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Editor's Letter

THE HUMAN FACTOR

The US airline industry was rocked by two, turn-of-the-year technology-related glitches that brought systems to a grinding halt. The first was the meltdown of Southwest

Airlines between Christmas and New Year that saw more than 16,700 flights cancelled and which racked up costs starting at US\$825 million. The second was the FAA system outage that halted departures nationwide.

The US transport authorities are now scrutinising whether airline executives overscheduled flights which under federal law is considered an unfair and deceptive practice. Southwest is only admitting that its systems became stressed from days of disruption across 50 airports due to an unprecedented storm.

Southwest has called its performance unacceptable - and has apologised, promising that its US\$1 billion programme for IT systems upgrades would now be accelerated.

Interestingly, the latest results published by two of the 'big four' US carriers indicate a positive 2023 outlook so, instead of siphoning off profits for buybacks and dividends, money now needs to flow in the right direction in order to shore up essential infrastructure.

Let's not forget that to access Covid bailouts, airlines had to suspend shareholder rewards that over the years have forced the business to



do ever more with less. Which brings us to the vexed issue of the country's National Airspace System. Such outages occur because the FAA is perennially underfunded and subject to a budget process that is not fit for purpose. "The December travails of Southwest Airlines would be an everyday occurrence if its capital allocation processes were as starved and unpredictable as the FAA's," remarked former FAA chief David Grizzle.

Southwest was quick to resume dividend payouts once the federal ban was lifted and yet when crisis struck, it was Southwest's flight crews, airport employees and back-office staff who saved the day and recovered the schedule. All of which begs the question, where is the leadership at both system and airline level that depends on the loyalty of the rank and file to go beyond what is reasonable in order to paper the cracks in such fragile and fractured institutions?

Aimée Turner

Aimée Turner

EDITOR

aimée.turner@realresponsemedia.com

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Cover image design: Phil Couzens

EDITORIAL TEAM

EDITOR

Aimée Turner

aimée.turner@realresponsemedia.com

CONTRIBUTORS

Paul E Eden

Emma Kelly

Alex Preston

Addison Schonland

ART DIRECTOR

Phil Couzens

SUB-EDITOR

Heather Ford

PRODUCTION MANAGER

Barnaby Moore

barnaby.moore@realresponsemedia.com

COMMERCIAL DIRECTOR

Toby Walton

toby.walton@realresponsemedia.com

ADVERTISING SALES EXECUTIVE

Christian Orros

christian.orros@realresponsemedia.com

CEO

Chris Pitchford

chris.pitchford@realresponsemedia.com

For subscriptions & enquiries:

Barnaby Moore

barnaby.moore@realresponsemedia.com

All enquiries

+44 (0) 20 8444 2554

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Airline Business

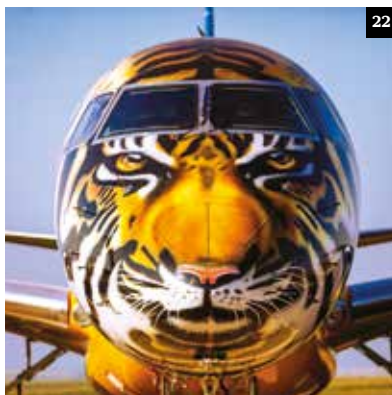
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Patrick Edmond warns that aviation risks becoming a social pariah where restrictions on growth look increasingly plausible

BUSINESS BRIEFING



AIRLINES

Storm brewing for US airlines as legislators move to protect passengers

➤ US lawmakers are beginning to push for stronger consumer protections as a result of Southwest Airlines' performance over the holiday period when bad weather triggered significant operational failures.

The Texan low-cost carrier has pencilled in fourth quarter losses of up to US \$825 million in pre-tax income following its disastrous meltdown which resulted in the cancellation of 16,700 flights over Christmas and New Year.

The losses, including a US \$425 million bill for missed revenue and costs in reimbursing people for alternative travel, will likely generate a net loss for 2022's final quarter, completely reversing earlier forecasts of strong profits and margins.

Southwest said it expected continued financial fallout for the operational fiasco as travellers start to cash in vouchers and

points – which are not recorded as costs until redeemed.

In early January, Southwest chief executive Bob Jordan said that the carrier was processing 'tens of thousands of refunds and reimbursements a day' as well as offering 25,000 rewards points to each passenger worth around US \$300.

But the compensation will do little to placate US lawmakers who are now mulling additional regulation for the industry. A group of 26 House Democrats have written to US Transportation Secretary Pete Buttigieg calling on him to improve passenger protections and set standards for airlines to 'maintain a reasonable level of operational capabilities' during severe weather.

US Senate commerce committee chair Maria Cantwell also announced her committee would hold hearings

into the merits of the Federal Aviation Administration, examining how to strengthen consumer protections as part of the agency's reauthorisation, set to be carried out by 30 September.

Cantwell shared her concerns about the Southwest cancellations, saying many major airlines fail 'to communicate with consumers during cancellations' and that consumers deserved better protection.



16,700

The number of Southwest flights cancelled during the airline's disastrous meltdown over Christmas and New Year



AIRCRAFT

Boeing secures year-end MAX variant reprieve

US lawmakers have supported Boeing's quest for a reprieve from a December 2023 deadline imposing a new safety standard for its 737 MAX 7 and 10 variants.

Boeing secured a waiver as part of the year-end US \$1.7 trillion package of legislation, without which it would have had to add an alerting system to cockpits which would have required flight deck re-design and additional pilot training.

The US requirements were introduced after other models in the 737 MAX line were involved in fatal crashes in Indonesia and Ethiopia, in which 346 people were killed.

US Congressional leaders attached a waiver requiring retrofitting existing MAX aircraft with a synthetic enhanced angle-of-attack system and the ability to shut off stall warning and overspeed alerts. It gives operators three years from certification to retrofit existing MAX aircraft, and Boeing must bear the costs.

