of the Q-Starling’s global supply chain.

Samad believes the Q-Starling will be able to be flown by anyone with a private pilot’s licence, with as little as 10h of further training required to master the VTOL system. An additional level of safety is provided by a ballistic parachute.

With the addition of the Q-Starling to its line-up, Samad now has two active programmes on its books, plus it recently unveiled plans to construct a network of “e-VTOL innovation villages” across the globe.

Despite the scale of the undertaking, Mosheni bats back suggestions that the start-up is overloading itself and points to its partnership model. “We are not taking everything on our shoulders,” he says.

He also says Samad is eyeing the spin-off potential of the early scaled-prototypes developed for the e-Starling programme as unmanned cargo, medical evacuation or surveillance platforms. “These could be used to generate revenue before we bring the passenger aircraft to market,” he says. ▀



Design features lift-fan mounted in centre of fuselage for VTOL performance

Samad Aerospace

ATR

move with the times

40% less fuel and 40% less CO₂*

atr-aircraft.com

TACO / Gettyimages

* per trip compared to regional jets

 **into life**

Reports highlight long-term FAA fears

Trio of draft evaluations on US regulator's controversial self-certification process show concerns were raised five years ago

Jon Hemmerdinger Tampa

A trio of Federal Aviation Administration (FAA) reports, written several years before two fatal 737 Max crashes, highlighted concerns about the agency's self-certification programme, describing Boeing-FAA relations as "contentious" and possibly requiring a "reset".

Marked "draft reports", the 2015 documents broadly review the agency's Organization Designation Authorization (ODA) programme and recommend improvements that would enable the agency to reduce some project involvement.

The reports were compiled well before the Max crashes in 2018 and 2019, which killed 346 people and spurred criticism of the ODA initiative. Under that programme the FAA authorises selected manufac-

turers to perform certain certification activities.

FlightGlobal recently received the reports from the FAA, more than one year after requesting them. The documents broadly summarise information and opinions received from the FAA and aerospace manufacturers, reviewing how implementation of the ODA in 2009 affected those companies and the product certification process.

Change resistance

The reports are dated August, October and November 2015, and some pages are marked "McKinsey", a consulting firm.

The FAA did not respond to questions about the documents. "Lack of consistent performance management systems, change-resistant frontline mindsets, and skills challenges contribute to variable performance," say the reports. "Disagreement on safety relevance contributes to uneven application of standards," they add.

"ODA implementation has not met expectations and has not consistently delivered industry-wide benefits," the documents say. "OEMs feel a larger administrative burden without corresponding benefits."

The reports review Boeing's relationship with the FAA's Boeing Aviation Safety Oversight Office (BASOO), which oversees Boeing certifications and is within the FAA's Aircraft Certification Service (AIR).

"The Boeing-BASOO relationship is the most important and contentious," the reports say. "Disconnects between Boeing and BASOO may require a relationship reset."

The reports describe Boeing as perhaps "the most important AIR stakeholder by virtue of [its] size and growing product complexity".

"Projected 15% annual growth in Boeing's certificate submissions will overwhelm BASOO at [the]



ODA programme came under scrutiny after Max crashes



JL Images/Shutterstock

"We continue to make progress in improving how we work with the FAA"

Boeing

current level of involvement," the documents say.

Still, BASOO "is a relatively high performer" compared with other FAA certification offices, despite handling far more projects.

Asked to comment, Boeing says, "This report, released in 2015, illustrates how the FAA and the aerospace industry, including Boeing, have an ongoing practice of identifying and resolving issues - all with an eye towards continuous improvement as a global aerospace industry.

"After Boeing and many other companies implemented their ODAs, the FAA and the industry focused on continuous learning and improvement of the ODA programme," the airframer adds. "We continue to make great progress in improving how we work with the FAA."

Boeing says it and the aerospace industry are "relentlessly focused on safety". The reports quote a



VDB Photo/Shutterstock

Boeing representative as saying: “Our relationship has deteriorated to the point where every non-compliance finding is viewed as a systemic problem... as if we don’t have a commitment to safety.”

“The FAA is more reactive than” the European Union Aviation Safety Agency (EASA), a Boeing representative added. “EASA supports Airbus in a way that isn’t mirrored by the FAA with us.”

Boeing and BASOO use “different metrics and methods to determine compliance”, and “data is not consistent between Boeing FAA databases”, the reports say.

The studies were compiled following input from and workshops with 10 “industry players”: Bell; Boeing; CubCrafters Aircraft; GE Aviation; Gulfstream; Heico; Honeywell; Icon Aircraft; Rockwell Collins (now Collins Aerospace); and Textron Aviation.

Boeing executives contacted to contribute to the review included:

John Hamilton, who has since left the company but was vice-president of engineering; Michael Delaney, then vice-president of commercial engineering; and Lindsay Anderson, vice-president of commercial aircraft quality, the reports say. Top executives at the other companies were also contacted.

FAA officials who participated in the reviews included former deputy associate administrator for aviation safety John Hickey, and Jeff Duven, system oversight division director of aircraft certification.

Process evaluation

The FAA Modernization and Reform Act of 2012, which funded the agency, required the FAA to assess certification processes and evaluate potential ODA programme improvements. It is unclear whether the 2015 studies stemmed from that requirement.

“What we need is more flexibility and autonomy,” one unnamed

industry representative said. “ODA has had the opposite effect. Relationships with the FAA have been replaced by a formal, rigid process.”

“I never expected the level of administrative burden ODA entails. I have three people working full-time for me just to handle the admin,” a manufacturer added.

Outside of the reports, many companies have publicly praised self-certification programmes like ODA, saying they help them bring innovative and safer technologies to market faster.

“ODA is the latest and most-comprehensive in a series of steps towards increased delegation and leverage of industry resources in certification,” say the reports.

The ODA process is now under fire following the two 737 Max crashes. Investigators attributed the accidents to factors including Boeing’s design, the FAA’s certification process, and pilot and maintenance issues. US lawmakers

It recently introduced legislation aimed at strengthening the FAA's certification oversight.

According to the reports, manufacturers spent between \$1 million and \$11 million annually on their ODA work, equating to less than 0.5% of all OEM profits.

The documents specify how manufacturers' certification workload changed after the ODA programme came into being. Boeing's "delegation level" roughly doubled from 39% in 2006 to 82% under ODA, the 2015 documents indicate. Aerospace supplier Heico's delegation level saw a huge increase from 10% to 91%, and GE's delegation rate increased from 90% to 98%.

Other companies' delegation levels remained flat or declined. Collins remained unchanged over the period with a 99% delegation level, while Cessna's level declined from 68% to 55%, the reports show. As the documents are five years old, those figures are likely to have changed since.

Manufacturers' certification paperwork ballooned following their transitions to the ODA structure. Their certification plans jumped from an average of 236 pages to 5,248 pages after adopting ODA programmes, while certification descriptions increased from an average of 69 pages to 830 pages, the reports say.

Staff shortage

Former National Transportation Safety Board member and independent aviation safety consultant John Goglia said US aerospace suppliers need self-certification because the FAA lacks sufficient resources and skilled staff.

"When you ask a bureaucrat to make a decision about something he knows little about, he is going to take time to dig and talk to everyone else... to build up his comfort level," Goglia says.

"While that is going on, you are giving the competition time to develop their product."

An industry-wide shortage of skilled technical workers has contributed to those staffing issues, Goglia adds.

According to the 2015 documents, Boeing reported that FAA approvals "are too long and unpredictable", and that "50%-60% of deliverables are completed after agreed-upon targets".



David Fossler/Shutterstock

A century of delegated certification

Forms of aerospace self-certification extend back to the early decades of flight.

From the 1920s to 1940s, US regulators designated individuals, including those at manufacturers, "to make compliance" findings related to certification, the reports note. Those individuals included "designated engineering representatives", "designated manufacturing inspection representatives" and "designated airworthiness representatives".

Between the 1950s and 1990s, the FAA had a "limited organisational designation"

process under which it authorised groups within companies to oversee certification aspects.

The agency then broadened its approach with the ODA structure, which "opens [the] possibility for almost all manufacturers to receive organisational designation".

"The certification model has continuously evolved to handle more volume with proportionally fewer resources," say the reports. "ODA allows manufacturers relatively broad authorisation... but requires a dedicated internal organisation with stringent audit and control standards."

OEMs have also struggled to find employees with qualifications required for ODA work, the documents say.

The reports describe the interplay between certification and broader competitive issues.

Manufacturers tend to set "ambitious" project schedules, and sometimes make delivery commitments "in advance and independent of certification planning", the documents say.

"Innovation puts continued pressure to keep up with frontier standards. Releasing a product a year later will mean delaying if not entirely forfeiting that revenue, as new products from other suppliers will create obsolescence for your product," they add.

The documents touch on other issues, noting the tendency by some manufacturers, when disagreeing with FAA specialists, to "go above to management, causing friction".

The FAA's Boeing office "describes repeated and recurring instances where Boeing leadership engages with FAA leadership

before [the] escalation process has run its due course," according to the documents.

Manufacturers sometimes lack "necessary systems and processes to enable effective FAA... systemic oversight".

Other countries' civil aviation regulators face similar issues, but "feel [that the] FAA digs into too many non-safety-critical details", the reports say.

The reports recommend the FAA "partner with applicants" to prioritise policies for emerging technologies. The agency should reduce paperwork and harmonise its regulations with those of other countries, they advise.

Accelerate delegation

Additionally, the documents call on the FAA to accelerate delegation of some types of certification, and to improve "systems-level oversight... by building and leveraging" ODAs' capabilities and responsibilities.

The reports estimate that improvements could reduce the FAA's "real-time project involvement by 40%".

WE SHARE YOUR PASSION FOR FLIGHT

Airside from CAE is the new digital platform created for pilots, by pilots during the COVID-19 pandemic.

Designed using feedback from thousands of pilots around the globe, Airside supports you with the tools to prepare you to fly again. Find pilot jobs, update your CV with our resume builder tool and browse pilot training articles from experts across the industry. Create an account today to take advantage of an experience tailored to you.

airside.aero



From  CAE

No confidence crisis at ST Engineering

New president of Singapore company's aerospace division can see silver lining behind current coronavirus clouds

Alfred Chua Singapore

As the old business adage goes: never let a good crisis go to waste. Of course, the aerospace industry has never seen a crisis quite like the current coronavirus-driven downturn, but for some, that maxim remains as relevant as ever.

Jeffrey Lam, the newly installed president of ST Engineering's aerospace division, can be counted among that group. While

Covid-19 has caused the unit's business to plunge – at points by up to 90% – he remains unflustered, and instead sees an opportunity in the current situation.

Lam took the reins on 1 October, when his predecessor Lim Serh Ghee was promoted to the role of ST Engineering chief operating officer.

In an interview with FlightGlobal days after assuming his new role, Lam strikes an optimistic note, despite the gloom surrounding the aviation industry:

“A crisis like this offers us opportunities,” he begins, rather setting the tone for the conversation.

“For example, what are some of the growth and acquisition opportunities? We continue to focus on partnership opportunities, looking for acquisitions, in the right space, at the right time.

“So we do have active discussions ongoing, for example, [about] some partnership arrangements outside of Singapore. A crisis is an opportunity not to be missed.”

For example, he says the pandemic has allowed ST Engineering to double down on its smart technology initiatives, such as the use of drones in its work processes.

While the idea of using unmanned air vehicles for MRO operations is not new, the pandemic has given the company “an opportunity to accelerate” their usage, such as for aircraft inspection tasks, says Lam.

But while aerospace is perceived as a high-tech industry, some areas can be resistant to change. Lam admits that the “traditional operating environment that is aerospace [and especially] MRO”, is a “little bit harder to transform.

“But we recognise the opportunity, and we have been accelerating these programmes and investing in people to move these activities forward,” he says.

Another area of opportunity that ST Engineering has been quick to tap into has been the growing demand for passenger to cargo conversions. That market “is very important to the short- to medium-term strategy”, Lam says.

ST Engineering is seeing a “higher number of enquiries about what we can do for them” in the freight market, whether that is the permanent conversion of passenger aircraft, or a temporary modification to the cabin – by removing seats, for example – to allow it to carry more cargo.



Facility at Changi airport, Singapore, offers broad range of capabilities

The company recently announced that it was ramping up production slots for Airbus A321 passenger-to-freighter (A321P2F) conversions it carries out.

In addition to existing modification lines for the A321P2F programme in Germany and Singapore, in September it said that Chinese unit ST Engineering Aerospace Guangzhou Aviation Services and Alabama operation VT Mobile Aerospace Engineering would also be equipped to handle conversions of the popular narrowbody. The move will bring total annual capacity from nine to 25 aircraft by 2023.

Innovation drive

And this part of the business is not escaping the drive for innovation either: ST Engineering's German joint venture EFW is also looking into creating containers about the size of an aircraft seat, meant for temporary converted freighters.

The design will allow for the container to be loaded through a standard passenger door before being locked into seat tracks. Instead of “carrying bags and packages” or moving pallets through the aircraft door, it will permit the efficient loading and unloading of cargo from the passenger cabin.

The new container design is one example of how ST Engineering is “open to all kinds of solutions”, says Lam.

“[This] is something we just want to help our customers with. It is not like a big business, you know, you're not [going to] make a tonne



ST Engineering



ST Engineering

of money there, but helping our customers that use the passenger aircraft as freighters is going to help them return to operation [and] return to profitability. Really, that's our focus right now, to help them survive the crisis," says Lam.

Lam says the company's focus is, and has always been, about "creating value for the customer".

"A crisis like this offers us opportunities for growth, acquisitions and partnerships"

Jeffrey Lam President, aerospace division, ST Engineering

"When we say we create value for the customer, it is about capability, it is about value, it is about safety and quality," he adds. That also includes helping them during the pandemic-driven crisis, a point Lam reiterates on several occasions.

"We want to be there to support our customers [and] help them recover... from a financial point of view, a cash-flow point of view, and also from a going back to flying point of view," he tells FlightGlobal.

Of course this is not pure altruism: the aerospace unit's for-

tunes are firmly tied to those of its customers.

The pandemic, which has forced airlines across the world to ground most of their fleets, could cause the MRO market to be low "for a while", says Lam, even as flying gradually returns due to low utilisation rates.

In the short term, Lam says ST Engineering is working with its customers on rescheduling work, as well as "working with them on their cash flow".

One advantage ST Engineering has against its regional competitors is what Lam calls its "breadth of capability", paired with its presence not just in Singapore, but in China, Europe and North America.

"I mean, literally from the birth of an aircraft, to retirement, and then from the nose to the tail. [We have a] huge, broad range of capabilities, a huge footprint and very comprehensive capability," says Lam.

"So to be all that, and then to be independent, and then to actually survive without being bought, I would say, is truly unique," he says.

Lam adds that ST Engineering's Singapore home is "truly the global hub for aerospace".

"For any single country, [Singapore has] so much capability, and this much representation of OEMs and aerospace interests is hard to find in any country, you know. So, I'm really happy about it," says Lam, who entered the aerospace industry more than 25 years ago.

The island nation has come a long way since that point. Lam recounts how he, while deciding

what to study at university, realised that Singapore did not offer a bachelor's degree in aerospace engineering, a subject that was close to his heart.

Lam ended up taking on a government scholarship to study the subject overseas, returning to Singapore with liberal arts and engineering degrees.

Graduate studies

On graduation, he worked at Singapore's Economic Development Board, where he was "promoting the aerospace industry", to seek investment by foreign OEMs and suppliers into the country.

It was during his stint working for the Singapore government between 2000 and 2003 that he addressed the higher education gap that he had previously noted, persuading local universities and polytechnics to start aerospace engineering courses.

Today, he says, there is a "wonderful explosion" of aerospace programmes in Singapore. Lam is also quick to point out that aerospace courses "remain one of the hottest programmes in the schools".

"So today, the young don't have to go overseas to get their degree. They can get it here. And we have been hiring many of them, you know, who graduated from the local universities in aerospace engineering," he adds.

"I've been fortunate to see the evolution of the industry from small beginnings to become comprehensive, and still becoming bigger." ▶

Endangered species

As Australia nears a decision on its armed reconnaissance helicopter capability, Airbus is fighting to save its at-risk Tiger

Greg Waldron Singapore

It may have taken years for Airbus Helicopters' Tiger to hit its stride in Australian army service, but the capability improvement now achieved may have come too late to save the armed reconnaissance helicopter (ARH) from being replaced by a US-built rival.

In February 2016, Australia's defence White Paper explicitly stated that its 22 Tigers were to be supplanted. "The Tiger has had a troubled history - essential upgrades are programmed to maintain the capability's effectiveness. Defence will invest in a future armed reconnaissance capability to replace the Tiger, which could include manned or unmanned systems or a combination of both, to be introduced from the mid-2020s," the document said.

Eight months later, the Australian National Audit Office (ANAO) delivered another blow. In a 64-page report, it identified 76 "capability deficiencies" with the Tiger, of which the Department of Defence deemed 60 to be "critical".

"The Tiger helicopter fleet has not yet delivered the original capability expected by the Australian government, and continues to experience higher than expected sustainment costs and lower than expected aircraft availability," said the ANAO. "On average, only 3.5 aircraft in the operational fleet of 16 helicopters were available on any given day in 2015," it said: far short of a targeted readiness of 12.

Other issues included the apparent lack of ability to operate from warships, shortcomings with sustainment and combat capabilities, and challenges communicating with the broader army network, reducing its usefulness as a reconnaissance platform.

Canberra's Tiger replacement effort has since coalesced into Project Land 4503, which calls for 29 ARH. A request for informa-

tion was issued in July 2019, and a formal tender is expected to be launched early next year. In a July 2020 strategic update to the 2016 White Paper, the government indicated that the replacement effort will cost between A\$3.4 billion and A\$5.1 billion (\$2.4-3.7 billion).

The army's new ARH must also be comfortable operating at sea, from the Royal Australian Navy's (RAN's) amphibious assault ships HMAS *Adelaide* and *Canberra*.

The contest immediately attracted the interest of Bell and Boeing, which are respectively promoting their AH-1Z Viper and AH-64E Apache.

Amid Canberra's ever-deepening defence ties with Washington, both firms have talked up commonality with US forces. Bell notes that the US Marine Corps, which has forces in Australia, operates the AH-1Z. Boeing points out that several regional allies operate the Apache and the type has a long future thanks to US Army-driven upgrades.

In addition to emphasising the raw firepower embodied in both rotorcraft, the rivals - and especially Bell - have stressed the ability of their helicopters to operate from ships.

Upgrade path

The stakes are high for Airbus. Approximately 90% of its helicopter business in Australia is derived from government work, of which the Tiger is a key element. Ironically, Canberra's plan to buy 29 new attack helicopters is at full steam as the Tiger, at last, is performing as advertised. So, instead of offering a replacement for the type, Airbus Australia Pacific is proposing an upgrade. "The decision in 2016 was made at a time when Tiger was not performing as well as it is today," says Andrew Mathewson, managing director of Airbus Australia Pacific. "Now it's kicking goals and achieving its missions. And the performance is very good. We hope that we've got a bit of a



head start because the product is in service."

The company estimates a Tiger upgrade will be A\$3 billion cheaper over two decades than introducing a new fleet. Mathewson notes that the in-service rotorcraft also have plenty of life left. So far, the airframes have amassed an average of 2,000 flight hours, against an 8,000h design life. "We know that we need to do the engineering analysis on some dynamic components so they can be lifed out to 8,000h, and then could serve well out to 2040," he says.

In addition, the helicopter's electronic warfare and targeting systems would be upgraded, along with the addition of a Link 16 datalink, enabling the Tiger to better integrate with Royal Australian Air Force and RAN assets.

In February 2019, Brigadier Jeremy King, director general army aviation systems, said a huge effort had gone into getting both the Tiger and another helicopter with heavy Airbus involvement - the NH Industries NH90 (designated MRH90 in Australia) - up to speed.

A more collaborative approach with Airbus Helicopters had driven availability and ironed out performance issues with the Tiger, he said. "It is now a capable platform



Commonwealth of Australia

Type's introduction proved far from plain sailing

and one that can be relied upon, but it has been quite a journey – we have had to drive it really hard.”

One problem with the company's proposal, however, is that the new requirement calls for 29 helicopters: seven more than the existing Australian fleet size.

In its initial proposal, Airbus offered to upgrade the 22-strong inventory and provide seven armed H145Ms to make up the difference.

“We offered those seven H145Ms to work in conjunction with the Tigers to offer a mixed fleet, so they can be supported when they're deployed... and also to lift the number up to 29,” says Mathewson.

However, the idea of an H145M top-up failed to pique Australia's interest, so Airbus will instead focus on obtaining seven additional examples of the out-of-production Tiger. The type's other operators are France, Germany and Spain.

As for shipborne operations, the

Tiger demonstrated its sea legs with an operational unit in 2019, completing a Southeast Asian cruise aboard HMAS *Canberra*. Four ARH were embarked aboard the vessel, having been flown from Darwin to Kuala Lumpur aboard Boeing C-17 strategic transports.