"Customers ordered the MAX 10 in droves - over 600, making it the second most popular model in the MAX family," said one industry expert. "The US government got the message and offered Boeing more time. Now it is up to Boeing to get the two remaining MAX models certified and delivered."

AIRLINE

Porter takes delivery of first Embraer E195-E2

The first of 50 Embraer E195-E2 have started arriving at Porter Airlines, the aircraft's North American launch customer, to support the regional carrier to expand operations throughout the continent.

The aircraft will initially be deployed from Toronto Pearson International Airport, with Halifax, Montreal and

Ottawa also seeing new services with the E195-E2. Porter has chosen to configure the 146-seat aircraft in a 132-seat all-economy configuration, with 36, 34 and 30 inches.

"The official delivery of these aircraft is the beginning of a new era for Porter," said Michael Deluce, president and CEO, Porter Airlines. "The E195-E2 enables us to reach across the continent, beyond our Eastern Canada roots, while introducing a level of service for economy air travellers that no other North American airline provides."

In total Porter has orders with Embraer for up to 100 E195-E2 aircraft; 50 firm commitments and 50 purchase rights. The first aircraft will enter into regular service in February. Read more about Embraer's new E-Jet E2 series in *Killer Instinct*, page 20.

BRIEFS



- Norwegian low-cost carrier Flyr and AI technology business FLYR Labs are to work together to boost the airline's revenue performance and enhance customer value and cost optimisation. The new partnership will build on the airline's own accounting, settlement and billing technologies developed in-house by pairing them with new capabilities across offer and order management. Included will be dynamic ancillary pricing capabilities that maximize conversion and revenue through AI-powered decision intelligence.

- Airport industry body ACI Europe has released a revised passenger traffic forecast for the European airport network, showing volumes in 2023 are set to fall nine per cent below pre-pandemic (2019) levels, with a full recovery pushed back to 2025 rather than 2024. ACI Europe director general Olivier Jankovec said 2023 industry volumes would only match 2017 levels: "All this reflects a mix of determinants with more negatives than positives - along with significant downside risks."

- Indonesian low-cost carrier TransNusa Airlines has taken delivery of its first ARJ21-700, COMAC's first delivery to an international customer. The aircraft - the first of 30 on order - was sourced via a China Aircraft Leasing Group Holdings (CALC) operating lease. CALC has a long-term commercial relationship with the Chinese state-owned COMAC and also holds a 49 per cent equity interest in TransNusa. COMAC is reported as having delivered 93 since production began - all to Chinese carriers until now.



1,500

600kW hydrogen-electric
ZeroAvia powertrains
have been pre-ordered

7

ZeroAvia has established seven
partnerships with aircraft
manufacturers

2023

A commercially certifiable
configuration will be submitted
by ZeroAvia by year-end



TECHNOLOGY

ZeroAvia flies world's largest aircraft powered by hydrogen-electric engine

ZeroAvia took to the skies on January 19, 2023, for the maiden flight of its 19-seat Dornier 228 testbed aircraft, retrofitted with a full-size prototype hydrogen-electric powertrain on the left wing. The flight took place from the company's UK R&D facility and lasted 10 minutes, completing taxi, take-off, a full pattern circuit and landing.

The landmark flight forms part of the HyFlyer II project which is developing a 600kW powertrain to support 9-19 seat aircraft worldwide with zero-emission flight. The twin-engine aircraft was retrofitted to incorporate the hydrogen-electric engine which operated alongside a single Honeywell TPE-331 stock engine.

In this testing configuration, the hydrogen-electric powertrain comprises two fuel cell stacks with lithium-ion

battery packs providing peak power support during take-off and adding additional redundancy for safe testing.

Hydrogen tanks and fuel cell power generation systems were housed inside the cabin although in a commercial configuration, external storage would be used and the seats restored.

"All systems performed as expected," said the business. "This is the largest ZeroAvia engine tested to date and places the company on the direct path to a certifiable configuration to be finalised and submitted for certification in 2023." ZeroAvia added that this programme would soon lay the foundation for its 2-5 MW powertrain programme, which is already underway and which will scale the clean engine technology for up to 90-seat aircraft, with further expansion into narrowbody aircraft demonstrators over the next decade.



START-UP

Australia's low-cost Bonza cleared to fly on domestic network

Australia's aviation authorities have issued an Air Operator's Certificate (AOC) to new Australian airline Bonza after the carrier submitted final documents and successfully completed proving flights.

The carrier plans to open up routes to more of the country's regional destinations, flying 27 routes to 17 locations, and offering low-cost fares in the process.

Bonza chief executive Tim Jordan said: "This is an historic moment for Australian aviation as we get ready to launch the first high-capacity airline in over 15 years, and the country's only independent low-cost carrier. With the approval from Civil Aviation Safety Authority (CASA), 2023 is set to be the year of seeing more of your own backyard for less."

A specialist team at CASA has been working with Bonza since it submitted its application last year. Federal transport minister Catherine King said Bonza would boost competition in the sector, leading to downward pressure on fares. This is a significant milestone for Australian aviation, marking the first new high-capacity entrant into the Australian market since the launch of Tiger Airways.



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BRIEFS



● Since January 2022, Iceland's new low-cost carrier PLAY's share of Icelanders travelling abroad has been close to 25 per cent. "We're incredibly proud of our achievement in winning such a considerable share of our home market in a highly competitive environment, and believe this shows the clear need for a low-cost airline in the market," said Birgir Jonsson, PLAY chief executive. In 2022, PLAY served 25 destinations in Europe and North America. In 2023 that will rise to 40 using 10 A320/1neo aircraft.

● Latvian airline airBaltic is to equip its entire Airbus A220-300 fleet with SpaceX's Starlink internet connectivity system. Starlink provides high-speed, low-latency broadband internet and began serving commercial aircraft with inflight high-speed internet last year. With satellites positioned in low-Earth orbit at an altitude of 550 km, over 65 times closer than conventional geostationary satellites, Starlink said it achieves significantly lower latency and higher transmission speeds for its users, delivering up to 350 Mbps.

● An easyJet maintenance hangar has opened at Berlin Brandenburg Airport. easyJet said the hangar would provide it "with the capacity needed to ensure it can operate in the most efficient, safe and competitive way". The project was supported by the Brandenburg economic office as well as easyJet partner MRO Facilities which managed its design and construction. More than 100 easyJet employees will conduct aircraft maintenance activities for the airline's European fleet which currently comprises 135 aircraft.



CORPORATE

Virgin Australia owner prepares for listing on aviation market recovery

➤ US private equity house Bain Capital is examining potentially relisting Virgin Australia following the recovery of the domestic aviation market.

"In the coming months we will consider how to best position Virgin Australia for continued growth and long term prosperity," said Mike Murphy, a Sydney-based Bain Capital partner, who confirmed the business would likely retain a significant shareholding in any future IPO.

Restrictions on Australia's domestic travel along with barring international travel had a devastating impact with

Australian flag carrier Qantas admitting that it was close to bankruptcy at the height of the pandemic.

The full reopening last year has triggered a strong rebound in both domestic and international travel, with the airline commanding a market share of over 30 per cent, up from the 20 per cent when it collapsed in 2020.

Despite recording operating losses of A\$400m (US \$279m) in June, it expects to return to profit this year. "The business is in great shape," said Murphy, who declined to specify if and when a return to the Australian Securities Exchange would happen.

START-UP

Founders of new Fly91 regional look to UDAN connectivity incentive

➤ An aviation veteran and former Kingfisher Airlines senior executive is to launch a new domestic airline and exploit India's UDAN regional connectivity scheme.

Manoj Chacko, in collaboration with business partner Harsha Raghavan, said Goa-based Fly91 will operate in the short haul segment with a standard fleet of ATR 72-600 aircraft with a seating capacity up to 78 seats.

The airline will launch in the third quarter with two aircraft, scale up to six in the first year and add 32 aircraft within five years. "Our network is not going to be just flying in and out of Goa," Chacko explained. "There are many unserved and underserved airports within 90 minutes of Goa such as Kolhapur, Sholapur, Latur. We would access those cities and from

there potentially operate into other cities as well."

Chacko added that the airline will be based on a basic, no-frills model: "It will be a supremely digital airline with extremely lean organisation and cost-effective operations with features like onboard retail products."



COUNTING THE COST



3-6

Airbus and Boeing are delivering new aircraft up to six months late, claiming post-pandemic supply chain issues



No. 1

Airbus remains the world's largest aircraft manufacturer for the 4th year running

400

Boeing's commercial aircraft deliveries in 2022 - up 40% on the 340 jets delivered the previous year

661

Commercial aircraft in 2022 delivered by Airbus, missing its target of 700.

\$3M

Both airframers are facing huge penalties in the event of 'inexcusable delays', which could reach \$3 million per aircraft

7,239

AIRBUS' YEAR-END BACKLOG OF AIRCRAFT ORDERS

OPPORTUNITY DESPITE VOLATILITY

Todd Power, senior vice president, commercial, Americas, Aero Capital Solutions, looks at the role of mid-life aircraft and engine assets in a post pandemic world



“operators now face unexpected maintenance and engineering cost on aging aircraft as both major OEMs struggle to accelerate their production systems”



Todd Power is SVP,
commercial, Americas, ACS



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Market volatility and complexity create risk and reward. Owners and operators of mid-life commercial aircraft continue to experience this reality as the industry recovers from the effects of COVID-19. On the one hand, lessors and operators of mid-life narrowbody aircraft were best positioned to serve domestic and regional markets as passenger demand surged in North America, Europe, and Latin America over the last year.

On the other hand, many of those same operators now face unexpected maintenance and engineering cost on aging aircraft as both major OEMs struggle to accelerate their production systems. Aero Capital Solutions is one of the fastest-growing mid-life narrowbody aircraft and engine lessors in commercial aviation. In this volatile market environment, we continue to see clear opportunity to deliver value-added solutions to airlines in order to provide the fleet capacity that airlines require while minimising engine and airframe maintenance cost.

Airlines lack the fleet required to address market demand

Perhaps the largest issue remains that OEMs are experiencing significant delivery delays, subsequently placing operators in a compromised position as their older technology aircraft continue

to age and leases expire around originally scheduled orderbook deliveries. Even when there are aircraft available from the mid-life fleet of lessors to support operators, the pressure on OEM supply chains is not limited to new aircraft, and critical transition modifications are now also on highly extended timelines as a result of post-COVID resource bottlenecks.

The combined consequence is delays in all aircraft deliveries and substantially higher maintenance on in-service aircraft due to delayed retirements and lease extensions. Unfortunately, this all-time peak demand is created at a time when a higher portion of airframe MRO capacity has been allocated to satisfy narrowbody freighter conversions lines and engine shops are struggling with supply chain issues of their own, resulting in record-high engine TATs.

Short-term solutions are attractive, but not sustainable

The benefit of these dynamics is spread across several fronts.

35

ACS has now largely deployed its lease engine portfolio with over 35 additional lease placements secured in 2022



“longer TATs are combining with higher overall demand for engine maintenance”

One notable impact is the premium now demanded by ACMI operators, which has rebounded strongly in both EMEA and the Americas. This market was devastated during COVID and had taken slightly longer than scheduled and charter operations to fully recovered as would be expected. With the continued strong demand and delayed deliveries, most ACMI airlines are now seeing revenues well beyond pre-COVID levels.

Thrust availability creates schedule reliability

Another market that has rebounded above pre-COVID levels is engine leasing on narrowbodies – for both new and classic generation engine types. For older CFM and PW engines, engine MRO TATs are stretched due to parts repair supply chain issues and manpower limitations following the retirement of many older and more experienced staff.