Warm words

Lieutenant Colonel Dan Bartle, commanding officer of the army's 1st Aviation Regiment, had warm words for the Tiger during the deployment. “You won't find too many pilots who dislike the Tiger,” he said. “Maintainers love it as well, as do the guys who re-arm and refuel it.”

With reference to shipboard operations, Mathewson notes that the Tiger has a smaller footprint than its rivals, with a maximum take-off weight of 6t, versus the AH-1Z's 8t and the Apache's 10t.

Yet, despite the Tiger's strong progress in recent years, memories

of the programme's earlier challenges are hard to shake. “That reputational damage just seems to last and last,” Mathewson concedes. “And it's something that we're now trying to work at, getting the positive stories out. Until recently, some army commanders have made some very positive comments about the Tiger. Now, as we lead up to a competition, of course the army is completely silent, and quite rightly, because they don't want to be in any way seen to be influencing future decisions.”

Canberra is close to deciding who will receive the Land 4503 request for tender, and some industry observers believe it is leaning towards soliciting just one bid: for the Apache.

It is up to Airbus Helicopters to set the record straight about the Tiger and try to persuade Australia that its troubles are part of aviation history. ▀

FlightGlobal

in association with:

**Together
ahead.**

RUAG

**Download the 2020
World Air Forces Report**

www.flightglobal.com/waf

Max factors

As controversial narrowbody nears FAA recertification, **Max Kingsley-Jones** outlines key issues around jet's return

The signs are that after the many hurdles that had to be overcome – and several false dawns for its revival – the Boeing 737 Max should finally return to the skies before the end of 2020. But the recertification will be just the start of a new set of challenges for Boeing, its customers, and the wider industry. There are myriad issues that will come into play as the programme is revived more than 20 months since its grounding, including some linked to the airline trading conditions caused by the coronavirus pandemic.

There are questions around areas such as the pace of the Max fleet restoration (among the installed fleet and the hundreds of built but undelivered airframes); operators' appetite to add Max aircraft and crew-training capacity; the potential displacement effect on other fleets; and the alignment of regulatory approvals worldwide.

Travelling public

But one crucial parameter is beyond the industry's control: the acceptance by the travelling public to fly on the aircraft. While the narrative on the Max's safety failings has perhaps been overtaken by the Covid-19 pandemic, media attention around its re-introduction could quickly revive painful memories. As it stands, there are 385 delivered Max aircraft grounded worldwide, according to Cirium fleets data. Cirium estimates that approximately another 450 Max airframes are built and stored awaiting delivery.

If, as is now widely expected, recertification by the US Federal Aviation Administration (FAA) is

imminent, that should clear the way for an almost immediate resumption of deliveries to US airlines. It is likely that the FAA's approval will be shadowed promptly by authorities participating alongside it in the 737 Max Joint Operations Evaluation Board: Brazil, Canada and the EU. The approval status in key market China is less clear, but might be expected to follow within months of the FAA's decision.

If US Max clearance does come soon, then Ascend by Cirium estimates that 2020 deliveries could just reach double figures. As Boeing works to clear the backlog of built aircraft, along with integrating deliveries from the Renton assembly line, Cirium projects annual shipments reaching 430 in 2021 and 480 in 2022, before declining below 400 over the following two years. Assuming deliveries are a mix of stored and new-build airframes, the parked backlog will be cleared by the first quarter of 2023. The delivery rate would then fall slightly to approximately 390 in 2023, with production stabilising at a monthly rate of 31 aircraft.

The resurrection of the mothballed, undelivered aircraft will be complicated by some airframes now being unallocated due to cancellations or rescheduling. These aircraft would require some cabin reconfiguration and estimating the number involved is imprecise. But with customers potentially able to cancel penalty-free if delivery is not achieved within 12 months of the original contractual date, then the number is potentially high.

Ascend by Cirium estimates that Boeing has already shed approximately 1,300 Max orders in the

wake of the grounding, including 553 confirmed cancellations plus more than 750 orders that are subject to ASC 606 accounting adjustments – orders that are still firm but which the airframer believes are unlikely to complete. Some of these changes may affect aircraft that have already been built. The Max's ASC-adjusted firm backlog stood at 3,403 aircraft at 30 September.

Return to service

There will be several drivers determining the pace of return to service of the 385 aircraft grounded in March 2019. Once approval is received within each operator's jurisdiction, every aircraft will have to undergo post-storage checks and testing. From a demand-side perspective, airlines will look at their fleet-planning strategy amid the downturn and training availability required for flightcrews.

But there will certainly be implications for incumbent single-aisle fleets, as amid the crisis the Max's absence has helped the supply and demand balance. Its reintroduction will create a displacement effect at operators where they will replace rather than supplement existing aircraft – predominantly 737NGs.

The likelihood is that each Max returned to service or delivered will replace a 737NG on a one-for-one basis. This will increase supply when capacity growth is off most airlines' agenda, and so there will be implications for values and lease rates – not just in the 737NG community, but also across the wider single-aisle spectrum. ▀

Max Kingsley-Jones is a senior consultant at Ascend by Cirium



Restart of deliveries will have effect on existing 737 fleets

Jack Darling Photo/Shutterstock

Next month

Our new World Air Forces directory details combat strength and spending plans

FLIGHT INTERNATIONAL

On sale
26 November



Plus...



Maintaining thrust
Engine makers keep driving ahead despite the downturn



Global view
We interview Saab chief executive Micael Johansson



Giant puzzle
Don't miss Uncle Roger's ever-fiendish festive quiz

US Air Force

Boeing

Saab

Munich airport

An industry on hold



The delivery ceremony for Aeroflot's first A350-900: widebody's monthly output has been slashed to five

Airbus For some airliner programmes and their manufacturers, Covid-19 jammed the brakes on robust sales growth; for others it has simply made worse existing problems. In this special package we look at the challenges facing each airframer as we approach the end of the toughest year the industry has faced.

Boeing – already badly damaged by the grounding of the 737 Max – and Airbus continue to pin their hopes on a single-aisle recovery as demand for widebodies

evaporates. Embraer is facing a very different future after being jilted at the altar by would-be marriage partner Boeing.

The freight market is providing some respite for ATR and De Havilland Canada as the regional turboprop market crumbles, while the emerging players of China, Russia and Japan are all wrestling with their own unique challenges, from certification obstacles to Western sanctions.

Airbus

Single minded

The airframer is struggling to find customers for its A330s and A350s, but narrowbody production will continue at 40 units per month. However, plans to add production capacity by turning the former A380 facility in Toulouse into a dedicated assembly line for the A321neo have stalled

David Kaminski-Morrow London

Within just two weeks at the beginning of autumn Airbus oversaw two contrasting events that illustrated the frustratingly capricious nature of air transport and the delicate balance of circumstances that influence the industry. It rolled out its final A380, MSN272, from the Toulouse production line's station 40 – the combined point at which the jet is fully assembled, bar the engine installation – leaving the facility empty, just 16 years after the first test-flight aircraft, MSN001, emerged.

The airframer had already called time on A380 production a year before the pandemic-driven crisis which – having curtailed A380 fleets at several carriers – would almost inevitably have forced the decision. But the A380 facility will not remain dormant. Airbus intends to convert it to house a modernised assembly line for its A321neo, an aircraft that occupies a place on the opposite end of the popularity spectrum.

Airbus has formally handed over an A321neo bearing the numerically-significant MSN10000, to the same customer – Lebanese flag-carrier Middle East Airlines – which took MSN5000, an A320 transferred to the Beirut-based operator in January 2012. “This delivery is a sign of incredible adventure and incredible success,” Airbus executive vice-president of programmes Philippe Mhun tells *Flight International*.

Mhun has seen the high and low points having joined the manufacturer, as vice-president of the A380 programme within customer services, just after the first airframes were completed in 2004. The son of one of the first A320 captains, his role as programmes chief means he oversees the single-aisle range Airbus originally forecast would reach 600 sales. “But the A320 delivered in 1988 is an ancestor of what we’re delivering today,” he says.

Since that initial customer acceptance, Airbus has seen a “permanent acceleration” of single-aisle deliveries, adds Mhun. It took 11 years to hand over 1,000 A320s but less than four to reach the same mark with the re-engined A320neo.

Airbus had delivered 9,529 A320-family jets by the

end of September this year, and Mhun admits that – owing to “industrial sequencing” – the MSN10000 airframe is not technically the 10,000th example to be taken up. Airbus had already delivered MSN10001, an A321neo to Air China, and MSN10002, an A320neo to Iberia, from Hamburg and Toulouse last year.

The serial number often departs from the production rank – that for the final A380, MSN272, exceeds the 251 aircraft ordered. EasyJet received the 9,000th A320, which bore MSN9105. Airbus sometimes assigns test serial numbers to components or projects outside of the jets on the physical assembly line, including simulators. The airframer is also shuffling hundreds of aircraft positions – as it did in 2008-2009 – to maintain its delivery stream during the pandemic. But it has also been using some serial numbers for the pilot phase of a project to ensure its systems, and those of its suppliers, can cope with the change from four to five digits.

Reference number

Mhun describes the airframer's first five-digit MSN delivery as a reference, and points out: “It's one number out of 15,000 aircraft ordered.” The precise figure of 15,577 at the end of September puts the A320 family 830 aircraft ahead of the Boeing 737, and makes it the most popular commercial jet in terms of orders – although deliveries lag its US rival by about 1,100 aircraft. “Customers believe in the future of the A320,” says Mhun, adding that Airbus is investing around €2 billion (\$2.3 billion) per year in enhancements for the family.

Single-aisle production will be a focus for Airbus, as this sector is set to lead the crisis recovery. “I think the [A320neo family] is a good answer to the uncertainty we're in – airlines using them to open new routes, point-to-point, and long-range operations,” Mhun states.

Weakness in the twin-aisle sector, exacerbated by the pandemic, and fragmentation that has resulted in smaller aircraft being introduced on long-haul routes has spurred Airbus to maintain the development schedule for its A321XLR – the longest-range version of its largest single-aisle jet, due for flight tests in 2022 and service entry in 2023. “We've protected the project,” says Mhun. “We're still on the same milestones. We've had talks with airlines, they still want to get A321XLRs at the time they were expecting them.”



Airbus handed over an A321neo with the serial number MSN10000 to Middle East Airlines in October

He believes the aircraft, which will feature a large aft centre fuel tank to enable its 4,700nm (8,700km) range, will “bring a lot of value in the current situation”.

“It’s one of the priority projects where we’re still full-speed ahead,” Mhun adds. Metal cut has commenced for the crucial aft tank, and structural sections are starting to be assembled. Airbus is testing and using its new digital design, manufacturing and services tools on the project to help model the assembly process. “It’s not only about the product, but the efficiency of the end-to-end industrial process,” he says.

Delivery rate

Airbus still has a backlog of more than 3,000 A321neos, but monthly single-aisle production has been pulled back to 40 aircraft, a slowdown that came just two months after the airframer had been exploring ways to nudge output further than the 63-per-month planned for 2021. This has forced Airbus to shelve the conversion of the Toulouse A380 facility into an updated A321neo line.

“The question is not any more about adding capacity but to deliver at the rate we’ve decided to deliver,” says Mhun. He says the A321neo assembly line project is on hold and will be revived once the market justifies it. He indicates, however, that the easing of production rates has brought time for the company to address industrial problems that had hampered A321neo ramp-up and deliveries, after the aircraft’s increasing range generated demands for new interior configurations compatible with long-haul travel.

“We allocated a lot of energy to think about end-to-end industrial efficiency,” says Mhun. This involved putting “value-stream management” in place, bridging the development and industrial systems, from suppliers to the various plants and the final assembly line. Evidence that this was generating the necessary results emerged in early 2020, he says. “Then we were trying to use the reduction of production rates to go further, to another element of stabilisation – ‘quality first’ – targeting high-quality standards,” he states. The airframer has been able to revisit processes and de-bottleneck the system, as well as “raise the bar” on quality.

Mhun says the combination of these strategies will result in a positive situation when A321neo production increases. But he is mindful of the economic pressures on the supply chain while the crisis persists, and says the airframer has directed a lot of government support to this chain, to help ensure they do not slip into trouble before they are needed for ramp-up.

With the prospects for a substantial return to intercontinental flying still unclear, Airbus is yet to commit to restoration of twin-aisle production rates. It has halved monthly A350 output to five, while the A330neo line is ticking over at two. The airframer, which delivered 14 twin-aisle jets in the first two months of this year, handed over just 18 in the following six months – and none in July.

Mhun says Airbus’s models are predicting 2023-2025 to be a “reasonable window” for recovery in widebody activity, but points out that “100% of A350-1000s are flying” – discounting a few for Etihad Airways, which were already being parked before the pandemic struck.

Airbus estimated, at the end of July, that it had 145 undelivered aircraft. But chief executive Guillaume Faury believed this would be the “high point” for

Boeing

A better place

Consolidating its US manufacturing footprint might be one way Boeing will tackle the challenges of its long 737 Max grounding and a collapse in orders as a result of the pandemic

Jon Hemmerdinger Tampa

Amid the troubles of 2020, Boeing’s strategy for returning to past heights remains unclear, with open questions about the company’s product strategy and future production footprint. Some analysts speculate that production rate cuts and tough market conditions, which have hammered the entire aerospace industry, might lead Boeing to consolidate its two commercial aircraft manufacturing sites in the Puget Sound region.

Also uncertain is whether Boeing might continue shifting away from the Seattle area entirely by building its next new jet, whatever that may be, outside Washington state.

Analysts view North Charleston, South Carolina, where Boeing makes 787s, as among candidates for future expansion. Other options could include somewhere in eastern Washington state, or cities such as Huntsville, Salt Lake City or San Antonio, says aerospace analyst Michel Merluzeau with consultancy AIR.

Within Washington state, analysts suspect consolidation may be looming, saying production cuts have left too much manufacturing capacity. “It’s only natural for Boeing to consolidate Renton into Everett,” says Alex Krutz, aerospace manufacturing strategy consultant with Patriot Industrial Partners.

If Boeing were to keep only one Puget Sound site, analysts view Everett as the likely winner, citing that facility’s capacity and engineering talent.

Boeing’s Renton site produces 737s, while the Everett facility manufactures 767s, 777s and, for a while longer, 747s and 787s.

Chicago-based Boeing this year announced it will move 787 production out of Everett in mid-2021, consolidating that work in North Charleston, where it



Will 737 Max production remain at Renton for the duration of the programme?

also makes the jets. Boeing also announced plans to cease 747 production in 2022.

Boeing has not disclosed other Seattle-area commercial aircraft manufacturing footprint changes. However, it is undertaking a wholesale business appraisal. “We’re evaluating our overall infrastructure across Boeing to optimise our facilities and footprint,” the company tells *FlightGlobal*. “We’ll share any additional details in the future.”

Krutz suspects Boeing will eventually transfer 737 work to Everett, a move also enabling it to sell the prime Renton real estate. “I think they have to,” Krutz says. “If there’s a time to do a transition, it’s now,” when 737 production rates are low, he adds.

Renton was “busting at the brim” before the Max grounding, when Boeing was churning out upward of 50 Max aircraft monthly, he notes. Everett would give Boeing the manufacturing space to ensure it can meet production goals when demand returns.

Others think the cost and logistics of moving 737 production to Everett would be prohibitive – especially considering the 737 Max may have only 10 or 12 years of production remaining, says Merluzeau.

“In terms of economics, I’m not sure that a transfer of the 737 line out of Renton would make sense,” says Richard Aboulafia, aerospace analyst with Teal Group.

Other 737 options could include keeping Renton humming until Max production runs its course, or transiting the 737 to Everett in phases, initially splitting production between sites.

Challenges aside, Boeing has positive developments on the horizon, including the anticipated re-certification of the long-grounded Max. Boeing expects regulators will clear the jet in time for deliveries to resume in the fourth quarter.

The company also continues working toward certification of its 777X, which it expects to begin delivering, with the 777-9, in 2022. The US Federal Aviation Administration recently certificated that jet’s GE Aviation GE9X powerplants.

And Boeing predicts a healthy aerospace recovery. Its recently released 2020 outlook estimates carriers globally will need 43,110 new jets through 2039, down only 2% from last year’s 20-year projection.

Questions about Boeing’s production strategy stem from sagging demand, rate cuts and cost pressure.

Boeing is bringing 787 production to six jets monthly, and 777 output to two monthly, in 2021. Previously, it had produced 14 and five respectively every month.

737 Max production has been anaemic for much of 2020. Boeing predicts output will reach 31 jets monthly by early 2022. Before the Max grounding, it produced 53 737s monthly.

Boeing also this year stepped back from its proposed New Mid-market Airplane (NMA). That jet, never formally launched, was to carry 270 passengers, have 4,000-5,000nm (7,400-9,300km) range and counter long-legged variants of the Airbus A320neo family.

Several months ago Boeing announced a 10% workforce reduction. It had 161,000 employees in 2019. Departing staff reportedly include 170 vice-presidents, directors and other mid-level executives, including those in sales, manufacturing, supply chain and strategy. A “true business transformation” is under way

Max Kingsley-Jones/FlightGlobal



The 787 is built in North Charleston and, for now, in Everett

at the company, executive vice-president of enterprise operations and chief financial officer Greg Smith said during Boeing’s second-quarter earnings call on 29 July. Boeing is reviewing every aspect of its business, including infrastructure, facilities, sites and enterprise footprint, in light of the reduced demand, he said.

Boeing lost \$3 billion in the first half of 2020. Revenue slipped 26% year-on-year to \$28.7 billion in the period. Its challenges are not unique – many aerospace companies reported recent losses and cut staff in a rush to save cash amid the downturn. Airbus likewise trimmed commercial jet production.

But Aboulafia wishes Boeing would communicate something about its commercial aircraft strategy – “If only to... say, ‘Yes, there is a future and this is what we are considering’.”

Some observers suspect Boeing’s next move will be a 737 replacement. Others speculate that it may first return to an aircraft like the NMA.

Regardless, where might Boeing build such a jet? “Building a new jet in Everett would make a great deal of sense,” says Aboulafia.

Krutz likewise sees Boeing aligned with Everett.

While Renton is primarily a manufacturing site, Everett is home to a large engineering workforce. “You want to centre your production with engineering,” Krutz says. He also thinks Boeing will not risk losing the talented workers there who are affected by its widebody production cuts. “It should be important to Boeing to continue to have work there, to be able to harness that talent, and retain it,” Krutz says.

Merluzeau thinks Everett stands a strong chance of building Boeing’s next jet, noting the site’s skilled labour and the company’s long ties to the region. Without more work fast, Everett will become “an empty building with a lot of smart people”, he says.

But several factors could lead Boeing to look beyond Washington state. Those include labour challenges and the relatively high cost of doing business in Washington, Merluzeau says. He cites regulations and taxes, adding that comparatively high minimum wages have already affected smaller aerospace suppliers.

Merluzeau suggests neither Everett nor Renton may be compatible with Boeing’s future aircraft production process, which will likely employ advanced automation and composite materials, like thermal plastics. “The organs of the production system are not going to look anything like what you have in Everett,” he says. “You need a new type of factory, you need a new production system, you need something that does not exist.”

Also, automation could allow Boeing to build its next jet with one-third of the 737’s workforce, meaning fewer jobs for skilled workers. “I don’t think the workforce is the primary defining element in what’s coming next,” Merluzeau says. “The production system can move anywhere, and you can get the talent base.”

parked jets, and that the level would start coming down towards the year-end.

Mhun says he cannot predict when Airbus – which still has nearly 60 conventional A320s in its backlog – might hand over the single-aisle jet designated MSN11000. But he states that the airframer is confident it has the right product portfolio, from the A220 up to the A350. While the air transport industry awaits a sustained upward trend, he says, Airbus is supporting customers in various ways, retraining pilots and mechanics, helping carriers to store aircraft, and ensuring safety during restart. “People will remember the support we provided in the bad times,” he adds. “We’ve reacted quickly, reducing production rates, but we’re doing it in a responsible way. When demand ramps up, we’re ready.”

Russia

Made in the backyard

Sanctions mean Irkut is looking to domestic industry to provide an alternative source of components for the MC-21 and Superjet 100

David Kaminski-Morrow London

The death, aged 95, of Tupolev Tu-154 chief designer Alexander Shengardt in September closed the era of the Soviet Union’s most prolific airliner programme, leaving Russia still struggling to replicate the workhorse trijet’s success.

More than 1,000 Tu-154s were assembled, a four-figure production run comparable with that of the Boeing 757 and McDonnell Douglas MD-80 despite its relatively limited market for export. Some 150 were sold abroad.

Shengardt, who held his position for 36 years, had overseen the pioneering development of low-maintenance operation and internationally-approved technical documentation for the aircraft. Under political pressure from industrial sanctions, the Russian government is trying to rebuild some of that former Soviet aerospace glory, retreating from international co-operation in favour of an import-substitution initiative for its latest civil aircraft. Official Russian procurement documentation shows a steady stream of tender invitations for various equipment – avionics, life-rafts, passenger cabin control systems – to replace foreign equivalents on its Irkut MC-21.