The longer TATs are combining with higher overall demand for engine maintenance such that engine spares requirements have increased beyond most forecasts.

Compounding these issues are new engine types (both CFM Leap and PW GTF) that have severe teething issues and high unscheduled removal levels. Across the board, engine availability is at an all-time low and lease rates are adjusting accordingly, even prior to the full re-opening of Asian and Chinese markets.

In the case of ACS, we have now largely deployed our lease engine portfolio with over 35 additional lease placements accomplished in 2022 alone and a strong continuing demand for all engine types, often with airlines looking to secure a programme that avoids exposure to spot market availability and pricing where they may be caught on the wrong side of the power curve.

Mid-life solutions in a dynamic market environment

The market volatility we’re experiencing is not a short term disruption in the view of ACS and we remain bullish about mid-life aircraft and engine values for the next 3-5 years at a minimum as these various supply and demand issues play out in a fully recovered market. We continue to see excellent value from ownership in both passenger and freight market segments and so despite headwinds from recessionary pressure and a strong push towards newer aircraft, the mid-life aircraft market has arguably never been stronger. 1

1. ACS believes the mid-life aircraft market has never been stronger



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*Compared to previous generation engines.





Chris Kilgour

C&L Aviation Group president
and chief executive

Gaining Leverage

Low Cost & Regional Airline Business caught up with **Chris Kilgour**, C&L Aviation Group president and chief executive, to find out more about the recent ACLAS Technics acquisition



Visit <https://cla.aero> for more information about C&L Aviation Group

C&L Aviation Group is an FAA and EASA-approved business, expert in servicing, maintaining and supporting operators in the corporate and regional aviation industry. In addition to aircraft and engine sales and leasing programmes, C&L offers parts support, exchange and repair options, OEM product distribution, heavy maintenance, interior refurbishment, engineering services, avionics upgrades, aircraft disassembly services and aircraft management.

Headquartered in the US with international offices in Australia and Europe, the Bangor, Maine-based business ended 2022 by announcing that it had acquired Edinburgh, UK-based ACLAS Technics – itself a market leader in supporting a broad customer base which includes some of the industry's largest airlines, aftermarket, MRO and OEMs.

C&L is now set on expanding its sales and marketing efforts with the acquisition of ACLAS which boasts the broadest expertise in structural component repair and overhaul for multiple aircraft types, including ATR 42, ATR 72, B737, A320 and more.

Chris Kilgour, C&L president and chief executive, founded the business in Australia about 30 years ago from the basement of his own home, moving to Bangor, Maine in 2010 when he bought the MRO. He spoke to Aimée Turner about the rationale behind the acquisition of the Scottish business.

Low Cost & Regional Airline Business Why did you acquire ACLAS? What was it about the business that attracted you?

Chris Kilgour ACLAS is very well known for its work on ATR aircraft including structural repairs to flight control surfaces, leading edges and doors. The real synergies from this deal came because, while we are an MRO, the larger part of our business is in supplying the aftermarket so we have all those structural items that ACLAS repairs in stock for exchange.

We found we were sending a lot of repairs and overhauls to ACLAS from exchanges we were doing, so this acquisition brings all those elements together. Ultimately, it's better for the operators because it will keep everything

in-house. What it also does is gives us new sites in both Europe and here in the US where those exchange items can be stocked and where they can be overhauled.

In terms of what made them attractive, we felt that they demonstrated superior quality and turnaround times. In fact, before we had even thought about buying them, we had chosen to send our structural items to them because they did such a good job. ACLAS has a great reputation and anybody you talk to about them will comment about the quality of their product. As we did more and more work with them, we broached the subject of acquisition.

My belief is, let's take advantage of the synergies, but let's allow them to do





1

“ACLAS boasts the broadest expertise in structural component repair and overhaul for multiple aircraft types”

what they do. They have a reputation in the market for a reason and I’m not going to change that and Charles Henery, who owned ACLAS, will be remaining as managing director.

LCRAB What does C&L bring and what are the benefits to the customer of the combined operation?

CK At C&L, we have a worldwide sales team. We have people on every continent and so we can leverage all those resources to grow ACLAS. With C&L’s infrastructure, whether it’s of an operational nature like accounting, IT or marketing, in addition to having sales teams physically present on every continent, or the fact that we have warehouses all around the world, ACLAS can leverage that to offer its services and products to a much wider range of operators.

One of the other benefits of ACLAS is that they also do structural work on other aircraft types such as B737 and A320 and so that dips our toe in the water for a whole different class of aircraft with which C&L could be dealing.

LCRAB So that could well be a new growth area for C&L too?

CK Potentially, but we’re really concentrated on our specific aircraft types and growing them. We have other aircraft types we’re looking at. We’ve already torn down a couple of Embraer E170s and we’re working to get into that market. We offer all sorts of programmes for propellers, landing gear or power by

the hour contracts. We also distribute for a lot of other OEMs like Champion and Safran and PPG. We really take the holistic approach to supporting the operator; if someone’s operating an aircraft we support, they can rely on us for everything they need. A lot of people say that, but we really do offer it.

Another aspect of it is that as an MRO, we do heavy maintenance, we paint aircraft, we do full custom interiors – both corporate and regional. We’ve brought all that together and we’re now doing what’s been termed ‘semi-private aircraft’. We’ve already developed and installed a first class seat and a flat floor modification for the ERJ. There’s huge demand both in Europe and here for point-to-point Part 135 operations where we upgrade the panels, the bins, the galley, seats, LED lighting and Wi-Fi without having to go through all the security of a big airport. It’s an easier way to do it.

LCRAB In terms of general growth and the challenging environment for MRO providers, how do you plan to navigate your way through that?

CK The only area we’re finding challenging is the workforce on the MRO side. We have an apprenticeship programme and we’ve started to look at loan repayments for airframe and powerplant mechanics. We find we’re training our own people, whether it’s fresh A&Ps, military people or apprentices. We’re also engaging with the high schools in a medium-term

strategy to feed us in around five years’ time where people can be guaranteed a job once they have their A&P certificate. We’re just addressing the issue head on – whatever needs to be done.

I see that people are interested and excited to come and work for a company that’s growing like C&L. It’s an exciting place to work and that draws people, which is great. We have that sort of reputation – which is something that we’ve worked on – and we try to treat our people well.

In terms of spare parts, we have a worldwide network and every week our sales guys are bringing in opportunities to buy aircraft to tear down and to buy inventories. We have no issues with finding additional inventory as we repair our own parts and through our exchange programme, we also build up our exchange pool.

The supply chain is definitely a big challenge at the moment and it’s for things that you would never have thought of as being an issue – like basic items. It seems to be getting a little better now but there’s still a long way to go on improving the supply chain. That’s what I see as the biggest challenge over the coming year. The other challenge is availability of aircraft, both corporate and regional. The ERJ is particularly popular at the moment and it’s challenging to find good examples of the aircraft.



2

1. Painting aircraft is just one of the many roles undertaken by C&L

2. Apprenticeship programmes and in-house training are an essential part of the business

3. C&L is an expert in servicing and maintaining corporate and regional aviation operators

SKILLS STRATEGY

Competency-based training uses professional competence as the benchmark for determining when training is complete, rather than hours.

Low Cost & Regional Airline Business talks to one expert about the benefits of this more personalised and adaptive approach

With over 12 years' experience in easyJet in a variety of roles, Mark Farquhar, chief training captain, provides leadership for both pilot and cabin crew training teams, supporting more than 600 instructors delivering training in over 28 locations throughout Europe. Highly experienced in operational standards and safety investigation, he actively instructs in the classroom, aircraft and simulator.

Here, he discusses the value of a competency-based training approach where the focus is on continually improving training effectiveness and efficiency to equip cabin crew and pilots with the competencies and confidence to excel in their roles, ensuring that over 12,000 easyJet crew may safely and effectively manage any unforeseen situation.

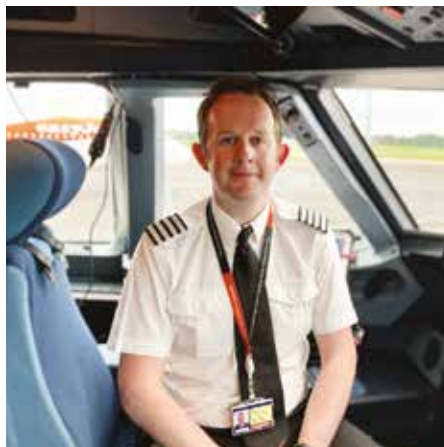
Low Cost & Regional Airline Business
What is competency-based training and why was it developed for commercial airline pilots?

Mark Farquhar The risks in aviation have evolved over the past 100 years of flight with huge benefits seen in improvements in processes, technology and infrastructure. The field of training pilots has evolved hugely since we started flying. Today's challenges are different, thanks to the benefits of the systematic industry learning of our predecessors. We know from recent history – based on evidence collected in accidents, incidents and flight operations – that the threats a

pilot may face nowadays are likely to be unforeseen. This has required a change in training methodology to equip the next generation of commercial airline pilots to manage unforeseen situations.

Competency-based training enables us to achieve this by clearly defining the behaviours that will empower a pilot. A competency is a combination of the knowledge, skills and attitudes required to perform an activity or task to a prescribed standard. Mastering a competency enables the pilot to apply it to any situation they may encounter, rather than simply be confident to complete a specific task or procedure for a prescribed event.

The taxonomy of competencies and observable behaviours removes ambiguity from the learning environment by using clear language to consistently identify behaviours, helping to ensure that effective learning takes place, improving training effectiveness.



1

LCRAB What is its value both to the individual being trained and for an airline such as easyJet?

MF For the individual, competency-based training is a paradigm shift. By specifying what competence and behaviours are required in an unambiguous competency matrix, trainees are able to see what 'good looks like' and work towards it. They have a clear vision of what they have to aim for. The competency matrix is often considered the job description of a high performing pilot – it literally defines the behaviours required to excel.

Competency-based training assessment (CBTA) provides individuals with bespoke personal development. Unlike traditional training programmes that deliver syllabus in a 'one size fits all' approach, competency-based training allows an individual to understand what behaviours need to be developed, giving the opportunity for tailored learning.

For an airline, rather than just have 'proficiency' data, CBTA allows it to carefully measure the performance of a pilot throughout their career. This granular analysis is based on competency grading in the training and operational environments, providing rich data insight into how pilots are performing. This gives an airline the opportunity to help improve recurrent training by understanding where improvement can be made.

Data analysis can also provide greater insight to sub-populations within a pilot community to see if there are patterns where tailored training may be required for pilots with a specific metric – for example experience level, fleet or rank. CBTA empowers pilots to self-critique their performance every day using the competency matrix themselves, which further helps to strengthen continual improvement of standards.

LCRAB What are the challenges of competency-based training for an airline?

MF It's a big change of training philosophy to transition to competency-based training for an airline, but extremely worthwhile. It's important to take all stakeholders on the journey, trainees and trainers alike. At the core of the change in training philosophy is a set

“MASTERING A COMPETENCY ENABLES A PILOT TO APPLY IT TO ANY SITUATION THEY ENCOUNTER”

of key competencies. A competency is a mixture of knowledge, skills and attitudes (KSA) that are familiar concepts for any instructor from more traditional training models. It's key to take instructors on the journey, making it clear that CBTA is an evolution of what we as an industry have done for decades. It's not a revolution.