Irkut has been hoping to fly its first MC-21-310 – the designation of the twinjet with domestically built Aviadvigatel PD-14 engines – before the end of 2020. The airframe has already undergone a technical engine installation for preliminary checks.

Recent procurement requests for the Western-

Regionals

Routes to recovery

Abandoned by Boeing and seeing its European market turn elsewhere, Embraer and De Havilland Canada have problems beyond those caused by Covid-19, while ATR is hoping a new freighter programme will offset a fading orderbook

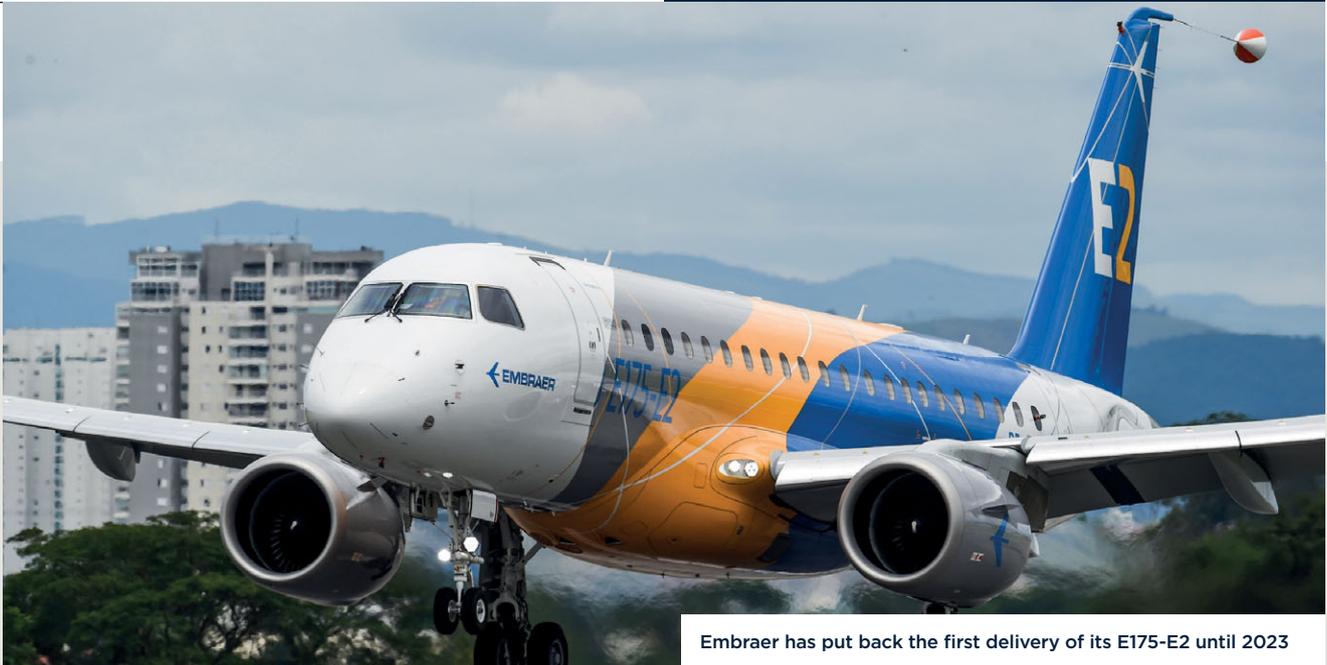
Murdo Morrison London

A year ago, the future looked bright for the three Western regional airliner manufacturers. Embraer was close to signing off on a takeover of its commercial aircraft division by Boeing that would have secured the future of the industry’s number three player. ATR was coming to the end of a solid year that would see it deliver 68 aircraft and notch up 79 orders – up 50% on 2018. And the sector’s newest name, Toronto-based De Havilland Canada, was hoping to inject impetus into the fortunes of the former Q400 programme that parent Longview Aviation Capital had acquired from Bombardier in June that year, renaming it the Dash 8-400 and adding it to the Twin Otter 19-seat turboprop built in British Columbia by sister company Viking Air.

For all three companies, 2020 has been about retrenchment, preserving cash, and survival, although there have been glimmers of optimism. Turboprop specialists ATR and De Havilland Canada turned their attention to freighter conversion programmes, with ATR in September also flying its first new-build freighter, based on the ATR 72-600. Embraer’s commercial aircraft business is under new management – although not the new management it hoped for – after John Slattery’s departure to head GE Aviation, to be replaced by former chief commercial officer Arjan Meijer. Boeing’s decision in April to abandon its 80% acquisition of the business for \$4.2 billion left Embraer furious and likely triggered Slattery’s exit.

It has dealt the Brazilian airframer a double blow. Like all manufacturers Embraer has seen sales collapse since the coronavirus outbreak: commercial deliveries fell by 75%, to just nine jets in the first half. Meanwhile, Boeing’s investment would have provided the funds for its Brazilian subsidiary to invest in new technologies to continue dominating the regional segment when recovery comes. One of these is a long-mooted 90-seat turboprop – taking Embraer into direct competition with ATR and De Havilland Canada – but now unlikely in the medium term as preserving cash and finding a new partner becomes vital. In July, Meijer said that, while the case for such an aircraft remained sound, Embraer’s priority was weathering the storm: “Then we will think about next steps.”

Embraer has also pushed back the entry into service until 2023 of its 80- to 90-seat E175-E2 after the



Embraer has put back the first delivery of its E175-E2 until 2023

initial flight of the final variant of its trio of re-engined regional jets in December 2019. The first of the larger E190-E2 and E195-E2 were delivered in 2018 and 2019 respectively, and the smallest sibling had been due to follow in 2021.

While a modern jet with that capacity might appeal to many airlines serving thinner routes, a big obstacle for Embraer is US scope clauses that ban regional affiliates of major airlines from operating aircraft with more than 76 seats or a maximum gross take-off weight of more than 39,000kg (86,000lb). The Pratt & Whitney PW1700G-powered E175-E2 falls into that category.

Where Embraer goes from here is uncertain. The company is still banking on its business rationale for the E2s – that they provide a more cost-effective option than conventional narrowbodies for airlines flying thinner city pairs, or bedding in new routes on which flying a large regional jet makes more commercial sense initially.

Bombardier's introduction of the CSeries a decade ago doomed the Canadian firm in the airliner sector – its pockets were not deep enough to compete with discounts offered by Airbus and Boeing. Will Embraer battle on solo, as a small, third player, or will it turn to the Chinese? If so, its ambitions in the defence market would likely mean it once again moving to spin off its commercial aircraft interests.

Although it is shedding some 200 jobs, ATR's position is less precarious. Owned by aerospace giants Airbus and Leonardo, the Toulouse-based airframer has just two product lines, the ATR 42-600 and larger ATR 72-600, and entered the crisis with a solid backlog. With the cargo market holding up reasonably well, the family's popularity as a freighter provides ATR with cushioning.

Its first purpose-built freighter, the ATR 72-600F, is now in flight testing, with the programme underwritten by a 2017 order for 30 examples with 20 options from the world's largest parcels company FedEx Express. The variant includes a large cargo door in the forward fuselage as well as an aft cargo door.

The airframer also claims the ease with which some operators – such as Fiji Airways – have converted ATR aircraft for freight operations illustrates the adaptability of its platforms. In May it authorised a quick

conversion solution that enabled airlines to quickly and temporarily install a light freighter configuration.

ATR is also developing a short take-off and landing version of the 40-seat ATR 42-600, for which Papua New Guinea carrier PNG Air is launch customer. The ATR 42-600S is due for service entry in 2022, and PNG says the variant will allow it to access more remote communities served by unpaved, short airstrips.

The manufacturer is also committing to a low-carbon future and said in October that it plans to announce a series of low-emission initiatives early next year, likely to include a trial using hybrid-electric propulsion. The French government has committed to part-funding the development of a “decarbonised regional aircraft” by 2035.

De Havilland Canada was still finalising its strategy for its newly-acquired aircraft programme when Covid-19 struck. Like ATR, it has seized the opportunity offered by cargo conversions, with regulator Transport Canada approving until at least next July the Dash 8-400 Simplified Package Freighter adaptation – where seats and seat track covers are removed overnight to provide room for freight.

The company made its maiden delivery of the rebranded Dash 8-400 in June, when state-owned TAAG Angola Airlines took the first of six examples it signed for at the 2019 Paris air show. However, De Havilland's woes started early in the crisis with the collapse of its biggest customer in early March. UK regional airline Flybe had 54 Dash 8-400s, almost 10% of the turboprop's global fleet.

With the type losing favour with several European operators, including Austrian Airlines and Air Baltic, De Havilland Canada is looking to replace them elsewhere. Target markets are Africa and Southeast Asia, where there are efforts to improve connectivity to far communities. The firm sees potential there with a high-density, 86-seat version that can also operate as a “combi” freighter.

With domestic and other short-haul travel likely to rebound quicker than the intercontinental market, established regional aircraft manufacturers are in some way better placed for recovery than Airbus and Boeing. However, each of the three finds itself in an uncomfortable position as the industry continues on its turbulent course into 2021.

powered version – the MC-21-300, with Pratt & Whitney PW1400G engines – include testing of noise levels for the powerplant and work on type certification documentation, signalling that the variant is slowly edging towards completion of its flight-test campaign.

Four PW1400G-powered MC-21s are undertaking flight tests. The latest to join the fleet (73056) is fitted with an all-economy configuration equating to 211 seats, whereas its predecessor (73054) had a two-class cabin with 163. The twinjet's engines underwent water-ingestion testing, using its second flight-test airframe (73053), during ground runs in mid-July.

Irkut claims firm orders for 175 aircraft. Aeroflot remains the primary customer, with firm orders for 50, plus 35 options, but certification and deliveries are unlikely until 2021, particularly given the added complication arising from the coronavirus pandemic.

Import substitution is under way for the Superjet 100, which has been absorbed into the Irkut portfolio, to produce a 'Russified' version, the SSJ New, by 2023.

Irkut has been testing the KRET BINS-2015 inertial navigation system, using a prototype Superjet, to replace the Honeywell Laseref V system fitted to the type.

Tests will start next year on other domestic systems that will be integrated into the SSJ New, including oxygen equipment to cope with depressurisation and a vibration-control system for the aircraft's engines.



Irkut had hoped to fly its first MC-21 with Russian-made Aviadvigatel engines before the end of 2020

United Aircraft

Russian state technology firm Rostec's aerospace divisions are supplying multiple components including a different landing-gear assembly. It says the landing-gear will have enhanced damping and control, for a more "comfortable" touchdown. Testing has already started on the SSJ New's air-conditioning and cooling system, which moderates hot engine air, for cabin pressurisation and temperature control.

"Research carried out during the development process has revealed possibilities for improving [the system], reducing the weight and increasing its heating and cooling capacity," says Viktor Tyatinkin, general director of the system's supplier, Teploobmennik.

Irkut is also looking to improve the Superjet's flight performance as part of the SSJ New project.

Asia-Pacific

Emerging, diverging

Asian airframers Comac and Mitsubishi Aircraft are on different trajectories as they continue to look to become significant players in the commercial aircraft market

Alfred Chua Singapore

In the middle of this year, as most of the world was convulsing between lockdowns, two Asian aircraft manufacturers made announcements relating to their key programmes. In May, Mitsubishi Aircraft of Japan delivered sobering news: the annual budget for its flagship SpaceJet regional aircraft programme was to be halved, amid fresh delays to the clean-sheet jet. The SpaceJet was allocated just ¥60 billion (\$569 million) for the current financial year, amid widening losses on the programme. Just over a month later, the positive news from neighbouring China was in stark contrast.

On 29 June, Shanghai-based airframer Comac trumpeted the fact that examples of its ARJ21 regional jet had been delivered to China's Big Three airlines – Air China, China Southern Airlines and China Eastern Airlines. The trio of ARJ21s made for a picture-perfect moment, adorned in the easily recognised liveries of two of the carriers, save for that of China Eastern, which instead was painted in the colours of regional subsidiary OTT Airlines.

It was a long time coming for Comac, which has always hoped to give the ARJ21 greater visibility in its home market. Its optimism when at the milestone could barely be concealed: hailing what it called "the official entry of the ARJ21... into mainstream international airline fleets", Comac was quick to add that the ARJ21 will "play a positive role" in the promotion of regional aircraft operations.

Indeed, the two announcements of May and June highlight the diverging fortunes of Comac and

Russia's other near-term programme is the resurrection of the Ilyushin Il-114 as a modernised 68-seat regional turboprop, the Il-114-300, ground tests and engine runs for which commenced in September ahead of taxi trials and the flight campaign. Low-power runs of its Klimov TV7-117ST-01 powerplants were carried out at Ilyushin's Zhukovsky flight-test base.

Il-114 programme director Maxim Kuzmenko says the installation of all systems and equipment has been completed, pointing out that these modern systems – most of which have been designed by Russian suppliers – represent the aircraft's "innovative component".

The fuel system has been tested and operation of the engine was performed in real conditions for the first time, says United Aircraft's Ilyushin division. Manufacture

Mitsubishi Aircraft, and that they seem to be drifting ever further apart. But Mitsubishi Aircraft's recent history has been written via a steady drip-drip of bad news. The Japanese airframer began the year on a low note, announcing in February, days before it was due to participate in the 2020 Singapore air show, that it expected the first SpaceJet delivery to be delayed by a year or more. That milestone is now expected in April 2021 at the earliest, and potentially beyond March 2022.

Launch customer All Nippon Airways was due to have received its first Pratt & Whitney PW1200G-powered SpaceJet M90 in the middle of this year.

In March, as the pandemic forced the adoption of social-distancing measures, Mitsubishi Aircraft's SpaceJet M90 flight-test vehicle 10 took off for a muted, low-key maiden sortie. After its major announcement about budget cuts and fresh delays, Mitsubishi Aircraft dropped yet another bombshell: it was to close all non-Japan locations, and move SpaceJet activities back to its Nagoya headquarters. As part of the consolidation to Japan, the company halted flight testing of its 90-seat SpaceJet M90 variant and suspended development of its 76-seat M100.

Financially, the SpaceJet programme has also proved to be a poisoned chalice for parent company Mitsubishi Heavy Industries (MHI). For the quarter to 30 June, the SpaceJet programme made a loss of ¥68.8 billion. Although that was mainly driven by impairment charges related to the acquisition of the CRJ regional jet programme from Bombardier, another ¥20 billion of development costs did not help. SpaceJet-related losses pulled MHI into the red, as the parent company sank to a loss of ¥71.3 billion for the quarter.

The aircraft, defence, and space unit, in which the SpaceJet programme resides, emerged as one of the worst-hit segments from the coronavirus outbreak, as it tumbled to a steep first-quarter loss of ¥62 billion, reversing the ¥9.4 billion profit it made in the same period last year.

As for Comac, its fortunes in 2020 could not be any more contrasting. More specifically, the fate of its ARJ21 programme continued its upward climb. The airframer was forced to suspend operations in February, as China battled the coronavirus outbreak. But just a month later, Comac announced the opening of a second ARJ21 production line at its Shanghai

of a second prototype, using serial production techniques, is being undertaken at the Likhovitsy plant of RAC MiG, near Moscow. Fuselage mating of this aircraft is being finalised at the automated assembly rig, to be followed by tail and wing attachment.

Deputy technical director of the Likhovitsy plant Artyom Sukach says the assembly technology enables high-precision work - including alignment within hundredths of a millimetre - accompanied by a reduction in preparation costs.

The Il-114-300 is being manufactured through a co-operation between several aerospace plants including Aviastar, VASO, and MiG's Sokol facility, as well as Likhovitsy. Aviastar makes fuselage panels and doors, while VASO supplies the wing, tail and engine nacelles.



Mitsubishi Aircraft's SpaceJet programme has been plagued by budget cuts and production delays

base, co-located at the same facility where its C919 narrowbody programme is assembled. It was also the same month that it restarted production at its site.

In April, it made its first post-shutdown delivery, an ARJ21 that went to Chengdu Airlines. It was the 24th ARJ21 to be handed over, and the first to be assembled at its Pudong production line. In addition, Comac has managed a rare feat this year by adding to its backlog: in June, Guizhou-based China Express Airlines signed a partnership framework agreement for the purchase of 100 ARJ21 and C919 aircraft.

Cirium fleets data shows that as of 30 September, Comac has delivered 12 ARJ21s to Chinese carriers this year. Of these, 10 are in service, while two are in storage. Two further handovers are scheduled this month, which should help the airframer towards its 30-unit year-end target.

Details on Comac's other development programmes remain scant, however. Test flights of the C919 narrowbody - powered by CFM International Leap-1C engines - are continuing using a six-strong fleet, but no firm dates for certification or service entry have been revealed. In addition, China continues to work on an indigenous powerplant for the jet, the ACAE CJ-1000AX.

As for the CRAIC CR929 widebody, which is being jointly developed with Russia's United Aircraft, Comac adds that it hopes to complete "optimisation of composite structural parts" by the year-end. However, reports of serious differences between the partners, plus an apparent lack of progress on supplier selection, do little to instil confidence in the project. First delivery now appears to have shifted to 2028-2029, from 2025 previously.

United Aircraft intends the Il-114-300 to succeed Soviet-era Antonov types including the An-24 and An-26, as well as foreign models in the same category. It envisions the turboprop operating primarily in the domestic market, and offering connectivity to remote regions in Siberia and eastern Russia. The Il-114-300 will have digital avionics and, says Rostec aviation industrial director Anatoly Serdyukov, will be "one of the most promising models in its class", with an 800nm (1,500km) range.

The twin-turboprop is a completely domestic aircraft, the product of a broad co-operation between Rostec's aerospace manufacturing companies, he says, adding that it will be "unpretentious", able to operate from unpaved, short runways and even Arctic ice strips. ▶

A fatal accident involving an Atlas Air freighter exposed a lack of progress in operators compiling and sharing data on pilot training performance, despite a 2010 mandate to boost safety



Operator recruited first officer to fly 767-300F unaware of his prior performance limitations

Karolis Kavolelis/Shutterstock

Hard lessons

David Kaminski-Morrow London

When investigators delivered their scathing verdict on the loss of Giant 3591, the Atlas Air Boeing 767-300F that disintegrated after diving into a lake on approach to Houston on 23 February 2019, the language barely contained their frustration over the missed opportunities to prevent the accident.

Barely 30s before the jet struck the water of Trinity Bay at over 400kt (740km/h) it had been stable, descending through 6,300ft, and riding mild turbulence from a cold front. This benign disturbance, the inquiry believes, caused the first officer's wrist to bump against a thrust-lever go-around switch as he held the speedbrake handle. The engines powered up, and the first officer, startled, pushed the nose sharply down – an over-reaction from which the crew failed to recover.

Former naval aviation instructor Michael Graham, one of the National Transportation Safety Board (NTSB) members participating in the inquiry, was unequivocal in his opinion of the first officer's abilities.

"He lacked the basic airmanship skills required to perform as a pilot, much less an airline transport pilot. His training performance, deficient skills, and inappropriate responses at multiple carriers confirmed this," he said. "At some point one of these instructors, training review boards, or companies should have pulled him from the cockpit." Graham stressed that, in his military service, he had intervened to halt pilots' careers over weak skills, poor judgement, and lapses in safety, and that the first officer's trail of training failures at four previous carriers should have led each airline to recommend an alternate vocation.

Atlas's own hiring process relied on agents, rather than flight operations specialists, to review pilots'

1,500h

Experience required by new first officers under tightened FAA criteria

5,000

Operators employing pilots that will need to submit records to pilot database

\$27-31m

Estimated total cost of developing single electronic record system

backgrounds and highlight potential concerns. This vulnerability combined with missing pieces of the first officer's record, some deliberately obscured and omitted, allowed him to slip through the operator's recruitment defences.

"I hate to be a Monday-morning quarterback," Atlas senior director of flight procedures training and standards Scott Anderson told the inquiry. "If I had that information at the time we would not have offered him a position."

Without the full disclosure of prior problems, Atlas proceeded to train the first officer on the 767 without being able to put into context his subsequent difficulties in flying the aircraft, including heavy-handed control, low situational awareness, failing to think ahead, and pressing wrong buttons.

Poor training record

The investigation was critical of the first officer for deliberately concealing his poor training record, and stated that – despite this deception – the airline could not be given "a pass" for missing indications of his weakness in the paperwork it had available. But the inquiry also underlined the continuing absence, years after it was proposed, of a sufficiently robust database of pilot records on training, proficiency, qualifications, evaluations, and employment.

"I'm convinced that had the [database] been fully implemented by the mandated deadline, it is likely that the first officer of [the 767] would not have been hired by Atlas Air," says NTSB chairman Robert Sumwalt.