A dedicated programme is required to upskill instructors to be effective role models and implementors of CBTA. To do so successfully requires an airline to understand their own instructors and engage them in the change process. Instructors need to be upskilled to make effective observations of defined behaviours, selecting consistent

key for successful implementation, by focusing on training more than checking and creating an effective learning environment where the trainee builds meaningful trust that the training system and CBTA is entirely focused to help them to improve their competence and confidence to fly passengers safely throughout the world.

LCRAB At what stage in their career will a pilot be exposed to competency-based training?

MF We are currently recruiting 1,000 Multi Pilot Licence (MPL) cadets over the next five years to fly our passengers throughout Europe and they'll receive

LCRAB Does competency-based training have any role when easyJet is recruiting?

It's really important for an organisation to recruit people who demonstrate the competencies required for a role. By defining the competencies and observable behaviours required for a role, an organisation has a very clear understanding of what to look for when assessing candidates for a role.

At easyJet, after a pilot has been selected they'll join and develop their competencies and behaviours during their initial training and further refine them throughout their entire career by completing our competency based recurrent training programmes. It's a holistic process from initial recruitment through a pilot's entire career, helping them improve their competence and confidence to safely fly our passengers throughout our European network.

LCRAB What next for competency-based training both at easyJet and throughout the global airline industry?

MF At easyJet we're continuing our focus on competency-based training, now pioneering to introduce it to develop and empower our cabin crew community because we understand how it has revolutionised training effectiveness for our pilots.

Looking at the wider industry, the benefits of this approach are clear and the majority of airlines and ATOs are on the journey to transition from task-based training. Interestingly, many eVTOL and RPAS training providers are also now evolving commercial air pilot competency matrices to these emerging branches of aviation, seeing the benefit of this systematic approach to training pilots.

Opportunities also exist for airlines and ATOs to further customise their competency matrix to their specific needs. For example, there may be different competencies required for operators of different generations of aircraft, or in different flying environments. Likewise with the rapid change of technology provided by leading manufacturers, the human-machine interface evolves constantly and may require additional competencies or behaviours. ¹

competencies and observable behaviours to ensure high instructor concordance. Investing in a development team of passionate instructors who help recruit, train and develop instructors throughout their career is critical to success.

Trainees also have to be taken on the journey via effective communications to help them understand the purpose of this taxonomy of assessment and how to use it themselves. Building trust between instructors and trainees is

the training from the very beginning. It's fundamental to how we train our newest pilots, using primacy to embed the concept into how they self-analyse and measure their own performance, to continually improve. Training future airline pilots, CBTA enables us to focus on the competencies required to be an effective multi-crew pilot, the core of being an effective modern airline pilot managing complex people and technology systems today and tomorrow.



2

1. Chief training captain Mark Farquhar says CBT gives the opportunity for tailored learning

2. easyJet is pioneering the use of CBT for cabin crew as well as pilots

Killer Instinct





↑
Embraer's new E-Jet E2 series has rightly earned its 'Profit Hunter' nickname

Brazilian regional jet manufacturer Embraer's new E-Jet E2 series has a striking nickname: the Profit Hunter. *Addison Schonland* examines its performance to date and assesses its future prospects

In 1997 Embraer revealed they were working on a larger family of aircraft. Before this, Embraer was focused on regional jets. The new E-Jets (E-170, E-190 and E-195) covered the market from 72 seats to 124. The decision to enter this segment was brave, given that the "crossover jet" segment above 100 seats had turned into a graveyard for Fokker, AVRO and others.

On the lower side, the E-170 was upgraded to the stretched E-175, which seated 76. Of the E-Jets, the E-175 turned out to be a bestseller. This model has become the market leader among US regional airlines, which account for over 70 per cent of the world's regional airline flights.

The chart overleaf lists the E-Jet family in service as of this writing, using the ch-Aviation Fleet database. The principal takeaway is how quickly the market embraced the Embraer product.

Embraer tinkered with their E-Jets continuously, working closely with customers to deliver what they needed. This is especially the case with the E-170 family. The incessant refining of the range is almost certainly why this model became the most successful regional jet. Embraer had a version for any airline's needs. This meant it even had versions that could exploit the US Scope Clause to give mainline airlines a connection tool that is comfortable and efficient.

E2 Announced

Embraer was doing great business with its E-Jets. But by 2010, its primary competitor Bombardier had gone through several years of ideas and settled on what would become the C Series. The C Series was a two-family model with 110 seats, like the E-190, and 130 seats – larger than the E-195.

Airbus saw the C Series CS300 as a threat to its A319. The CS100 was a threat to the E-190. Boeing largely ignored the CS models until United nearly ordered the CS300. Boeing scrambled to save the order by offering United a deal on 737-700s – none of which were delivered but converted to larger models. Meanwhile, a new competitor loomed in the form of the Mitsubishi Regional Jet (MRJ). Then, in 2011, Embraer announced its E2 family.

Competition

While Bombardier was attracting the ire of Airbus and Boeing, Embraer wisely went to work on an E-Jet update. It won the 'last mover advantage' as a result. While the competitive environment was heating up, Embraer took



EMBRAER HAS THE RIGHT PRODUCT WITH THE EARLIEST DELIVERY SLOTS



3

its time and developed three E2 models. Each had a new wing. All three were to be powered by the P&W GTF engine.

The result was a lighter-weight aircraft with excellent economics. Embraer also updated the avionics and made other improvements. Meanwhile, in response to the C Series, Airbus announced its A320neo family, and Boeing announced its 737 MAX family.

At the lower end, Embraer was ready to take on the CS100 and MRJ. Unlike its competitors, Embraer had been trading in this space for years and knew the customers and what they wanted. Customers told Embraer not to touch the E-190 dimensions when creating the E190-E2.

For the E195-E2, a stretch was warranted over the E195. With the CS300 aiming at the 130-seat market, Embraer offered 120 seats in dual class and 146 in a single class layout. Both the CS300 and E195-E2 offered considerably better seat mile economics compared to the 737 MAX7 and the A319neo.

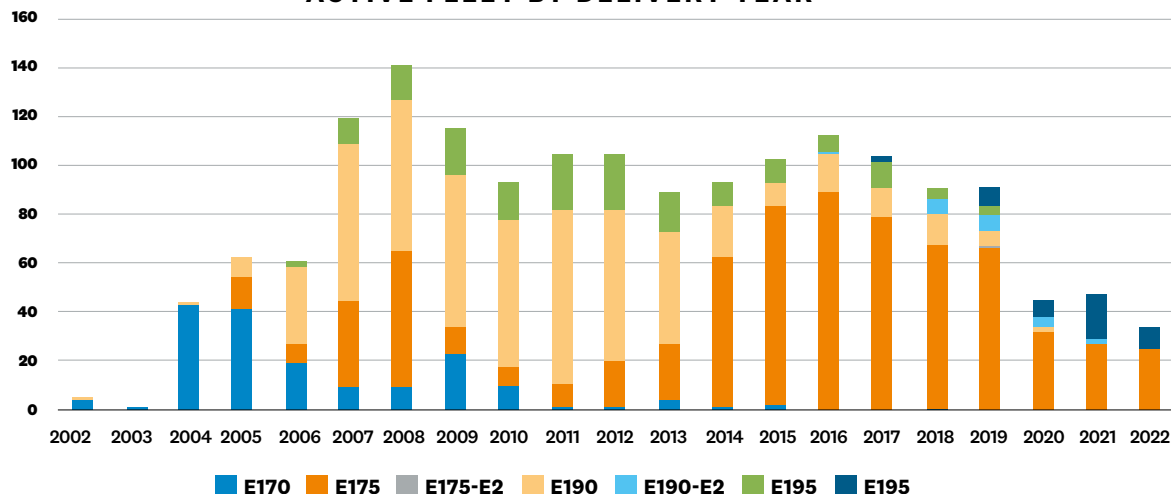
Whereas Bombardier fought with Airbus and Boeing, Embraer was not seen as a threat. Boeing flirted with Embraer in an aborted merger.

Embraer's engineers did a great job on the E2. Performance was better than expected. For example, the E190-E2 fuel burn was 17.3 per cent lower than the E190, which was predicted to be 16 per cent better. The E195-E2 saw a 24 per cent improved fuel burn over the E195. This meant the E2 family would have longer ranges than planned.

Indeed, early customer Helvetic Airways shared the following: "Embraer's factory E2-specifications regarding savings in fuel consumption and CO₂ emissions compared to the E1 are around 17 per cent. On our Helvetic routes we can exceed these figures with savings of at least 20 per cent (fuel and CO₂).

"The E2 is not only an ideal aircraft for Helvetic Airways in terms of fuel consumption and CO₂ emissions but also because of its operational possibilities. In particular, it can be used at smaller

ACTIVE FLEET BY DELIVERY YEAR



airports with short runways, such as London City or the Swiss airports of Sion and Bern. We can offer the Bern-Larnaca route and fly it with a full load.”

The market looked great for Embraer – Bombardier was in the duopoly crossfire. Boeing and Embraer were talking about a combined business.

Black Swan

Black Swan events are rarely good things. For the commercial aviation industry, the first glimpse of such an event was on 26 January 2018. The US International Trade Commission (ITC) dealt Boeing a stunning loss in its dumping claim against Bombardier – allowing Delta to keep its CS orders. The ITC case froze Bombardier’s CS sales efforts. Bombardier could not recover and was bleeding cash.

Then in October 2018, the first MAX crashed, followed by a second in March 2019. Boeing was reeling as the MAX was grounded. The Embraer deal was cancelled for what seemed like implausible reasons, and Embraer sued. That case is ongoing.

The broken deal between Boeing and Embraer caused consternation in Brazil. Embraer had separated its commercial

division from the rest of the company. Now, these two parts had to be reassembled.

Boeing’s bad karma from the ITC court ruling swept Embraer into its vortex.

At the time of writing, Embraer has recovered from the Boeing debacle. But the market has also changed. The C Series is now known as the A220 and is an Airbus programme, while Bombardier has returned to its business jet roots.

Market opportunities

The globe was hit by a pandemic that curbed air travel. Yet amid this, demand for deliveries for the A220 did not waver. The ‘crossover jet’ proved to be what the market wanted – a small aircraft with excellent economics and a useful range – although 99.6 per cent of all A220 flights are under 2000nm, suggesting a significant weight penalty to achieve ranges rarely required. Helvetic offered the Swiss government the means to pick up stranded Swiss citizens in Africa. Their E2 had the right costs and range to accomplish the mission.

Airbus’s move into the crossover jet space was a threat to Embraer. Airbus was deploying a one-two punch at every opportunity. Airbus offered customers an A220/A321 combination that proved irresistible in key campaigns. Boeing and Embraer could not respond. Important deals like JetBlue, Qantas and Air France went to Airbus.

Where Embraer faced off against the A220 directly, with no other aircraft in combination, it was doing well. It won deals with Air Peace and follow-on orders at Widerøe. It also won a crucial campaign at KLM.

Embraer had previously seen its E-190 as the more popular of its larger models. In the case of the E2, it is the E195-E2 that is twice as popular. Recent approvals

in China are likely to open that huge market for Embraer.

As we look across the market, the A220 and E2 are in one of the hottest market segments. Airbus sold a few A319neos. Boeing has seen a lukewarm response to its as-yet uncertified MAX 7. Airbus has seen an excellent response to the A220, and Embraer has also outsold the MAX 7 and A319neo.

Looking at the market opportunities, Embraer is in a great place. Airbus has a long backlog in the A220. With all its marketing power and financial incentives, Airbus cannot create more A220s. For operators looking for a crossover jet in the under 150-seat segment, the quickest solution is the E2.