The Pilot Records Improvement Act, known as PRIA, has governed cockpit crew recruitment for nearly a quarter of a century, requiring operators to investigate an individual's piloting background, sourcing data from previous employing carriers, the US Federal Aviation Administration (FAA) and the National Driver Register covering the previous five years.

But flaws in the PRIA's enactment emerged with the fatal ditching of an Air Sunshine Cessna 402C near the Bahamas in July 2003, following an engine failure to which the pilot had not responded correctly – unnecessarily losing too much altitude.

"If the pilot had been more proficient, he might have been able to decrease the descent rate enough to maintain flight and reach land," an investigation into that crash stated.

Just before joining the carrier the pilot had received a large number of 'unsatisfactory' grades during simulator training at cargo operator Arrow Air, while a review of FAA records revealed an earlier string of nine failed flight checks for various qualifications over a 15-year period.

But the PRIA vulnerabilities began to receive greater scrutiny following the loss of a Colgan Air Bombardier Q400 near Buffalo in February 2009 – the last mass-casualty accident involving a US carrier.

An inquiry found the aircraft, during its descent, stalled in icing conditions at 2,300ft after the captain did not respond correctly to a stick-shaker warning.

Colgan had electronic pilot-training records, but they did not contain sufficient detail for the airline to analyse properly the captain's "trend of unsatisfactory performance", the investigation found. Nor did the carrier use all available sources of information on the crew's qualifications and performance to determine their suitability for work at the company.

After the Air Sunshine accident, the NTSB asked the FAA to require carriers, when recruiting pilots, to obtain any 'notices of disapproval' – a formal record of failure – for flight checks before making a hiring decision. The PRIA process did not explicitly require airlines to obtain such information. Carriers that sought it needed to ask applicant pilots to sign a consent form permitting the FAA to release any notices of disapproval.

During the probe into the Colgan accident, the FAA's programme manager for PRIA was unable to say how many carriers obtained additional information about their pilot applicants, but stated that "only one or two" had contacted him for such information.

The NTSB underscored its belief that notice of disapproval information should be included in an airline's assessment of pilot suitability during recruitment, and that such notices amounted to safety-related records that ought to feature alongside detailed training records in an airline's evaluation of a pilot's career progression.

NTSB investigator Roger Cox, in the aftermath of the Colgan accident, noted a phenomenon of new-hire pilots being flushed from one regional carrier only to turn up at another, and questioned the airline as to whether it had encountered cases of pilots' concealing background information.

"If someone lies to us on the application, they're bounced out," Colgan vice-president of administration Mary Finnigan told him.

Certificate disapprovals

The NTSB found that the Q400's captain, during his hiring, had only partially revealed previous certificate disapprovals – but also found that Colgan had not exercised the opportunity to obtain his consent for further disclosure.

Then-NTSB vice-chairman Christopher Hart expressed concern that the airline industry was failing to respond to a decline in ex-military pilots. While commercial training tested written knowledge and stick-and-rudder skills, he pointed out, military training crucially instilled discipline and judgement. "Not only is military training world-class, but the military has a long history of effectively weeding out those who lack the right stuff," he said, adding that commercial licensing did not distinguish between

▶ pilots passing tests first time and those passing only after several attempts.

“Our civilian system needs to address the challenge of systematically continuing to provide the world-class pilot training that the military has provided for so many years,” Hart said. “The system particularly needs a better way to keep out those who should not begin or continue flying passengers for hire.”

This need to screen pilots more effectively led Congress, in 2010, to mandate the FAA to create a single electronic pilot-records database, speeding the retrieval of records under PRIA. The database would contain FAA certificate, type rating and medical records, as well as information on failures to pass qualifications and summaries of any legal enforcement actions. It would also feature employment records including information on training, proficiency, comments from examiners, and any information on disqualification, resignation or termination.

Written consent

Carriers would be required to obtain written consent to access the database, and access would be a condition before hiring pilots. But this database has yet to materialise. No deadlines were originally set, and the Office of Inspector General correctly predicted, in an August 2015 review, that the database would not be ready until at least a decade after Congress’s mandate. It pointed out the FAA had been late in making decisions on transitioning to the database and maintaining historical records, even after airlines ceased operations, with the result that pilot training information might not be retained, rendering potentially “thousands” of records “irretrievable”.

Carriers could use “good faith exception”, it said, to hire pilots if records were not available – but the FAA did not know how often airlines relied on this practice.

One of the FAA’s greatest hurdles was deciding how to lessen the paperwork burden to obtain and enter pilot information dating back to 2005, given that some carriers had paper-based systems or archived records.

This also meant resolving inconsistencies in the type of data held. Instructor comments for traditional

training schemes identified specific pilots, while those for advanced qualification programmes did not.

The FAA also faced problems transitioning from PRIA-compliant record-keeping because the new database would contain more extensive information – requiring carriers to undertake extensive record retrieval, a process that could take years, the review said. In response, the FAA mentioned its rulemaking obligations to analyse costs and benefits, and stressed that the database – which would contain records of some 866,000 pilots – needed to be reliable and secure. “This particular rulemaking project is a complex and lengthy undertaking due to the requirements that the proposed rule be fully examined for acceptable alternatives to mitigate costs, and for cyber security risks,” it said.

The original 2010 legislation was amended in 2016 to insert a 30 April 2017 deadline not only to establish the database but make it available for use. This deadline was missed. But the FAA, which divided the project into four stages, managed to complete the first three – essentially creating a proof-of-concept version, for beta-release to a small number of volunteer airlines – by the end of 2017. This limited version, with FAA record data only, was used for the first time on 20 December 2017 to provide FAA records to a hiring airline.

Intensive training

The FAA stated, in an update to Congress in March 2018, that it needed to be convinced, through intensive testing, that the identify verification system was rigorous and that security could be assured. But it claimed that its availability, while preliminary, amounted to a “significant achievement”. Completing the database, by enabling carriers and other external entities to add their own pilot records, is the crucial fourth stage – and demands a rulemaking procedure.

The FAA finally published its notice of proposed rulemaking on the pilot record database in March 2020. More than 5,000 operators employing pilots would need to submit records, the FAA estimates, and its rulemaking proposal, running to more than 60 pages, reflects the complexity of the database and



Loss of Colgan Air-operated Q400 in February 2009 was blamed on captain’s improper response to stick-shaker



Pilot records database will 'overhaul' the way carriers access information about the experience and training of crew

Matus Duda/Shutterstock

its associated issues. It sets out not only which types of operator will be required to access the database – among them airlines, fractional ownership, and air tour operators – but which organisations will be required to submit background information.

The FAA observes that its own tightened criteria for new first officers, demanding they have at least 1,500h experience, means trainee airline pilots will spend more time building hours at “gateway” operators, which would be among those subject to database reporting requirements. Operations such as agricultural flying, not viewed as transition paths to airline pilot careers, will probably be exempt.

Formal comment has been sought on multiple aspects of the database’s use, content and application, and the FAA has received nearly 800 submissions.

Airlines for America has described the database as a “complete overhaul” of the way carriers access pilot information and, along with the Cargo Airline Association, pleaded for a several-month extension to the 29 June comment deadline, given the complexity of the proposal, the “numerous” issues it raised, and the diversion of the coronavirus crisis.

The Air Line Pilots Association also sought more time, stating that a previous review of the issues in 2011 had generated a 115-page report, and that the new proposal involved matters of “great and substantive impact”.

Strong opposition

But ironically, given its slow progress on the database, the FAA refused a postponement. Any delay, it stated, would “not be consistent with the safety objectives of the proposed rule”.

Strong opposition to the rule has arisen from the business aviation sector, with fractional ownership and corporate flight specialists strenuously objecting to “burdensome” record-keeping and reporting requirements set out in the proposal.

One commenter describes the rule as “bureaucratic overkill” for the sector, with “absolutely no safety advantage”, while another argues that the FAA

is “overreaching” in its bid to include fractional operators, and surpassing its regulatory authority.

The National Air Transportation Association puts forward several scenarios about which, it says, clarity is needed – such as the situation of record management when businesses close, particularly regarding rectification of errors in the data.

Simulation and training organisation CAE queries whether the system can track pilots who show consistent difficulty with particular tasks, but eventually pass their checks.

“With so much riding on a pilot’s personal record in the [database], will this system negatively influence an examiner, keeping them from accurately assessing the pilot in such a public record?” it says. “Will this system put inadvertently undue pressure on an examiner to pass a pilot when their competency is questionable?”

Standardised format

Once the database is fully operational, the PRIA process will be discontinued after two years and 90 days. The FAA estimates the cost of developing the database at \$26-31 million over 20 years to 2030.

Having explicitly contrasted the 32s of the Atlas 767 accident sequence with the FAA’s 10-year slog, the NTSB says it “generally supports” the proposed rule, and the extension of reporting requirements to non-airline entities.

“We are pleased with the proposed breadth of record sources and that these various records will be in a standardised format and available in one database,” it states, adding that it supports plans to include documentation of pilots’ failure to adhere to company procedures, or drug and alcohol violations.

Far less analytical, but perhaps no less persuasive, are the favourable replies from several personal accounts submitted by individuals purporting to have known relatives or friends among the 49 occupants of the ill-fated Colgan Q400. “We need to protect the lives of future travellers,” states one. “This pilot database will help.” ▶

Even in the midst of the pandemic, many would-be commercial pilots lack the aptitude to get a job. One aviation veteran believes changes are needed before the sector starts to recruit again

Train in vain?

David Learmount London

Something is wrong with the delivery of pilot training in Europe – and it has nothing to do with the coronavirus crisis. There are an estimated 7,000 individual holders of full commercial pilot licences in Europe who are not good enough to get a job with an airline.

That is what the former head of the Airline Training Policy Group (APG) at the European Union Aviation Safety Agency (EASA) believes after conducting a review of training provision throughout the region. But how could this situation have arisen, given that the licence-holders have completed the statutory syllabus and passed their written exams and flying tests?

Right now – while air transport is in a holding pattern forced on it by the Covid-19 pandemic – would seem to be a good time to acknowledge and correct the weaknesses in a recruitment and training process that fails a significant proportion of its participants.

Firing or hiring?

At present, the most popular question directed by would-be pilots at air training organisations (ATOs) is: “Should I start training now, when the airlines are firing, not hiring?” The former APG chief cited above – Ryanair’s then head of training Captain Andy O’Shea – predicts that the demand for commercial aviation will return when the pandemic is perceived to be under control by the wider public.

When that happens, there will be fewer airlines, he predicts. The weaker ones will have gone to the wall, but approximately the same number of aircraft will be in the world fleet, operating with the fewer but larger surviving airlines. Therefore, O’Shea argues, there will be a need for about the same number of pilots.

Meanwhile, the remaining “baby-boomer” pilots born in the late 1950s will continue to retire, some of them even taking early retirement instead of facing furlough. So, O’Shea believes, the aviation skills crisis that the industry faced pre-Covid could actually be worse afterwards.

Given that training and landing a job will take

an aspiring pilot between 18 and 30 months, the challenge facing would-be trainees is to predict when commercial aviation operations will be back to pre-coronavirus levels. The betting right now varies from two to three years.

Recognition of the licensed-pilot skills deficit is not new, but it is still there to be dealt with. O’Shea made this public two years ago, when – still at Ryanair – he announced that his airline had consistently found that up to 55% of fully licensed candidates could not carry out its routine simulator flying exercise to a satisfactory standard, despite being given plenty of time to prepare.

O’Shea was still in his head-of-training job while leading the EASA APG, and there he developed a solution that not only worked within Ryanair, but was also approved by the agency. This involved replacing the old Multi-Crew/Jet Orientation Course (MCC/JOC) – usually tacked onto the end of the solo-pilot-focused commercial pilot’s licence/instrument rating (CPL/IR) – with a more realistic knowledge and skills course that awards those who pass it an Airline Pilot Certificate (APC), confirming success in the higher-level flight-deck skills.

The APC training employs a sophisticated jet-performance flight simulator, whereas the MCC/JOC had been found to be a major contributor to the skills deficit because there were no rules against carrying it out in low-performance devices. EASA, however, has

Anyone who wishes to train for a licence despite failing aptitude tests can still do so, but he or she risks becoming the 7,001st pilot on Europe’s unemployable aviators heap



AFTA

O'Shea has set up the Airline Pilot Club in an effort to improve standard of new recruits heading for the right-hand seat

held back from making the APC training compulsory because of its additional expense.

O'Shea, recently retired from Ryanair and the APG, is launching what he has named the Airline Pilot Club, describing this as a complete pathway to commercial piloting. It makes use of the best of the existing training system, while putting pressure on it to improve the quality of its output.

The Airline Pilot Club plan inserts systemic improvements from the beginning of the training process, rather than just relying on adding better material at the end. This starts with setting higher standards for its candidate intake, on the grounds that not every person who wishes to be an airline pilot has the aptitude to be one.

Of course, anyone who wishes to train for a licence despite failing aptitude tests will still be able to find an ATO that will take their money and do their best, but he or she risks becoming the 7,001st pilot on Europe's unemployable aviators heap.

For a long time, the route to the right-hand seat of an airliner has been confusing to those wishing to embark upon it. Decisions are many, including: which ATO to train with? Consolidated or modular course? CPL/IR or multi-crew pilot licence? In addition, today's aircraft are far more technically sophisticated than the early digital flight-decks of the 1980s, and the air navigation environment is, likewise, more crowded, demanding and complex. This state of affairs has added more layers to the journey.

The airlines have never seen it as their job to ensure that a flow of suitably educated candidates are available to the industry. Most operators still do not, so candidates looking for guidance can feel lonely. If they attend an aviation training fair, they are likely to leave with an armful of brochures feeling more confused than when they arrived.

It is across this confusing terrain that O'Shea's Airline

Pilot Club offers to guide prospective student pilots, but he is also working with another organisation to extend that guidance even further back. Whereas the club starts with a candidate who has already, at least tentatively, decided to embark on the training journey, by partnering with Aviation 360, a training consultancy that recommends trawling for suitable candidates even earlier, the partnership can encourage and guide youngsters from about age 16 through the most appropriate academic route towards an aviation career, and finally provide an entry into it. That applies whether the aspiring students want to be pilots, engineers, air traffic controllers or future astronauts. O'Shea describes his co-operation with Aviation 360 as "a meeting of minds".

Transforming training

Meanwhile, the founder of Aviation 360, airline training expert Simon Witts, is working with the Lincoln College Group (LCG), UK, to create "the country's first" International Air and Space Institute (IASTI). This, says LCG, will transform the way pilots, engineers and ground staff are trained. An employment and skills enterprise, it will be based initially in Newark, Nottinghamshire, and has potential to scale-up both across the UK and internationally, subject to a promised UK government grant designed to generate skills and expertise in new regions.

LCG explains: "We aim to produce the next generation of skills-matched aviation professionals, providing a shop window for civil airlines and operators to acquire fully-qualified trained pilots as well as future astronauts, engineers and ground staff. It also offers the potential for future military co-operation. The talent pipeline will achieve a step-change in the way people from all backgrounds are trained and will eventually offer reduced training costs for an industry that has been hit hard by the recent pandemic."



AFTA

Ryanair commissions additional APC instruction for its new pilots from Cork-based Atlantic Flight Training Academy

In the case of trainee pilots, the IASTI product can parallel – or feed neatly into – the Airline Pilot Club. Once registered at the club, the potential pilot has embarked on the first of eight stages in the journey to the right-hand seat. The actual training takes place during stage seven; being paid as an airliner co-pilot does not come until stage eight.

So what are the other stages – and why so many? The second stage involves completing an online “indicative assessment” – the initial part of determining the candidate’s suitability for the piloting task. If a candidate is judged “ready”, he or she is now a club member and will receive a development plan indicating where potential weaknesses have been detected, and in stage three, it provides guidance and learning material to reinforce those areas. Stage four follows, in which candidates apply to one of the club-approved partner ATOs and undertake the full aptitude assessment that school requires. In stage

five, partner organisation AON, a specialist insurance consultant, offers individual coverage against risks that could result in course drop-out, and ensures that banks will look more kindly on a subsequent application for course financing. Stage six involves the full Class One medical assessment, followed by securing financing for the cost of the course.

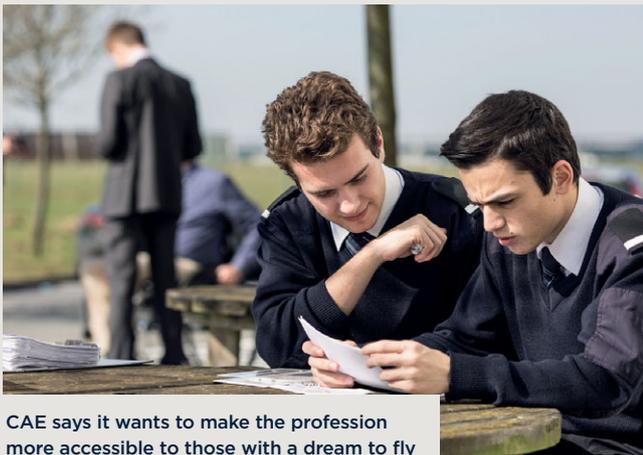
Joined-up education

The Airline Pilot Club, Aviation 360, and the IASTI project are all still works in progress, but if they establish and thrive, such systems will represent a more joined-up education and training path towards the aerospace industry than anything available before.

The absence of a consistent, logical pathway is one of the reasons so many well-motivated aspiring aviators have ended up on the scrap heap, and also why many whose families did not have the financial means to back them never even tried it. ▶

Follow the money

CAE, the world’s largest flight crew training organisation, has launched an initiative to help aspiring pilots secure financing for the cost of their training. Financing for students whose parents can afford to provide loan security has never been a problem, but this limits training to those from prosperous backgrounds.



CAE says it wants to make the profession more accessible to those with a dream to fly

CAE

The Canadian firm is partnering with a number of banks and financial institutions to provide financing packages to those who are not able to fund themselves. “With this initiative, CAE is connecting aspiring pilots with banking partners that offer specific financing solutions for pilot training, making the profession more accessible to those who wish to pursue their dream of flying for a living,” it says.

Despite the destabilising effect of the coronavirus pandemic on the airline industry and its recruiting, CAE says it “foresees significant demand for new commercial pilots over the next 10 years”.

But it adds a caution: “Successful applicants who have passed assessment may access a funding solution with one of our approved partners. As with any financial solution, terms and conditions apply.”

This highlights a problem for those wanting to apply for financing in the near future while Covid-related uncertainty still plagues the industry, because even students assessed as certain to win their commercial pilot licence cannot be guaranteed a job at the end of their course.

Unsecured loans, repayable only when the student finds a job and is able to repay might be the solution, but, with the airline sector shedding rather than taking on pilots, at least for the immediate future, that might be a lot to ask lenders.



Aircraft Interiors | EXPO[®]

13 - 15 APRIL 2021
HAMBURG, GERMANY

THE DESTINATION FOR THE **AIRCRAFT INTERIORS INDUSTRY**

Aircraft Interiors Expo is the leading marketplace where the cabin interiors and inflight entertainment industry supply chain meet buyers from commercial airlines, lessors and business jets. They come together to collaborate, find solutions to today's challenges and design the cabin of the future.

Join the global industry at:
www.aircraftinteriorsexpo.com



Co-located:

World Travel Catering
& Onboard Services
EXPO 13 - 15 APRIL 2021
HAMBURG, GERMANY

Passenger
Experience
CONFERENCE 13 - 15 APRIL 2021
HAMBURG, GERMANY

Organised by:

 Reed Exhibitions[®]

In co-operation:

 Hamburg
Messe + Congress

Connect with us:



BAINES SIMMONS



PROFILE

Baines Simmons, part of the Air Partner aviation services group, is a trusted advisor on a global level, serving more than 750 aviation organisations and more than 40 aviation authorities.

Renowned for its professional expertise, practical skills and industry experience in aviation regulations, compliance and safety management, Baines Simmons offers aviation safety management, fatigue risk management, wildlife hazard management and aircraft registry services.

Baines Simmons, which was acquired by Air Partner in August 2015, is recognised as one of the world's most influential aviation consultancies in organisational safety performance.

CONTACT INFORMATION

Tel: + 44 (0) 1276 859519

Email: hello@bainessimmons.com

www.bainessimmons.com

HIGHLIGHTS

- Specialists in safety management systems, fatigue risk management and wildlife hazard management
- Trusted advisors to EASA, 40+ component authorities, the MAA and the EDA
- Training available in Surrey, Doncaster and online
- Specialist consulting and diagnostics services
- Registered 9000 ISO company



Our virtual training courses are designed to help our customers maintain and grow competence, refreshing vital skills from the comfort of their own home or workspace, saving time and travel costs.

Our virtual training portfolio includes:

- Safety and Risk Management
- Regulatory Compliance
- Air Operations
- Quality and Compliance Monitoring
- Approved Organisations
- Airworthiness Best Practice
- Defence

Call our friendly expert team for more information on **+44 (0)1276 859519** or email training@bainessimmons.com

www.bainessimmons.com

SIMAERO

PROFILE

SIMAERO is the largest independent provider of commercial pilot flight simulation training worldwide. The company operates 19 simulators in its Training Centers in France and South Africa and serves more than 100 civil and military clients from more than 65 countries worldwide.

The subsidiary in China - SIMAERO Engineering - is successfully active in simulators relocation, repair and upgrade services.

SIMAERO is an EASA-approved training organisation (ATO) with the number FR.ATO.0011.

SIMAERO also holds approvals for pilots' training by authorities of Russia, South Africa, Malaysia and many others.

CONTACT INFORMATION

SIMAERO Head Office

26 Avenue de la Demi-Lune
95913 Roissy en France,
France

Tel: +33 130 119 240

www.sim.aero

contact@sim.aero

OUR SIMULATORS

- Paris Training Center, France
A320, A330, A340, B737CL, B737NG,
FBS B737NG, 8757/767, ATR72-500
- Dinard Training Center, France
F100, MD80

- Johannesburg, Training Center,
South Africa
Dash 8-100/300, MD82, A320,
Beech 1900D, Embraer 145,
Super Puma AS332 MI, ATR72-500

EVERY CRISIS BRINGS NEW OPPORTUNITIES



Pilots' Licences Revalidations & Renewals- Type Ratings- Instructors' Courses- PBN, UPRT, LVO & Other Modules

CAE



CONTACT INFORMATION

CAE - 12 global locations

Brussels, Belgium
 Dammam, Saudi Arabia
 Gondia, India
 London Gatwick, UK
 Madrid, Spain
 Melbourne, Australia
 Oslo, Norway
 Oxford, UK
 Perth, Australia
 Phoenix, USA
 Sohar, Oman
 Tamworth, Australia

www.cae.com/becomeapilot

Follow the global journeys of recent CAE graduates by following **#CAE_pilot**. Keep up to date with CAE news and connect with our training advisors, students and graduates on our Facebook, Twitter, LinkedIn, Instagram pages.

 **CAE_pilot**

 **@CAE_Inc**

 **CAE**

 **CAE_pilot**

PROFILE

CAE trains aspiring pilots through its network of aviation academies in 12 global locations. Depending on the location, a range of training programs are available including, Commercial Pilot Licence (CPL), Airline Transport Pilot Licence (ATPL), and airline-mentored Multi-crew Pilot Licence (MPL), all of which combine premier ground school courses with high-quality flying instruction.

CAE offers training programs that address the entire career life cycle of a pilot from cadet to captain. As the training partner of choice of many aircraft manufacturers and airlines, we offer innovative training solutions to our customers, such as the recently launched CAE Rise training system, the XR Series Training Equipment suite, including the CAE 7000XR Series full-flight simulator. With 60+ training locations worldwide, CAE has the world's largest civil aviation training network, providing training on the widest coverage of in-production and in-service aircraft models. In addition, we offer aviation personnel sourcing services including recruitment of flight personnel and leasing of pilots to airlines.

In 2018, CAE announced the introduction of the CAE Women in Flight scholarship program, demonstrating its commitment to promoting the advancement of women in the aviation industry. The CAE Women in Flight scholarship program is a competitive program seeking female ambassadors who demonstrate leadership skills, active involvement in their communities, perseverance and who are passionate about aviation. CAE will provide financial support to aspiring female pilots by awarding a number of full scholarships across its global training network to support greater diversity and a better gender balance in the aviation industry. For more information, visit cae.com/womeninflight

CAE is a high technology company, at the leading edge of digital immersion, providing solutions to make the world a safer place. Backed by a record of more than 70 years of industry firsts, we continue to reimagine the customer experience and revolutionise training and operational support solutions in civil aviation, defense and security, and healthcare. We are the partner of choice to customers worldwide that operate in complex, high-stakes and largely regulated environments, where successful outcomes are critical. As a testament to our customers' ongoing needs for our solutions, more than 60% of CAE's revenue is recurring in nature. We have the broadest global presence in our industry, with approximately 10,000 employees, 160 sites and training locations in more than 35 countries.

www.cae.com

HIGHLIGHTS

- Modern fleet of EFIS 'glass cockpit' training aircraft including Piper, Cessna and Diamond aircraft types
- CAE training programmes span the entire life cycle of a professional pilot, so we are able to provide you with the training you require throughout your career, from cadet to captain
- As the worldwide training partner of choice, no other training provider places more pilots with airlines than CAE



Ready to pursue your dream of becoming a pilot?

Learn to fly with CAE and make your dream of becoming a pilot a reality. We train more pilots around the world than any other organisation. Are you ready to make your dream come true?

Start your journey right, and right here.

Contact us today at www.cae.com/becomeapilot

Follow the global journeys of recent CAE graduates on Instagram **@caepilot** and follow **#CAEpilot**

Your worldwide
training partner
of choice





Bespoke wing and 1.5m fuselage stretch help jet to out-distance its G500 stablemate by some 1,300nm

With 6,500nm range and a wealth of cabin and flight safety innovations, the G600 is Gulfstream's latest offering – we put it through its paces

Long ranger

Michael Gerzanics Savannah

Launched in October 2014, Gulfstream's G500/G600 family was designed to supplant its older G450/G550 models. The smaller and shorter-range G500 led the way, making its flight debut in May 2015, followed by the stretched and longer-range G600 on 17 December 2016: the 113th anniversary of the Wright brother's historic first flight.

The G600's initially promised range of 6,200nm (11,470km) would have been incomprehensible to those aviation pioneers, whose longest flight that day covered only 260m.

While they are aimed at different segments of the business jet market, the G500 and G600 have a lot in common. Both have a great ramp presence, with 14 large oval cabin windows that instantly mark them out as Gulfstreams. Like the G650, they also have shorter landing gear than their predecessors, giving them a more solid appearance on the tarmac. Previous, non-fly-by-wire (FBW) Gulfstreams have a unique nose-down attitude in their three-point stance.

While range performance remained roughly equivalent between the families, the G500/G600 offer notable improvements over the G450/G550. Their cabins are slightly longer, and fully 18cm wider. They also promise shorter trip times due to cruising Mach 0.05 faster, at the same time burning less fuel.

But from a design standpoint, the clean-sheet

models have little in common with their predecessors, instead sharing more with the top-of-the-range G650. Structurally they share a common empennage, and their FBW flight control system (FCS) architecture is nearly identical to the G650's. Additionally, the flight control laws (FCL) are basically the same. While their flight controls have many commonalities, the addition of an active control sidestick (ACS) marked a welcome advancement.

Restful cabin

Although they are similar visually, Gulfstream has made numerous improvements versus the G500 when fielding the more capable G600. The company fitted the latter with a bespoke wing that is 22.2% (19.6sq m) larger: a super critical design with a fixed leading edge and large span, single piece trailing edge flaps that also allows for the tankage of an additional 5,000kg (11,000lb) of fuel: a 37% increase.

During flight testing, the larger aircraft performed better than expected, enabling a 300nm bump in range, to 6,500nm. The larger wing also gives the G600 the lightest wing loading of any aircraft in its class, at 397kg/sq m, helping to improve field performance. Befitting a longer-range aircraft, the G600 is 1.5m (4ft 9in) longer than the G500, thanks to fuselage plugs before and aft of the wing.

The G600's cabin ordinarily features three living areas, with seating for up to 19 passengers. Alternatively, its extra 1.12m of cabin space allows



Gulfstream

Sleek tail section and PW815GA engines enable MO.925 performance

for the addition of a crew rest facility aft of the flightdeck – almost a must-have given its range. An additional passenger sleeping berth is also available, and both new models can be equipped with a forward or aft galley.

A lower cabin pressure altitude is proven to cause less fatigue, so the G500/G600 share the G650's pressurisation schedule. With a maximum 10.7psi, this yields a remarkably low cabin pressure altitude of just 4,850ft at their 51,000ft operating ceiling: on most airliners this is in the region of 8,000ft.

Greater Symmetry

Over the years I have been fortunate to have flown nearly the entire Gulfstream range, from the G150 to the G650. I was looking forward with great anticipation to flying the G600 from the company's facility in Savannah, Georgia, for several reasons, mostly focused on the flightdeck.

When I flew the G500 in 2018, I was impressed with its Symmetry flightdeck and the advance it represented over the G650's capable PlaneView II. The G600's flightdeck features the same hardware as the G500, but with some additional features and capabilities, to be discussed later in this report.

The cockpit features four 33 x 25.4cm LCD displays, as well as four 25.4cm touch-screen controllers (TSCs). As I detailed in my G500 report, the overhead panel is innovative. There is a row of push-button switches along the forward edge of the panel, used to power up the aircraft. On the overhead itself there are only four traditional panels: engine start; electrical power control; bleed air; and cabin pressurisation control.

Adding to these are three overhead panel touchscreens (OHPTS), each of which can control any one of 13 aircraft and cabin systems, along with six test and maintenance functions. These flexible displays can also show information more commonly presented on instrument panel MFD synoptic pages. Other standout features are a LCD head-up display (HUD), enhanced vision system (EVS) and synthetic vision primary flight display (PFD). Like the G650, the G600's cockpit is paperless, with JeppView charts and an electronic checklist.

Our preview flight aircraft was serial #73009 (registration N600GS). I accompanied Gulfstream

experimental test pilot Howard Judd as he performed the pre-flight walkaround inspection. The large wing was a sight to behold, with its smooth upper and lower surfaces unbroken by control hinges or flap tracks. While rounding the empennage I took note of the size of the T-tail-configured horizontal stabiliser and elevator. They were fairly small, which is no doubt a drag-reducing benefit of the G600's FBW control scheme.

After boarding the aircraft, I slid into the left seat and adjusted it to attain the design eye position, and dropped the Collins Aerospace HUD to ensure I could see its entire presentation area. The console-mounted forearm rest had height and tilt adjustments, so the ACS fell comfortably to hand. Judd then started the auxiliary power unit, its generator automatically coming online once up to speed. He then talked me through flight management system (FMS) initialisation and other pre-flight steps. The primary FMS interface is through any of the four TSCs.

The TSCs and OHPTS are elevated above their mounting panels, making their frames convenient hand holds in the event of turbulent airborne conditions. FMS initialisation was intuitive, facilitated by its "Phase of Flight" tab process. Gulfstream set a goal of 10min or fewer to prepare a cold aircraft for taxi, which is certainly an attainable mark based even on my unfamiliar hands.

After an easy left to right flow on the forward edge of the overhead panel and FMS initialisation we were ready for engine start. The FADEC-controlled Pratt &

Gulfstream G600 specifications

Dimensions

Length	29.3m
Height	7.77m
Wingspan	28.7m

Passenger cabin

Length	13.7m
Width	2.3m
Height	1.88m
Baggage stowage (tail cone)	4.69cb m

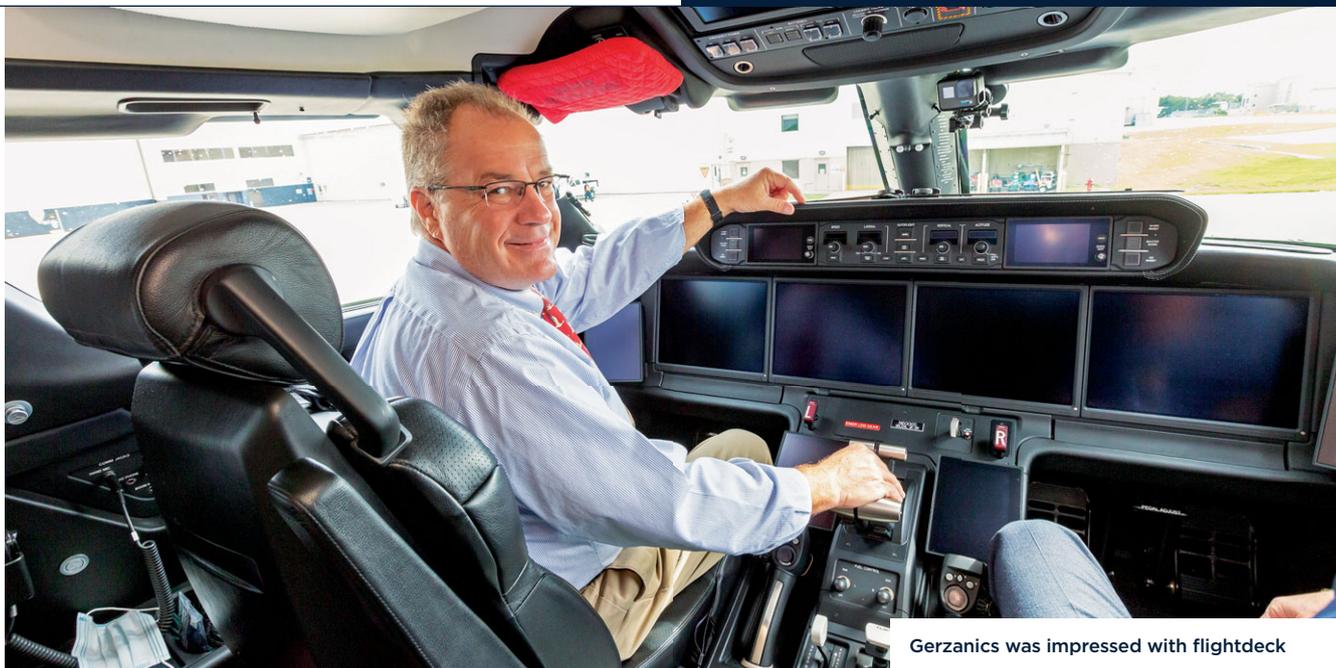
Weights*

Maximum take-off weight	42,900kg
Maximum landing weight	34,800kg
Standard basic operating weight	23,300kg

Performance

Take-off distance**	1,730m
Operating ceiling	51,000ft
Range (M0.85)***	6,500nm
Maximum operating Mach speed	MO.925
Landing distance****	884m

Source: Gulfstream *4 crew, standard avionics and interior **MTOW, SL, ISA ***MTOW, 4 crew + 8 passengers, NBAA IFR ****MLW, SL, ISA



Gerzanics was impressed with flightdeck

Whitney Canada PW815GAs were a snap to start: each reached IDLE approximately 60s after hitting the large overhead panel START switch. Like the commercial geared turbofan engines they share a core with, the high bypass PW815GAs are susceptible to rotor bowing from asymmetric heating after shutdown. But, had cooling been needed, the FADECs would have motored the engines until it was safe to initiate light off.

To ensure checklist completion before leaving the chocks we used Symmetry's electronic checklist, its auto-sensing feature checking off most items. During the taxi to runway 01 for departure, I re-familiarised myself with the ACS. This would be my third flight with an active sidestick, after the G500 and also Embraer's KC-390 military transport/tanker.

As I noted in my G500 report, Gulfstream rotates the ACS's pitch axis outboard by about 3°, to more closely reflect actual arm movement. While stick forces in the KC-390 were symmetric in both pitch and roll, Gulfstream opted to tailor its system to mimic real world arm strength. There is more forward ACS motion than aft, and wrist pronation is harder than outboard supination.

One of the benefits an ACS offers is electronic connection between the left and right sidesticks, so each pilot can feel the inputs made by the other; much like mechanically connected yokes/sticks. Before taking the runway I felt the ACS's interconnection feature as Judd conducted a flight control sweep.

Rated thrust take-off

Cleared by the tower, I advanced the thrust levers (TLs) and engaged the auto throttle (AT) with the thumb-actuated TL-mounted switch. Pedal controlled nose wheel steering allowed me to smoothly track the runway centreline as the AT set our "Rated" take-off thrust of 93.6% N1. The G600 can perform a "Flex" power take-off, with reduced thrust to lower noise and increase engine longevity, but I appreciated the brisk acceleration experienced using full thrust.

I referenced the HUD as airspeed increased, before Judd called "Rotate" at 119kt (220km/h). I pulled the ACS aft and rotated the flight path marker (FPM) up to the flight director's (FD's) guidance cue, which set a rotation angle of about 9°.

Once airborne with the gear and flaps retracted, I

followed the FD guidance in the HUD for the 200kt climb. This was intuitive, placing the "winged circle" FPM over the FD cue. Once above 3,000ft I lowered the nose and accelerated the G600 to 250kt in a right-hand-turn towards the Atlantic, where our working area was located.

Passing 10,000ft, we accelerated to 300kt for a climb to 45,000ft. With only three occupants and 5,400kg of fuel, our gross weight was just over 28,800kg – much lighter than the G600's maximum take-off weight (MTOW) of 42,900kg. At MTOW and standard conditions the aircraft can climb directly to 41,000ft.

During the climb I performed a series of bank-to-bank turns at up to 45° to gain a feel for the aircraft's handling qualities. The G600 has a turn co-ordinator, so I was able to smoothly execute these with my feet on the floor.

While some FBW schemes provide pitch compensation for banked flight, Gulfstream FCLs seek to replicate a conventional aircraft, so I needed to increase ACS back pressure to stop the nose from dropping as the angle of bank (AoB) increased. The FMS allows for user-selected climb speeds, and Judd suggested we transition to M0.87 rather than the default of M0.85. According to our safety pilot, Stefan Eling, the higher speed makes for a smoother ride with only a 4% reduction in fuel efficiency. During the climb I also exercised the FMS's graphical waypoint capability, which would be particularly handy if trying to manoeuvre around thunderstorms.

Less than 20min after brake release the G600 leveled at our cruise altitude of 45,000ft, where I made another series of 45° AoB turns. There was ample thrust available to maintain M0.87 during the banking and 1.4g pulls. Remarkably, no airframe buffet was felt during these high altitude steep turns, where I found the G600's control forces to be low and well harmonised.

Next I engaged the AT and allowed the G600 to accelerate to and stabilise at M0.90, its high speed cruise condition. Total fuel flow was 2,760lb/h at an indicated airspeed of 246kt. Our resultant true airspeed was a very respectable 505kt for the ISA +9°C conditions. Next I slowed the aircraft to its M0.87 intermediate cruise speed, with 236kt indicated. Total fuel flow was 2,580lb/h as we clipped along at a true

487kt. The final cruise point was at the published long-range cruise speed, M0.85, where a 2,480lb/h total fuel flow held an indicated 229kt for a true air-speed of 475kt.

Quiet, airy cabin

Pleased with the cruise performance, I left the flightdeck to sample the cabin environment. The forward section was comprised of an optional crew rest facility, forward lavatory, galley and several closets. Passenger living areas – of which our demonstrator had three – are separated from the forward area by an acoustical door. Gulfstream also offers a four-living-area configuration, which dispenses with the crew rest provision.

The large oval windows give the cabin an open and airy feel and, as could be expected, the furnishings were luxurious. The environment is controlled by a bespoke cabin management system with obligatory app. Ambient noise levels were astoundingly low – while Gulfstream does not publish numbers, it says the G600 has “industry-leading cabin sound levels”.

Auto-throttle intervention

After my brief respite in the lap of luxury, I returned to the flightdeck. With the high altitude work complete, we started a descent in preparation for low-speed handling evaluations at medium altitude. In the descent I accelerated the G600 to its maximum Mach operating speed (MMO) of M0.925 at part power (AT off). Ample warnings were provided for the high-speed condition, both on the PFD and HUD.

Approaching the limit, further aggravating pitch trim is prohibited. And on exceeding MMO, a “high speed protect active” (advisory) crew-alerting system (CAS) message alerted me that the FBW protections had kicked in. Although not available when I flew the G500 two years earlier, both new models now have an AT “wake-up” feature. An imminent or actual MMO excursion will cause this to activate and retard the TLs to IDLE.

I clicked off the AT and continued to apply forward ACS pressure. At the limit speed, the FCLs raise the nose to slow the aircraft, and no amount of forward ACS pressure can exacerbate the overspeed

condition: a safety-enhancing addition. Should a cabin depressurisation trigger the G600’s emergency descent mode, the AT will retard the TLs to IDLE and extend speed brakes (SBs) to facilitate a rapid descent. It will level the aircraft at 15,000ft, retract the SBs and advance the TLs.

We continued the descent into a 12,000-17,000ft altitude block to set up for three approaches to stall. The first was flown in a clean configuration. Decelerating in level flight at IDLE power, we entered the PFD’s amber speed tape band at 131kt indicated airspeed. Slowing further sounded an audible “airspeed low”. These cautions were purposely ignored as I applied full aft ACS. At the limit, the AT woke up and advanced power to keep us above the normal angle of attack (AoA) limit of 0.94. As with the high-speed condition, I disengaged the AT and held full aft ACS. The aircraft stabilised in a wings level descent at 116kt. Had the pilots been totally unaware that the envelope protection schemes had kicked in, an “FCS AoA limiting” (advisory) CAS message is displayed.

The next approach to stall was in a departure configuration, with gear up and flaps set to T/O APP (20°). Using the same procedures, the amber band was entered at 110kt, with a limit speed of 100kt. The final manoeuvre was flown in an approach configuration, with gear and flaps down (39°). Here, the amber band was entered at 106kt, with the G600 stabilised again in a wings level descent at an indicated 97kt. At the slow speed limit in all three stall approaches, the jet was predictable and responsive to small control inputs in all three axes.

EFVS approach

With the area work complete I turned the G600 towards Savannah and accepted air traffic control (ATC) vector to the final approach course for the ILS runway 10. En-route to the field Judd watched as I loaded and activated the approach. Using the phase of flight feature of the FMS we calculated an approach reference speed of 111kt for the 26,300kg G600. With the prevailing winds our target speed was 116kt. I hand-flew the approach, with the AT off. During the approach I found the FD guidance and precise aircraft

Gulfstream G600 versus competitors			
	G600	Bombardier Global 6500	Dassault Falcon 8X
Cabin (L x W x H)	13.7 x 2.3 x 1.88m	13.2 x 2.4 x 1.88m	13 x 2.3 x 1.88m
Accommodation	Up to 19 passengers	Up to 17 passengers	Up to 19 passengers
Basic operating weight	23,300kg	23,700kg	16,400kg
Range*	6,500nm	6,600nm	6,450nm
Maximum operating Mach speed	M0.925	M0.9	M0.9
Operating ceiling	51,000ft	51,000ft	51,000ft
Engines	2 x Pratt & Whitney Canada PW815GA	2 x Rolls-Royce Pearl	3 x Pratt & Whitney Canada PW307D
Take-off distance	1,740m	1,940m	1,790m
Landing distance**	945m	814m	897m
Wing loading, kg/sq m	397	476	468
Price	\$58.5m	\$56m	\$59.3m

Source: Manufacturers *4 crew + 8 passengers, M0.85 **MLW, SL, ISA

response to ACS inputs allowed me to accurately track both the localiser and glideslope.

As with my previous G500 experience, the G600 displays speed stability in all configurations. I found the yoke-mounted trim switch easily allowed me to null out pitch forces as we slowed for approach. On several occasions I used the autopilot disconnect switch in its trim speed sync mode, which immediately set the pitch trim to the current airspeed. Engine response to TL inputs allowed me to easily maintain our approach speed of 116kt with flaps set to down.

Industry first

The light workload on final allowed me to evaluate the G600's EVS display in the HUD. The HUD has a nominal 42° x 30° field of view, with the EVS's infrared (IR) view displayed in a large rectangular portion. As detailed by the US Federal Aviation Administration, aircraft properly equipped with an enhanced flight vision system (EFVS) and trained pilots can continue an approach below minimum decision altitude to 100ft above runway touchdown zone elevation if certain runway or lighting elements are visible without the EFVS.

In an industry-first, properly trained G500/G600 crews can fly all the way to touchdown solely with reference to the EVS. While using the feature during approach I was able to make out various topographical features, with land/water contrast particularly prominent. At 300ft, visual approach slope indicators were clearly visible in the display, as were the actual runway edges. The clarity of the IR display continued to improve as we descended, before Judd called for a go-around at 100ft radar altitude (RA).

Our next approach was to RNAV (GPS) runway 01. I hand flew the aircraft as ATC provided vectors to the final approach segment. I found that the large map display on the MFD greatly enhanced situational awareness as we navigated what was, traffic wise, an unexpectedly busy time. Once established on final, Judd retarded the right TL to IDLE to simulate an inoperative engine. Initially I used rudder trim to compensate for the adverse yaw, but once on the final descent path I zeroed it out. At 116kt, very little left pedal pressure was needed to maintain co-ordinated



Shorter gear gives the G600 a solid appearance on ramp

flight, with the left engine at around 65% N1.

At 100ft RA Judd called for a go-around. I smoothly rotated the nose towards a 10° attitude and called for gear up as I advanced the left TL. I fed in left rudder as the thrust was increased to a TOGA setting of 93.6%. Approximately 45kg of pressure and nearly full pedal was needed to counter the asymmetric thrust as we climbed to a downwind for our final circuit and approach.

While I found the G600's flight controls allowed me to properly manage the simulated engine failure, I think Gulfstream has missed an opportunity. By fully leveraging the capabilities that a FBW control scheme provides, an engine failure at even the most inopportune time could be turned into a non-event.

Once on downwind, Judd used the FMS interface on the TSC to set the auto-brakes to MED. Auto-brake status was displayed as a white message on the CAS. The last approach was a visual one to runway 01, with flaps again set to down. In the turn to final I used the HUD's FPM and pitch ladder lines to ensure I rolled out on a 3° glide path. About 55% N1 on both engines was needed to hold our target speed of 116kt. Approaching 50ft RA I retarded the TLs to IDLE, with a shallow flare initiated at about 20ft RA. After a small balloon, I relaxed aft ACS back pressure and the G600 settled gently onto the runway. I felt the auto-brakes engage as I lowered the nose gear onto the surface. The aircraft was slowed for runway turn off with auto-brakes and IDLE thrust reverse. The taxi back to Gulfstream's ramp and shutdown were a snap.

Accomplished with aplomb

Having already flown the G500 I was predisposed to be impressed with the G600, and our test flight confirmed my expectations. A 25% range increase from the G500's 5,200nm to 6,500nm is no small feat, but Gulfstream has accomplished it with aplomb.

The G600's bespoke wing and tweaking of the FBW flight controls ensure it handles just as well as the smaller and lighter model. It can cruise as fast as M0.9, shortening even the longest legs, while its passengers are coddled with a remarkably quiet and low-pressure altitude cabin.

A dedicated crew rest compartment ensures that even the pilots will arrive rested after a globe-spanning flight. The new auto-throttle wake-up feature of the envelope protection schemes and emergency descent mode are both laudable safety enhancements.

Oval cabin windows alone may be heraldry enough to show the G600 is a Gulfstream, and my preview flight revealed that there is much for passengers and pilots to like. ▀



Cabin is 18cm wider than G550's, accommodating up to 19 in luxury

Following its launch in 2018 as a replacement for the ill-fated 5X, Dassault's latest, highly advanced twinjet is set to make its first appearance ahead of a planned entry into service in 2022

6X appeal

Dominic Perry London
Cutaway **Tim Hall**

Dassault Aviation's newest business jet, the Falcon 6X, will, by the end of the year, have made its public debut. Roll-out of the ultra-wide-body twin is due in December, and while there are still at least 12 months of flight testing ahead, it is a sign of sustained progress on the programme.

Since its launch in February 2018, the Falcon 6X has maintained its steady march to a service-entry target of 2022. That is impressive for two reasons: first, the fact that the jet was born out of adversity, namely the cancellation of the Falcon 5X in December 2017; and second, the significant and unplanned impact of the coronavirus pandemic.

The latter issue in particular had the potential to significantly derail progress on the Falcon 6X. At the turn of the year, the programme was beginning to accelerate and the first pre-production aircraft had just entered final assembly. Then the pandemic hit, virtually shutting down France – and numerous other countries where parts of the jet's supply chain were located.

Outside of the development, Dassault made continued support for its customers a key priority. But keeping the 6X on track was seen as the other side of that coin; a commitment to its customers to deliver the jet as promised.

Engineering and production departments – as well as suppliers – pulled together to maintain momentum,

says the airframer. "We all took pride in this effort. When it rolls out, all our people will consider it a collective success that this aircraft is on the threshold of taking flight."

While the unforeseen effects of the pandemic came from left-field, the end of the 5X programme was a deliberate decision – but one that needed to be navigated nonetheless.

That aircraft was due to be powered by a pair of Safran Silvercrest engines, but persistent problems with the powerplants caused delay after delay and eventually forced Dassault to axe it.

Technological advances

In its place, the Falcon 6X was launched: conceived as a 5,500nm (10,200km)-range jet with the largest cabin in its class, the aircraft features numerous technological advances designed to bring significant benefits to owners, operators, customers and crews, as befits the airframer's new flagship.

The 6X is powered by a pair of Pratt & Whitney Canada PW812 engines – a variant of the PW800 series already selected by Gulfstream for its G500 and G600.

While the P&WC powerplants are more powerful and heavier than the Silvercrests, requiring some structural redesign to the Dassault-built empennage, they also promise an additional 500nm range over the already impressive 5,000nm planned for the Falcon 5X.

P&WC sister company Collins Aerospace supplies an integrated engine system, which includes the



Dassault extended the forward fuselage of the 5X by 50cm, increasing cabin volume

composite inlets, cowls, nacelles, thrust reversers and engine build-up system.

However, it is worth emphasising that the Falcon 6X is not simply a new pair of engines bolted onto an existing airframe design.

Dassault stresses that the jet is not an “evolution” but a “major redesign” of the previous aircraft.

Aside from the structural modifications required by the new engines, the most significant change over the Falcon 5X is an extension of 50cm (20in) to the forward fuselage, contributing to increased cabin volume of 52.2cb m (1,840cb ft), against 50cb m for the 5X.

However, the Falcon 6X retains the rest of its predecessor’s class-leading cabin dimensions of 2.58m (8ft 4in) wide by 1.98m high – 25cm wider and 10cm higher than the 7X – and a full 12.3m long.

Dassault boasts that the twinjet “offers the most interior space in the 5,000nm segment and features the highest and widest cross-section of any purpose-built business jet”.

Up to 16 passengers can be accommodated within the cabin, with individual seating in three different lounge areas. In addition, the ultra-wide-cabin credentials are highlighted by the additional 13cm of aisle width available.

The impressive size of the cabin has been put to good use. “Thanks to the extra space available, and based on extensive input from customers, Dassault’s in-house design studio completely rethought and restyled the cabin interior. Their solution features flowing, uninterrupted lines that enhance the feeling of spaciousness,” says the airframer.

The cabin also boasts a hugely impressive 30 windows – two more than planned for the 5X, which itself offered 30% more window area than the venerable 9X (and, if quantity is everything, is more than double the 12, admittedly larger, windows on Gulfstream’s flagship G650).

Speaking of transparencies, the 6X also features an industry first: above the entryway/forward galley sits a roof-mounted skylight, introduced following feedback from flight attendants.

Dassault says it wanted to do something different with the space and compares the experience to “walking into the foyer of your office or the hallway of your home”.

For added comfort, the cabin pressure altitude at 41,000ft will be equivalent to 3,900ft.

As with all modern business aircraft, the cabin features the latest in connectivity – in this case via

16

Number of passengers accommodated in the ultra-wide cabin, between three lounge areas



Dassault Aviation

At long-range cruise, nonstop missions like London to Hong Kong or Los Angeles, or Moscow to Singapore are fully within reach

» a Ka-band network. On top of that, passengers can control all the cabin functions via a mobile app or cabin interface. Smart-control mood lighting varies colour patterns in accordance with the type of activity, time of day and season.

Passengers sit in what the manufacturer calls an “ergonomic cocoon”, with all the required electronic functions within easy reach. Recessed controls light up when a hand is near and dim when not in use. Side-panel charging pockets accept personal devices of all types and sizes.

While maximum range is given as 5,500nm, that metric is achieved with eight passengers and three crew. While travelling at its long-range cruise speed of Mach 0.8, the figure is 5,100nm. At long-range cruise, nonstop missions like London to Hong Kong or Los Angeles, or Moscow to Singapore are possible, while at M0.85 nonstop flights from Moscow to New York or Paris to Beijing are within range.

A large part of the Falcon 6X’s efficiency comes from its new-generation wing, which is also another structure that has seen significant redesign over the 5X, with significant weight-saving applied to the internal components. Dassault assembles the wings at its Martignas facility near Bordeaux, adding GKN-supplied control surfaces to its own primary structure.

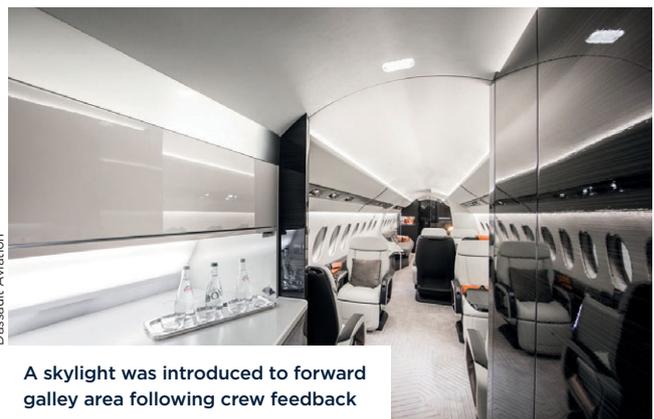
With a span of 25.9m, the structure is equipped with three slats on the leading edge on each side, and features a curved trailing edge with inboard flap, flaperon and outboard aileron.

While a flaperon is more usually seen on high-speed military aircraft, Dassault has leveraged its experience building the Rafale fighter to translate the control



Dassault Aviation

Passengers sit in what Dassault describes as an ‘ergonomic cocoon’



Dassault Aviation

A skylight was introduced to forward galley area following crew feedback



Wider fuselage allows for a spacious cockpit, with increased window area

Dassault Aviation

“The starting sequence for the 6X is automated, requiring few actions by the pilot other than monitoring the systems”

Dassault

surfaces onto the Falcon 6X – their first appearance on a business jet.

Although this adds complexity, the flaperon brings significant performance benefits, increasing control and capability.

Steep approaches are also aided by their presence; the ailerons can be deflected upwards while the flaperons act as an additional pair of trailing edge flaps. The ailerons and flaperons meanwhile combine to provide roll control. The result is a significant increase in drag with no lift degradation, helping to maintain a low approach speed.

Steep approaches

In fact, the approach speed can be as low as 109kt (202km/h) with eight passengers and three crew, and the 6X is able to fly steep approaches of up to 6°, enabling access to airports such as London City, Lugano, and St Tropez. Short-field performance sees the Falcon 6X able to land on runways of just 760m.

In some senses, though, it is in the cockpit where the biggest advances have been made. Described by Dassault as “the pilot’s new office”, on a basic level the larger fuselage allows for a more spacious cockpit – more headroom than any other aircraft, says Dassault – alongside 30% more window area. Seats recline to 130° and the wider cockpit allows entry and exit without the need to clamber over the centre console.

Dassault’s FalconSphere II electronic flight bags are integrated into the console. On top of which, there is more storage space for the flightcrew.

While pilots will welcome these changes from a comfort perspective, it is the numerous technological

advances that really set the Falcon 6X apart and will make their working lives simpler and, crucially, safer.

Dassault’s next-generation digital flight-control system (DFCS) provides better manoeuvrability and protection on the primary and secondary flight controls. The DFCS commands all flight-control surfaces, including slats and flaps. The system also integrates nose-wheel steering for safer runway handling in strong crosswinds or on wet runways.

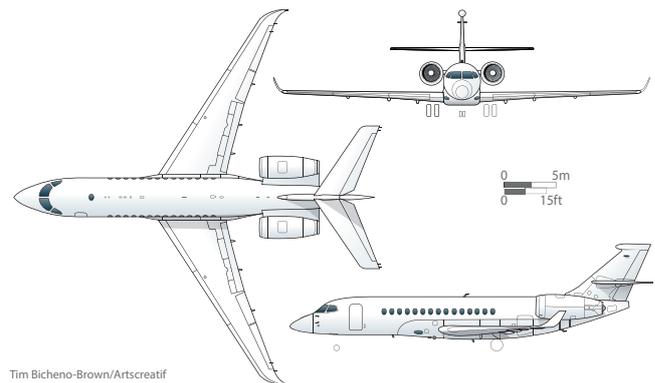
Digital flight controls have been present on Dassault business aircraft for over a decade – again aided by the company’s experience in military jets – but the Falcon 6X’s system “represents the next generation of DFCS refinement”, it says, “further simplifying the pilot’s workload for optimised, safer performance.

“Even the streamlined starting sequence for the Falcon 6X is more automated, requiring fewer actions by the pilot other than monitoring the systems as they come on line.”

Accompanying the sophisticated flight controls is the latest iteration of the FalconEye combined vision system (CVS), which was developed in conjunction with Elbit Systems. Already selected by most customers for the 8X, FalconEye will be standard on the new twin.

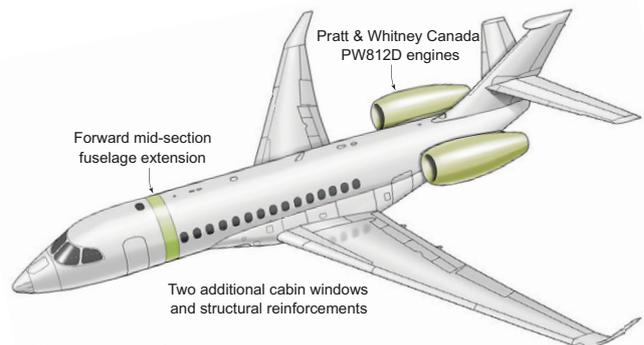
The CVS blends synthetic terrain images with those from infrared and low-light cameras into a single view on the head-up display. This provides an “unprecedented level of situational awareness to flightcrews in challenging weather conditions and all phases of flight,” says Dassault. “The EVS function will eventually provide operational credits for bad

Dassault 6X general arrangement



Tim Bicheno-Brown/Artscreatif

Exterior Dassault 6X changes



Tim Bicheno-Brown/Artscreatif

weather approaches with 100ft minima, providing operators with a substantial operational benefit as well.”

The HUD itself has a 30° x 40° field of view and is fed by a six-sensor electro-optical/infrared camera. Images from the camera are combined with three synthetic vision databases that map terrain, obstacles, navigation and airport runway data.

Rounding out the cockpit package is the third-generation EASy III flightdeck, based on Honeywell’s Primus Epic suite. New features include an integrated controller-pilot datalink communication system and RDR 4000 IntuVue 3D colour weather radar that provides predictive lightning and hail detection as well as 60nm-range Doppler turbulence detection. Hazardous weather and the vertical definition of thunderstorms can be seen at distances up to 320nm.

While outside the cockpit, one other safety feature is also worthy of note: a fuel-tank inerting system that uses a blanket of nitrogen gas to stop the fuel igniting – another business aviation first, according to the manufacturer.

109kt

Low approach speed allows access to airports including London City, Lugano, and St Tropez

Onboard diagnostics have also been improved: a new integrated maintenance system called FalconScan monitors more than 100,000 parameters in real time to provide enhanced visibility for technicians.

Final assembly of the aircraft is performed at Dassault’s Bordeaux-Merignac facility, with the fuselage delivered from the airframer’s plant in Biarritz and the wing from nearby Martignas.

Ahead of the December roll-out, ground testing of the first flight-test aircraft began in July at Bordeaux-Merignac. That means the aircraft remains on track for both its maiden sortie in early 2021 and service entry the following year.

In all, three aircraft will be used for the certification campaign; the second pre-production aircraft is complete and the third recently had its wing and fuselage mated at Bordeaux-Merignac.



Pratt & Whitney Canada PW812D engine has logged 200 flight hours

Dassault Falcon 6X specifications

Dimensions

Length	25.68m
Height	7.47m
Wingspan	25.94m

Performance

Engine thrust (x2)	13,000-14000lb
Maximum take-off weight	35,135kg
Maximum zero fuel weight	20,80kg
Range (at Mach 0.8)*	5,500nm
Maximum operating Mach speed	M0.90
Operating ceiling	51,000ft
Balanced field length**	1,670m
Approach speed (Vref)*	109kt

Source: Dassault Aviation
*8 passengers, 3 crew, NBAA IFR reserves
**MTOW, SL, ISA

The first two of these will be heavily instrumented and capable of performing a full range of aerodynamic, performance and systems testing. However, the third aircraft will be outfitted with a full passenger cabin to evaluate “systems functionality, acoustics, airflow, comfort and other factors”.

Interior furnishings, environmental systems, electronics and other equipment are currently being tested in a ground-test rig prior to installation.

Selection of the PW812D engine was a sign that Dassault was determined not to – and could also not afford to – make any decisions that would delay the development of the Falcon 6X.

When the aircraft was launched in early 2018 PW800-family powerplants were yet to enter service, although variants had been chosen by Gulfstream to equip its G500 and G600 jets, which duly arrived later that year. All of which provided some level of certainty on the relative maturity of the engine by the 6X’s service entry target of 2022.

On top of this, the engine shares core technology with Pratt & Whitney’s PW1000G-series powerplants for commercial aviation, adding an extra degree of reassurance for operators.

Aside from the out-of-the-box reliability, what the 13,000-14,000lb (59-62kN)-thrust PW812Ds also promise is emissions and fuel burn that offer a claimed double-digit improvement over previous-generation engines, plus a 40% cut in scheduled maintenance.

The PW812D completed an initial airborne test campaign earlier this year aboard P&W’s Boeing 747 flying testbed and a second series of flight tests is currently ongoing.

So far, the engine has logged 200 flight hours and more than 1,600h of ground tests.

A number of initial certification points for the powerplant have also been completed, including bird strike, ice ingestion and blade-off tests. ▀

This issue should contain a cutaway poster of the Dassault Falcon 6X. If yours is missing or damaged, please contact flight.international@flightglobal.com

54th INTERNATIONAL PARIS AIR SHOW

Paris • Le Bourget • 21 > 27 June 2021

LET'S BOOST
AEROSPACE
BUSINESS
TOGETHER

an event by
GIFAS 


siae.fr

Simulation-based training is a crucial element in preparing military aviators around the globe for the full scope of operations – our annual report looks at the devices in use worldwide

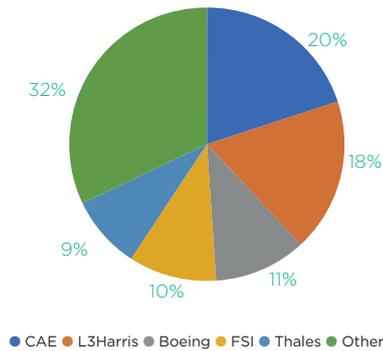


New CAE and L3Harris devices are supporting US Air Force AWACS crews

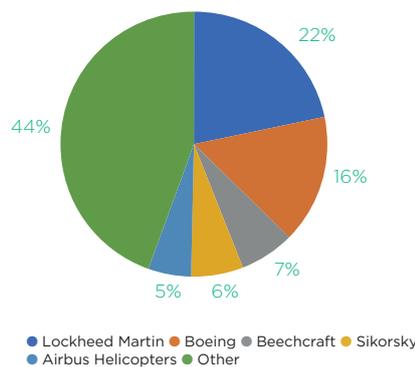
US Air Force

Always ready

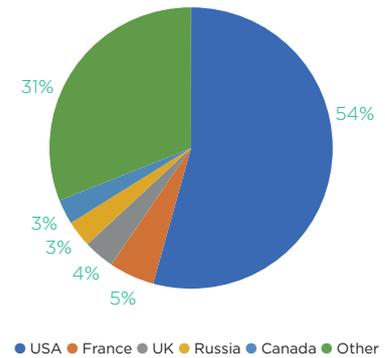
Market share by military simulator manufacturer



Military simulators share by aircraft manufacturer



Military simulator share by country



Craig Hoyle London
Data compiled by **Antoine Fafard** London

Our latest Military Simulator Census shows there are 2,789 instructional devices in operational use around the globe, across our qualifying categories.

As would be expected, since it has the world's largest and best-equipped military, the USA is by far the dominant customer for simulation-based training equipment, accounting for 54% of all listed devices: some 1,515 units. By contrast, second-ranked France has 145 devices and just a 5% share, followed by the UK, with 98 (4%).

CAE is the world's largest provider of military simulators, with our data showing that the company has supplied 20% of all listed equipment in use; some 556 devices. L3Harris is in second place, with an 18% stake (506 units), trailed by Boeing (11%/303), FlightSafety International (FSI; 10%/288) and Thales (9%/241). The remaining 32% share, representing 895 devices, is spread between other suppliers.

New business

Information received from the leading manufacturers shows that new equipment delivered in the first nine months of 2020 included four devices that are now supporting the US Air Force's (USAF's) Boeing 707-based E-3 Airborne Warning and Control System (AWACS) aircraft fleet in Oklahoma City. CAE and L3Harris each delivered a single flight training device (FTD), while the former also shipped a pair of operational flight trainers (OFTs) featuring its Medallion visual system.

L3Harris also handed over one OFT each to the USAF and UK Royal Air Force (RAF), as part of an upgrade programme affecting their Boeing RC-135

Rivet Joint intelligence-gathering fleets. Now in use at Offutt AFB, Nebraska, and RAF Waddington, Lincolnshire, the devices use the company's Raster XT visuals.

The RAF revealed in July that its three RC-135s, along with 17 USAF examples, are to undergo a glass cockpit modernisation activity, with the first examples already returned to the operators.

Also listed as a recent delivery is a Thales Reality H Level D full-flight simulator for the new Helisim Simulation Center in Grand Prairie, Texas. This will train pilots for operations with the Airbus Helicopters' H145T2. The company claims its equipment delivers "high levels of performance and unparalleled realism and flexibility".

Design and production

Despite the unravelling global coronavirus pandemic, new business announced during the first three-quarters of 2020 included an award for CAE to perform avionics updates on an E-3A flightdeck simulator and FTD for the NATO AWACS force at Geilenkirchen air base in Germany.

BAE Systems in July selected CAE's Medallion MR visual system for use with the full-mission simulators (FMS) to be delivered to Qatar in support of Doha's future Eurofighter Typhoon fleet.

Lockheed Martin selected CAE USA to support the design and production of a trio of FMS for the Air Force Special Operations Command's EC-130J electronic warfare aircraft and MC-130J combat tankers.

FSI, meanwhile, was selected to provide equipment and instructional services in support of the US Navy's incoming fleet of TH-73A training helicopters. Under the deal, the company will, from 2021, deliver 18 flight simulation training devices, along with image generators, visual databases, projectors and two



CAE – Your worldwide training partner of choice

Download the Military Simulator Census online now.

www.flightglobal.com/milisim



FlightSafety International



FlightSafety International will provide equipment related to US Navy's TH-73A

central control stations. Leonardo Helicopters will supply the navy with a version of its AW119 under the TH-73A procurement.

And in a new link-up with Boeing, FSI is to provide aircrew and maintenance personnel training on the 767-based KC-46A tanker at Altus AFB in Oklahoma. Their multi-year arrangement initially covers services for the USAF and Japan, but could later be expanded

to also train students for prospective Pegasus customers Israel and the United Arab Emirates. FSI supplies weapon system, boom operator and part task trainers for the KC-46A programme.

Securing such business with the USAF, which, with 722 training devices across our census categories holds a 26% share of the global market, is a clear goal for all suppliers.

Ensuring Safety and Performance for Today and Tomorrow



With light weight, small volume, outstanding environmental robustness and unmatched performance LITEF's certified Inertial Systems deliver value to the operators of all types of civil and military aircraft.

Inertial Systems
made by **LITEF**

For more information, please contact info@ng-litef.de
Northrop Grumman LITEF GmbH, Loerracher Strasse 18, 79115 Freiburg, Germany

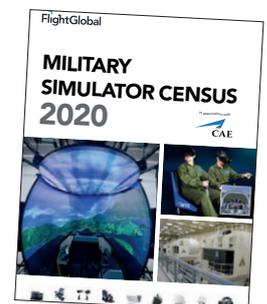
Common standards

In September 2020, an L3Harris-led team was picked to participate in the USAF's Simulators Common Architecture Requirements and Standards (SCARS) programme. Other team members are CAE USA, CymSTAR, Dell Technologies and Leidos.

"The team will help the air force develop a set of common standards for simulator design and operation," L3Harris says, noting that suppliers' current use of varying and unique interfaces "makes training updates difficult". As well as tackling this, another key objective of the SCARS effort is to enhance cybersecurity, which will enable the service to securely link remote simulators together.

Work under the initiative will initially focus on nine sites supporting the USAF's Boeing KC-135 tanker and Fairchild Republic A-10 ground-attack aircraft fleets. However, L3Harris notes: "There are approximately 2,400 simulators across 300 locations that will be updated with the new common architecture over the next few years." This total includes training equipment not covered by our listing.

Meanwhile, our data shows that 22% of all listed simulation devices are used in support of Lockheed-built aircraft - most prominently the C-130 and F-16 - followed by 16% for Boeing platforms, and then Beechcraft (7%), Sikorsky (6%) and Airbus Helicopters (5%) types. ▶



Flight International and FlightGlobal Premium subscribers have exclusive access to our Military Simulator Census, sponsored by CAE. To download a copy, go to: FlightGlobal.com/milisim



The Fund an Angel Virtual Auction raised significant funds in support of Corporate Angel Network (CAN). Proceeds from the event will ensure CAN is able to continue helping cancer patients, like Scarlett, in critical need during the pandemic and long after. Thank you to all who generously contributed.



Scarlett, an immune compromised pediatric cancer patient, was in need of transportation to a specialized treatment center. CAN was able to transport the family just before Scarlett's 5th birthday.

A SPECIAL THANK YOU TO OUR CURRENT SPONSORS

PRESENTING SPONSOR  NBAA

PLATINUM



GOLD



SILVER



BRONZE



**Sponsors as of October 1, 2020*

To learn more about Corporate Angel Network and future events, visit corpangelnetwork.org.



Russian connection

One poster that President Donald Trump will probably be glad did not emerge during his impeachment hearings has been produced by a group campaigning for his re-election.

It exhorts voters to “support our troops”, and shows three silhouetted soldiers walking as fighter jets soar over them.

Stirring stuff, except that the aircraft are Russian MiG-29s. Not only that, but one of the soldiers is carrying a Kalashnikov AK-47.

eVTOL village

Not content with designing a revolutionary hybrid electric vertical take-off and landing (eVTOL) aircraft, UK start-up Samad Aerospace has gone further and announced its vision for the “first eVTOL aviation innovation village in the world”.

This is not the sort of village that has a pub, post office and cricket green. Samad’s concept will offer its residents its own airport, factory and “aerospace innovation hub” as well as shopping malls, a hospital, schools, supermarkets, museum, cinema, health centre, sports centre and a range of villas and apartments.

Samad, a tiny company based at Cranfield Technology Park, hopes to build several of these villages around the world in countries ranging from India to Canada, Brazil or South Africa.

As one colleague remarks: “Samad idea.”



Sea Harrier fighters had decisive role in the Falklands conflict

Eat-380

As speculation grows about the fate of Singapore Airlines’ grounded Airbus A380 fleet, the airline has come up with an appetising idea to return at least one to service, albeit without leaving its parking stand.

Fans of the gentle giant had a chance to enjoy “a fine dining experience” on board an A380 at Changi.

Restaurant A380 @ Changi was due to open on 24 October for just two days, with customers able to choose from menus for each cabin class.

Tasty stuff. Just no jokes about wide bodies please.

From the archive

100

1920 Good propaganda

One of the essentials to the success of civil aviation is, as we have always insisted, good propaganda. The need for the proper kind of advertisement was well brought out at the recent Air Congress, and we are glad to learn that the suggestions then made are likely to bear much good fruit. To begin with, it is fact that the existing aerial services are not as well patronised, either by the travelling public or the business community which conducts its affairs by letter, as we have a right to think they should be. The main reason for this is, we are convinced, a want of general knowledge of the facilities available. In a casual sort of way a great many people know that such services exist, but the knowledge is not what we may, for want of a better term, call automatic.

75

1945 Spiteful behaviour

Retaining many of the features which have become so familiar through the long line of Spitfires, the new R.A.F. Spiteful fighter differs from its predecessors in that it has incorporated in its design the new type of wing known as the “laminar-flow” type. Briefly explained, this means that, in order to avoid or, rather, delay, the onset of the setting up of shock waves, the aerofoil sections are much thinner than those to which we have become accustomed. From the aircraft designer’s point of view, the laminar-flow wing is an unmitigated nuisance. A thin wing has to be made much heavier than a thick in order to bear the loads. However, these handicaps must be regarded as the price to be paid for entering speed regions in which the speed of sound is approached, or even exceeded.



Tower struggle

Thanks to regular contributor Doug Brown for drawing our attention to an online quiz appearing on the website of a certain aviation weekly.

"Where is the ATC tower located?" readers are asked underneath a picture of said erection.

Eagle-eyed quizzers don't have to journey too far to discover a helpful hint. Directly underneath the image reads the giveaway line: "Credit: New Istanbul Airport".

Sadly, no prizes seem to have been on offer.

Shar is born

With the 40th anniversary of the Falklands War approaching, Rowland White's latest offering – *Harrier 809* – nestles comfortably in the "must-read" category for any total aviation person.

Now available, the book tells the tale of the Fleet Air Arm's third squadron of British Aerospace Sea Harrier fighters, hastily formed on the eve of the conflict.

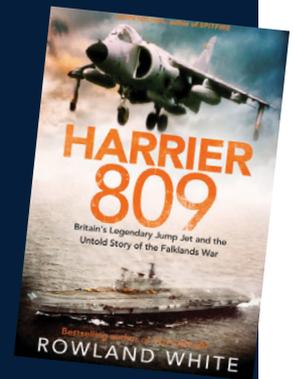
From the frantic hunt for suitably-skilled pilots and sufficient aircraft to the unit's creative embarkation aboard the ill-fated container ship *Atlantic Conveyor*, *Harrier 809* includes many fascinating details – but far from focusing exclusively on the Sea Harrier's critical role in the conflict, White also reveals the UK's efforts to secretly introduce English Electric Canberra bombers and BAe Nimrod R1 surveillance aircraft to the action. His inclusion of battle accounts from Argentinian pilots also gives the perspective from those who faced the "muerte negra" over the South Atlantic.

Meanwhile, word reaches us that legendary former *Flight* editor Mike Ramsden completed an update to his biography *Sir Geoffrey de Havilland: A Life of Innovation* shortly prior to his death last year.

A limited-edition run of just 200 copies has been printed, with the new content including an extensive interview with chief test pilot John Cunningham.

Priced £30, plus postage, the book can be ordered via dehavillandmuseum.co.uk/product/sir-geoffrey-de-havilland-a-life-of-innovation-by-j-m-ramsden

With the museum's agreement, we are offering our copy as a competition prize. For your chance to win the last editorial offering from the great "JMR", email your name and address to flight.international@flightglobal.com, with the subject line de Havilland, answering this simple question: Which de Havilland jetliner spawned the Nimrod? Closing date 11 November.



1970 Choosing Hobson

To be one of the major designers and manufacturers of flight control systems and aerospace equipment in the UK is an achievement worthy of note: to be pre-eminent in Europe in the field of aviation hydraulics is by definition unique, and it is H. M. Hobson Ltd of Wolverhampton which holds this position. In entering the Lucas group early this year, Hobson's has added greatly to the product range and capability of that group. Hobson's reputation rests on a combination of having produced carburettors for nearly every British World War Two aircraft and a line of hydraulic pumps, flying control systems, screwjack operating systems, constant speed alternator drive units, fuel-flow proportioners and boost pumps fitted to both civil and military aircraft since the war.

1995 Creating a colossus

Whether Boeing IS really talking to McDonnell Douglas (MDC) about a co-operation which might or might not lead to a merger, the mere thought of such a move has sent shock waves through an already shell-shocked aerospace industry. Immediate reactions have painted a potential merged company as a market-dominating, competition-killing, anti-trust-breaking colossus which would quickly smother most of its competitors. In relation to other industries, however, even at \$35 billion, Boeing/MDC would be, if not exactly small fry, hardly the biggest of whales either. It would be roughly half the size of a General Electric, a Daimler-Benz or a Siemens, and a fraction of the size of the big motor-manufacturers, computer manufacturers and the like.

Green machines

As an aviation veteran I have been very saddened by what has happened to our industry after so many successes by so many people worldwide. It started with the success of ICAO and IATA, which formed the path for the industry to follow. We were doing so well with one exception – fuel and carbon emissions.

As a result of Covid-19 we need to urgently get our industry looking at a replacement for Jet A1, because aviation's carbon footprint is terrible.

I believe the future success of aviation is dependent on a carbon-neutral fuel, and that needs to be well under way by 2024.

Industry and governments need to be forced into encouraging and sponsoring alternative fuel. But sustainable aviation fuel is only a temporary measure, to show that we are doing something.

Electric aircraft are already flying. They will be important, like electric cars, but it is the airliners

that we must consider and at the moment it must be hydrogen that is the favourite (*Flight International*, October 2020).

Governments must put money into developing this possibility, because aircraft are already flying using hydrogen, and it is carbon neutral. In Japan, it is already being used for ground transportation.

We also need aviation journalists to get stuck into this fuel development topic, so that it lights up the decision-makers to press forward. We have to be ready to meet our carbon-neutral targets and show populations that aviation understands and is supporting the green movement.

Graham Stephenson

via email

Back to Biafra

I learned to fly helicopters in 1958, with the Bell 47 and Hiller 360.

When the Biafra conflict broke out in Nigeria, my company,

Bristow Helicopters, told me to fly back to the UK the large, grey Westland S-55 that was used there for offshore operations.

I took along a young engineer apprentice with me to carry out the en route checks, and rather than go direct across Africa, I decided just to follow the west coast to Gibraltar and enter Europe there.

All went well until we entered what was then Portuguese Guinea. Because of the strong headwind we were flying at about 300ft and were just a few miles from the next international border when there was a huge external noise, followed by large splashes in the water below and a Fiat jet passing very close in front.

I pulled up and put out a "Mayday" call. Air traffic control answered and told us that we had been intercepted and must turn back and land at the military base behind us or we would be shot down. I complied.

Peter Gray

via email



Airbus

Yesterday's news

Taking up your invitation welcoming feedback on the new monthly format for *Flight International*, something I think that would be welcome is a round-up of news covering the past four weeks.

Much happens across the aerospace world, and while news in feature form gives a more in-depth approach, some of the small, short items would give readers a greater overview of the subject, and in my opinion such material should not just be published on the internet.

I believe readers would appreciate thumbnail slugs of news about important deliveries, first flights, new companies, or obituaries on those who made the news in the past.

Barry Wheeler

via email

Editor's reply: Our in-depth coverage is intended to keep readers informed about the key aviation developments each month, including registering major milestones, but we will consider whether some kind of "best of" section could add value. However, given our publishing schedule, using your subscriber login to access our 24/7 reporting on FlightGlobal Premium is the best way of keeping current with up-to-the-minute industry developments.

Power play

With reference to Chris Elliott's letter 'Maths vs Musk' (*Flight International*, October 2020), and several previous articles on electric- and hydrogen-powered aircraft options: the energy density of liquid hydrogen appeared to be missing.

This equates to 144MJ/kg – far greater than kerosene at 43MJ/kg – and should give much further scope for its use.

J Baker

Brighton, East Sussex, UK



Two-crew flight operations means errors can be trapped

Skycolor/Shutterstock

Why pilots need protecting

Regarding the concept of a 'crew-free future': the technology companies seem to be suffering from a number of serious misunderstandings.

Two pilots are about trapping error, and this is the reason that all large aircraft have two crew members: incapacitation to one is a small risk in comparison. It is the application of crew resource management theory that has enabled two-crew flight operations to reduce accident rates to such extraordinarily small numbers.

The current system allows an inexperienced pilot to safely gain the necessary experience, by both operating and observing, under the watchful gaze of an experienced colleague. The sum of two pilots in a crisis always exceeds the sum of their parts, and it is hard to see how a machine in one seat will ever lift crew performance beyond one.

A fully-autonomous system, while more than capable of replicating the motor skills of a pilot and operating safely, will fail when something catastrophic occurs. Examples such as the 'Miracle on the Hudson', the DC-10 at Utah City and the Qantas A380 uncontained engine failure spring to mind.

Safety is always an airline's number one priority, but a fully-autonomous system will suffer from the 'Challenger Syndrome'. The best defence against this is to have a crew of two on board the aircraft, empowered by their regulator-issued and -enforced licences to make hard decisions, and safe decisions that their airline is not always happy about. Take the crew away and the artificial intelligence algorithm will always dance to the company's tune.

The pilots are the final buffer between disaster and safety.

Look at recent events, where pilots and trainers were sidelined, company dogma applied to decisions, and two disasters followed. Remember how reluctant the company concerned and its regulator were to make the necessary safety-related decisions, even after fatal events.

I, like many, would not get on a single pilot/autonomously operated large commercial aircraft, until all the above points have been sorted to my satisfaction. I'm not a Luddite, but give me a hard-nosed captain and a fresh faced co-pilot any day: a genuinely tried, tested and de-bugged operating system.

Name and address supplied

We welcome your letters about our coverage, or any other aerospace-related topic. Please email flight.international@flightglobal.com, or write to: The Editor, Flight International, 1st Floor, Chancery House, St Nicholas Way, Sutton, Surrey, SM1 1JB. Letters should be no longer than 350 words in length, and supplied with the correspondent's name and location. Letters may also be published on FlightGlobal.com, and do not necessarily represent the views of the editor.

EDITORIAL

1st Floor, Chancery House, St Nicholas Way,
Sutton, Surrey, SM1 1JB, UK
flight.international@flightglobal.com

Editor Craig Hoyle
+44 7795 486691 craig.hoyle@flightglobal.com

Deputy Editor Dominic Perry
+44 20 8912 2164 dominic.perry@flightglobal.com

Head of Strategic Content Murdo Morrison FRAeS
+44 20 8722 8389 murdo.morrison@flightglobal.com

Consulting Editor David Learmount
+44 7785 901787 david.learmount@ntlworld.com

Magazine Enquiries
flight.international@flightglobal.com

AIR TRANSPORT TEAM

Executive Editor Graham Dunn
graham.dunn@flightglobal.com

Managing Editor – Airline Business Lewis Harper
lewis.harper@flightglobal.com

Air Transport Editor David Kaminski-Morrow
david.kaminski-morrow@flightglobal.com

AMERICAS

Americas Managing Editor Jon Hemmerdinger
+1 617 397 2809 jon.hemmerdinger@flightglobal.com

Americas Air Transport Editor Pilar Wolfsteller
+1 510 634 3496 pilar.wolfsteller@flightglobal.com

Aviation Reporter Garrett Reim
+1 571 216 5327 garrett.reim@flightglobal.com

ASIA/PACIFIC

Asia Editor Greg Waldron
+65 9489 4153 greg.waldron@flightglobal.com

Reporter Alfred Chua
+65 9643 4228 alfred.chua@flightglobal.com

CIRIUM DASHBOARD EDITORIAL

Michael Allen, Steve Goldstein, Michael Gubisch, SiMin Ngai, Niall O'Keefe, Thomas Risen, Jonathan Robins

FLIGHTGLOBAL.COM

Online Content Manager Amber Elias
+44 7816 991648 amber.elias@flightglobal.com

EDITORIAL PRODUCTION

Group Production Managers
Clare Goldie, Isabel Burton
Art Editor Tim Noonan
Layout Copy Editor Tim Norman
Consulting Technical Artist Tim Hall

DISPLAY ADVERTISEMENT SALES

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

EUROPE

Key Account Manager Grace Murphy
+44 20 8092 4080 grace.murphy@flightglobal.com

Sales Support Gillian Cumming +44 20 8092 4082

NORTH & SOUTH AMERICA

Vice-President, North & South America Rob Hancock
+1 703 795 5155 robert.hancock@flightglobal.com

Sales Director, USA & Canada Brett Ryden
+1 630 450 1164 brett.ryden@flightglobal.com

ITALY

Sales Manager Riccardo Laureri
+39 (02) 236 2500 media@laureriassociates.it
Laureri Associates SRL, Via Vallazze 43,
20131 Milano, Italy

ISRAEL

Sales Executive Asa Talbar +972 77 562 1900
Fax: +972 77 562 1903 talbar@talbar.co.il
Talbar Media, 41 HaGiva'a St, PO Box 3184, Givat Ada
37808, Israel

ASIA/AUSTRALASIA

Key Account Manager Jay Ee
+65 9173 3502 jay.ee@flightglobal.com
DVV Media International (Asia) Pte. Ltd.
15 Beach Road, 2nd Floor, Singapore 189677

RUSSIA & CIS

Director Arkady Komarov Tel/Fax: +7 (495) 987 3800
komarov@worldbusinessmedia.ru
World Business Media, Leningradsky Prospekt, 80,
Korpus G, Office 807, Moscow 125190, Russia

RECRUITMENT

Sales Manager Katie Mann
+44 7792 152097 katie.mann@flightglobal.com

Business Development Manager Lauren Cooper
+44 20 8092 4085 lauren.cooper@flightglobal.com

CLASSIFIED

Key Account Manager Jay Ee
+65 9173 3502 jay.ee@flightglobal.com

ADVERTISEMENT PRODUCTION

Production Manager Sean Behan +44 20 8092 4078

DATA

Data cited in Flight International is sourced from
Cirium, a data and analytics company in the wider
travel industry. For Cirium's data team, contact:

Trevor Mountford
trevor.mountford@cirium.com

PUBLISHING MANAGEMENT

Managing Director Andy Salter
VP, Publishing and Conferences Mark Pilling
mark.pilling@flightglobal.com

Commercial Director Publishing Sophie Wild
+44 7715 364765 sophie.wild@flightglobal.com

SUBSCRIPTIONS

Flight International Subscriptions,
DVV Media International,
PO Box 302, Haywards Heath,
West Sussex, RH16 3DH, UK

Subscription Enquiries If you have any subscription
queries, please contact customer service:
+44 330 333 9533

To purchase a FlightGlobal Premium subscription,
visit flightglobal.com/subscribe

Print & Digital Subscription Rates

(best rates are quoted)

1 year: £212.50/€229/\$293.25 Save up to 15%
2 years: £450/€484.50/\$621 Save up to 10%
3 years: £600/€645.85/\$828 Save up to 20%

Digital Subscription Rates

(best rates are quoted)

1 year: £187/€205.78/\$263.50 Save up to 15%
2 years: £396/€435.80/\$558 Save up to 10%
3 years: £528/€581/\$744 Save up to 20%

Only paid subscriptions available.
Cheques payable to Flight International

Flight International is one of FlightGlobal's
(publishing, events and FlightJobs) products
and services.



FlightGlobal uses data and analytics sourced from
Cirium.

www.cirium.com

Flight International welcomes unsolicited
contributions from readers but cannot guarantee to
return photographs safely.

© and Database Rights 2020 DVV Media International
Ltd. All rights reserved. No part of this publication
may be reproduced, stored in a retrieval system or
transmitted in any form or by any means, electronic,
mechanical, photocopying, recording or otherwise,
without the prior permission in writing of the
publishers.

Registered at the Post Office as a newspaper
Published by DVV Media International Ltd, 1st Floor,
Chancery House, St Nicholas Way, Sutton,
Surrey, SM1 1JB, UK.

Newstrade distributed by Marketforce (UK),
2nd Floor, 5 Churchill Place, Canary Wharf, London,
E14 5HU, UK. Tel: +44 20 3787 9001

Classified advertising prepress by CCM.
Printed in Great Britain by William Gibbons and Sons
Flight International published monthly 12 issues a year.

This periodical is sold subject to the following
conditions: namely that it is not, without the written
consent of the publishers first given, lent, re-sold,
hired out or in any unauthorised cover by way of
trade, or affixed to, or as part of, any publication of
advertising, literary or pictorial matter whatsoever.
No part of the content may be stored electronically,
or reproduced or transmitted in any form without the
written permission of the Publisher.

ISSN 0015-3710 (Print) ISSN 2059-3864 (Online)



DVV Media International



Check out Flight International's Image Store

Browse or customise a gift or memento from our **CUTAWAY ARCHIVE**
of more than 1000 aircraft drawings

www.flightglobalimages.com



FlightGlobal

New and used aircraft



amapola.nu

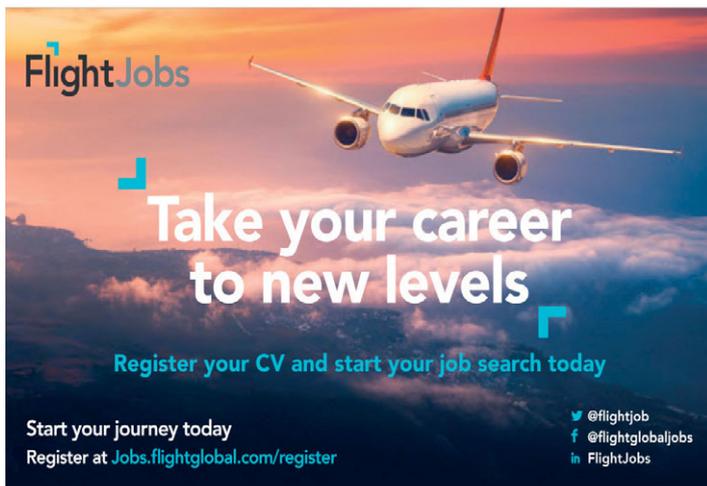


Fokker F50 Freighter & Passenger aircrafts for SALE

The Fokker 50 aircraft is perfect for operation on gravel and shorter runways, the aircraft model is known as the true working horse, there other aircrafts can't operate! Perfect cargo for bulk loading pallets and loose equipment. Passenger cabin in excellent condition.

- ✓ Availability September 2020
- ✓ Currently in operation
- ✓ Fully EASA Ops 1 compliance
- ✓ Fokker E-Class configuration. Max payload 7.200 kg, 56 m³
- ✓ Fokker passenger configuration 50 seat
- ✓ Fresh from C-Check
- ✓ Good engine, propellers and landing-gear status
- ✓ Excellent component status
- ✓ For outright sale, lease purchase TBD
- ✓ Export CofA in progress

For details please contact: Mr. Thomas Carlborg
E-mail: thomas.carlborg@amapola.nu
Mobile: +46 733 85 85 55
Website: www.amapola.nu



FlightJobs

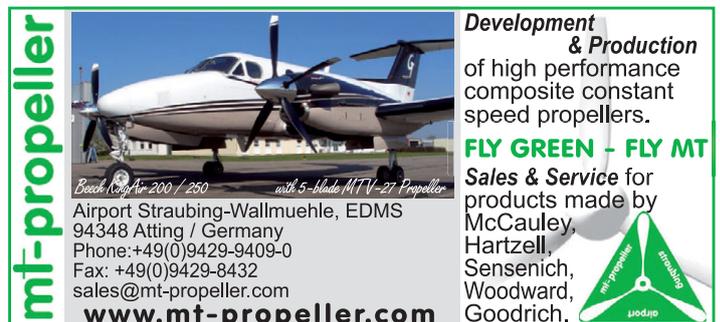
Take your career to new levels

Register your CV and start your job search today

Start your journey today
 Register at Jobs.flightglobal.com/register

[@flightjob](https://twitter.com/flightjob)
[@flightglobaljobs](https://www.facebook.com/flightglobaljobs)
[in FlightJobs](https://www.linkedin.com/company/flightjobs)

Equipment, maintenance and service



mt-propeller

Beechcraft 200 / 250 with 5-blade MTV-27 Propeller

Airport Straubing-Wallmuehle, EDMS
 94348 Atting / Germany
 Phone: +49(0)9429-9409-0
 Fax: +49(0)9429-8432
 sales@mt-propeller.com
www.mt-propeller.com

Development & Production of high performance composite constant speed propellers.

FLY GREEN - FLY MT

Sales & Service for products made by McCauley, Hartzell, Sensenich, Woodward, Goodrich.



New and used aircraft



The Regional Aircraft Marketing Specialist
 Tel. + 44 1753 832088 juliet@skyworld.co.uk

For sale
Package of 9 x PW 150A engines



- Located UK
- Packages or single engines
- Overall good status
- Borescope reports available
- Available immediately

www.skyworld.co.uk

Courses and tuition




New! Pilot Peer and Cyber Security Oversight courses by the UK CAA

Aviation regulatory training designed specifically for Aviation Authorities and the aviation industry across the globe. Based on EASA and ICAO Standards and Recommended Practices.

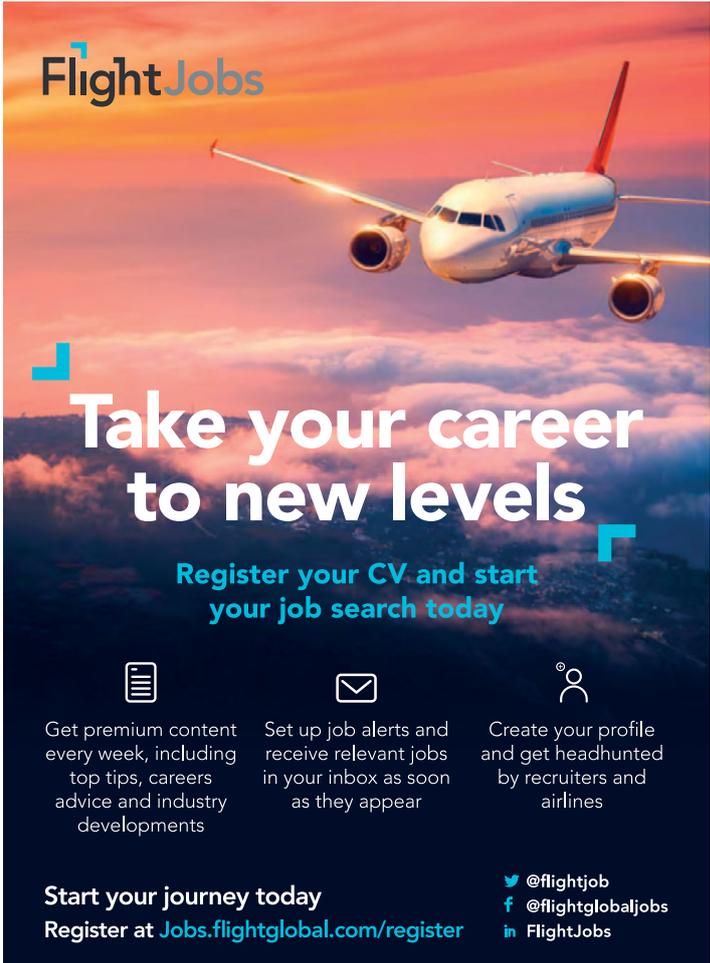
Pilot Peer Training
 Developed by the UK CAA in line with Regulation (EU) 2020/745, this course provides delegates with the skills and behaviours, as a Peer, to become confident to provide Pilot Peer Assistance to flight crew as part of a Commercial Air Transport operators Support Programme.
 13-15 Jan 2021 | 10-12 Feb 2021 | 29-31 Mar 2021

Cyber Security Oversight in Aviation
 Provides delegates with in-depth knowledge into the cyber security oversight process and explores the six steps of cyber security oversight using practical examples and exercises.
 18-20 Jan 2021 | 16-18 Mar 2021

To book or to view the complete schedule of our virtual training courses, please visit www.caainternational.com/training or contact us: E: training@caainternational.com T: +44 (0)330 0224401

www.caainternational.com
 Part of the UK CAA International Group

Together for better aviation



FlightJobs

Take your career to new levels

Register your CV and start your job search today

- 

Get premium content every week, including top tips, careers advice and industry developments
- 

Set up job alerts and receive relevant jobs in your inbox as soon as they appear
- 

Create your profile and get headhunted by recruiters and airlines

Start your journey today
 Register at Jobs.flightglobal.com/register

 @flightjob
 @flightglobaljobs
 in FlightJobs

EXCITING OPPORTUNITIES

A South East Asia based WVIP operator is seeking new recruits to fill a variety of positions in its Engineering and Logistics Departments. We are looking for experienced qualified personnel for the positions described. The successful applicants will be offered an initial 3 year contract with an attractive package. The contracts are renewable with 2 or 3 year options.

Interviews for successful applicants will be held in London in early December 2020.

Package

- Initial 3 year contract
- Renewable with 2 or 3 year contract
- End of contract and midterm travel (business class)
- Yearly performance bonus
- End of contract gratuity at 20% of earned salary for completed contract.
- Salary increment at contract renewal
- 48 days annual leave
- Duty travel expenses
- No income tax
- Full medical cover including family
- School fees assistance
- Spacious furnished accommodation

Available roles

Senior Quality Assurance Engineer x 1

- Minimum of 15 years in the industry with a certifying staff background
- Minimum of 3 years working experience in a quality system e.g. Q-Pulse
- EASA Part 66 B1 / B2
- Formal training on audit techniques and experience in auditing
- Good working knowledge of current regulations such as Part 145, Part M, Part 21J

Licensed Aircraft Engineer Avionics x 1

- Minimum of 10 years in the industry
- Minimum of 3 years as a certifying engineer, preferably with Sikorsky and Boeing aircraft.
- EASA Part 66 B2
- Working knowledge of EASA and/or EASA based regulations

Licensed Aircraft Engineer Rotary Wing x 3

- Minimum of 10 years in the industry
- Minimum of 3 years as a certifying engineer, preferably with Sikorsky aircraft.
- EASA Part 66 B1-3
- Working knowledge of EASA and/or EASA based regulations

Logistics Manager x 1

- Minimum of 15 years in the industry
- Minimum of 5 years in a logistics managerial position
- Relevant training for goods inwards / dangerous goods and Human Factors
- Working knowledge of EASA and/or EASA based regulations

Logistics Controller x 1

- Minimum five years in the industry or equivalent experience
- Holding a goods inwards authorisation
- Preferably holding dangerous goods authorisation
- Working knowledge of EASA and/or EASA based regulations

Technical Records / Library Supervisor x 1

- Minimum of 10 years in the industry
- Relevant experience in the registering of technical /airworthiness publications and data
- Familiarity with Rusada Envision or similar maintenance data base would be advantageous
- Working knowledge of EASA and/or EASA based regulations

For those individuals who are interested, please apply by submitting a CV (with personal details) via email at recruitment@hmsf.gov.bn quoting the relevant position

Steffi Ziegler is a new aircraft maintenance engineer, responsible for one of wartime Germany's most iconic types kept at the Messerschmitt Flight Museum. She combines the role with being an honorary ambassador for her region's horticulture industry across Europe

A promising future

Pilar Wolfsteller Manching

Tucked into a far corner of the sprawling Airbus Defence & Space campus in Manching, Germany, about an hour's drive north of Munich, is the Messerschmitt Flight Museum, housed in a converted hangar and home to a priceless collection of unique aircraft.

Willy Messerschmitt, one of the most prolific German aircraft engineers of his generation, played a decisive role in advancing mid-20th century aviation technology. His designs range from the minimalist M 17 light aircraft, first flown in 1926, through to the jets upon which today's fighters are based.

Rose Queen

The museum is also the workplace of 21-year-old Steffi Ziegler, Rose Queen of her home town and freshly-minted aircraft maintenance engineer. "I am so happy here," she says, surveying the sparkingly clean hangar, which also serves as a repair shop for the historic aircraft it houses. She completed her three-year apprenticeship in January, and works on the collection's Messerschmitt Me 262 and HA 200 D jet.

The iconic Me 262 is arguably Willy Messerschmitt's most enduring type, and the world's first jet-powered fighter. It lifted off on its maiden flight in 1941 amid the tumult of Second World War. Engine issues forced it to sit out the conflict until 1944 and it returned to service a year before the war ended. About 1,400 examples were built, but only 300 flew in combat.

A fully certified replica sits prominently in the Manching hangar, its maintenance and repair entrusted to Ziegler. "It's my favourite aircraft, and the most beautiful," she says. "Messerschmitt said it was the most important aircraft for him because there is so much to learn from it. It was fast, the most modern of its kind, and the first fighter to go from pistons to turbines."

Despite her youth, Ziegler appreciates the responsibility she carries and the importance of the legacy of which she is a part. "You have to be careful with these aircraft, they are so valuable," she says. "There are only a handful of these left in the world, and that's it. So it's crucial that we preserve this history."

Airbus and the Messerschmitt Foundation have made sizeable investments into restoring, maintaining and

showcasing the collection, often bringing the aircraft to airshows and exhibitions across Europe.

The biggest issue Ziegler and her colleagues at the museum face is the lack of spare parts for the historic birds, with components often out of production and difficult to find. Much creativity and elbow-grease goes into securing, refurbishing and replacing things that break. "It's not like a modern jet where you take a part that has failed and swap it with a new one," she says.

Ziegler also knows the work she does is not just for show. The aircraft are kept in flying condition. All are certificated and airworthy. "You can't just park an airplane on the side of the road, like a car, if it has engine trouble," she says. "There is a lot of responsibility that goes along with repairing an aircraft. When you are aware of that you realise what a great career this is on so many levels."

Ziegler showed an early interest in aviation. Her childhood home sat under the flight paths of two airports and she was fascinated by the technology. When the time came to choose a career, she naturally looked to the nearby Airbus campus. "In school I took the advanced-maths-focused track," she says. "I always loved watching the airplanes cross overhead, also fighter jets like the Eurofighter. So I decided to apply for the vocational course here."

Of the 15 students in her apprenticeship class, four were women. All graduated and are now working on different programmes at the Manching site.

"My family was excited when I told them this was what I wanted to do as a career, and that a girl could even do this. But they couldn't help me because none of them had any experience in the field," she adds.

Hard work and a bit of luck led to her job at the museum, she says. She had the choice of working on cutting-edge programmes like the Eurofighter, Tornado or the A400M, but the older aircraft appealed most. "It is so vital that people see how aviation started," she says.

Advanced technology

"Today's aviation is based on what the designers did years ago with these historic aircraft, and it's important to see how things were done then, how advanced the technology was at that time, what was even possible," she adds.

Ziegler's down-to-earth attitude also led her to be



Ziegler completed her apprenticeship in January and turned down the chance to work on more modern aircraft

Pilar Wolfsteller/FlightGlobal

“Today’s aviation is based on what the designers did years ago with these historic aircraft... how advanced the technology was”

voted Rose Queen of her hometown of Karlshuld, just west of Manching.

“It’s an honorary post where I represent the horticultural society at festivals, trade fairs and parades in Germany and across Europe,” she says. “Very different from my day job.”

Her advice to others interested in learning how to take apart aircraft and put them back together again is: “If you want to do this you need to be inspired by the technology, have some craftsmanship skills and manual know-how and, of course, you have to love aviation,” she says. “It’s such a fun career. You have so many possibilities to learn. That’s why I love what I do.”



Access all areas
Subscribe to FlightGlobal Premium

Get unrestricted access to all FlightGlobal content, including the latest from Flight International and Airline Business, plus more.

Subscribe now at
FlightGlobal.com/subscribe



INNOVATING FOR SUSTAINABILITY

While innovating to deliver peak efficiency and performance today, we never lose sight of tomorrow. In the air, our new, clean-sheet aircraft achieve industry-leading fuel economy and reduced emissions. On the ground, green facilities, sustainable manufacturing processes and a carbon offset program help guide the way to a better shared future.



Gulfstream™

A General Dynamics Company