The E2 offers competitive economics to the A220. Some argue it has better economics – the over two-ton difference in weight however cannot be argued. But the biggest advantage Embraer has is earlier delivery slots. This is a significant market advantage as airlines clamour for newer aircraft with greener credentials.

Moreover, as a lighter aircraft, the E2 has not suffered the same engine issues as the A320neo or A220. Embraer’s commercial president noted that coming to the market later has been a benefit as they have not had the same challenges Airbus faced.

The upset and disruption following the failed deal with Boeing allowed Airbus to move ahead of the E2 in the sub-150-seat segment. But now Airbus has run into supply chain challenges, as has Boeing. Boeing also has certification hurdles to overcome. For Embraer, it’s clear skies ahead – it has the right product with better delivery slots than anyone else. 1

1, 2 and 3. Embraer commissioned handpainted liveries for its E2 demo series, featuring animals including a tiger, an eagle and a striking black and gold ‘tech lion’



POWERING AHEAD

Emma Kelly examines the status of the drive to improve and optimise current combustion technologies for ultra-low emission aircraft

Airlines around the world are already benefiting from efficiency and environmental improvements with the latest generation of engines powering their narrowbody fleets. Engine original equipment manufacturers are working on further improvements to current engines and new technologies to deliver even greater benefits to operators, their finances and the environment. The aviation industry's target of halving CO₂ emissions by 2050 is a long-term destination for all.

Operators of the latest generation narrowbodies featuring LEAP and GTF

engines are already reaping benefits. CFM International's LEAP engine, for example, has enabled operators of Airbus A320neo and Boeing MAX families to save more than 17 million tons of CO₂ emissions, delivering 15-20 per cent improvement in fuel efficiency compared to earlier engines, according to the GE Aerospace and Safran Aircraft Engines joint venture. Gains come thanks to advances in engine architecture as well as improved aerodynamics and the extensive use of advanced materials, including carbon fibre and ceramic matrix composites.

LEAP-1A and LEAP-1B engines are currently powering more than 2,230 aircraft with 144 operators worldwide,

having amassed more than 25 million flight hours and 10,000-plus cycles since their 2016 entry into service. CFM has a backlog of approximately 10,000 LEAP engines still to be delivered.

A raft of LEAP orders last year alone included easyJet selecting a further 112 LEAP-1A to power its growing A320neo fleet, bringing its total A320neo commitment to 227; Air France-KLM purchasing 200 LEAP-1A engines for its new fleet of A320neo and A321neo; Delta Air Lines' commitment for 200 LEAP-1B engines for its new Boeing 737-10 fleet; Jet2plc's order for LEAP-1A engines for up to 75 A321neo; and Allegiant Air's purchase of LEAP-1B engines to power up to 100 737 MAX 7 and MAX 8 aircraft.

1. The LEAP engine has improved fuel efficiency by 15-20 per cent
2. P&W's GTF Advantage can run on 100 per cent sustainable aviation fuel

LEAP AND GTF ENGINES ARE ALREADY DELIVERING BENEFITS FOR OPERATORS

40%



The PW127XT-M offers 40 per cent extended time on wing, 20 per cent lower maintenance costs and a three per cent improvement in fuel efficiency compared to earlier generation engines

Airlines are benefiting from reduced CO₂ emissions, better fuel efficiency and lower noise, with long-term CFM customer Air Corsica, for example, highlighting 15 per cent fuel savings on its A320neo aircraft compared with its CFM56-5B-powered A320ceos.

Pratt & Whitney says its GTF, meanwhile, is delivering reduced fuel consumption and CO₂ emissions in the order of 16-20 per cent, with NO_x emissions cut by 50 per cent and a 75 per cent reduced noise footprint compared to earlier generation aircraft, due to its geared fan architecture and use of advanced materials and technologies.

The GTF entered service in January 2016 and powers the Airbus A320neo, Airbus A220 and Embraer E-Jets E2 families. By the beginning of this year, the GTF was powering more than 1,400 aircraft operated by 64 airlines, according to P&W. Total orders and commitments top 10,000 engines from more than 90 customers worldwide.

In the first half of 2022 alone, P&W had received GTF orders from Aviation Capital Group, Air Lease Corporation, Air Canada, Azorra, Delta Air Lines, JetBlue Airways, Porter Airlines and Qantas. "These orders demonstrate not only the strength of aviation's recovery, but also the value that GTF engines deliver in industry-leading efficiency and sustainability," Rick Deurloo, president of commercial engines at P&W said at

last July's Farnborough Air Show. "GTF engines will have soon saved airlines more than a billion gallons of fuel and avoided more than 10 million metric tons of greenhouse gases. This is in just seven years since entry into service. Over the life of these programmes, GTF engines will save our customers billions more," he said.

Regional turboprops

Regional jet and turboprop operators are also benefiting from developments. Pratt & Whitney Canada received Transport Canada certification for the PW127XT-M regional turboprop engine for new builds of the ATR 42/72 turboprop last August, with European certification following and entry into service with Air Corsica in December.

The PW127XT-M offers 40 per cent extended time on wing, 20 per cent lower maintenance costs and a three per cent improvement in fuel efficiency compared to earlier generation engines. The engine benefits from the latest materials and technologies, including increased low-pressure and high-pressure compressors capacity and enhanced power turbine efficiency. The PW127XT-S variant has been selected by Deutsche Aircraft to power the D328eco regional turboprop.

Further environmental and efficiency improvements are promised, with extensive research and development under way. P&W, for example, says its GTF Advantage will lower fuel consumption and CO₂ emissions by up to one per cent compared to the current GTF engine. Capable of a take-off thrust improvement of four per cent at sea level, the engine could enable longer range and higher payload, making it particularly suitable for A321XLR aircraft, says P&W, in addition to promising an increase of up to eight per cent take-off thrust at higher altitudes.

The GTF Advantage embarked on the next stage of its test programme with development flight testing last October on an A320neo. This early flight test campaign will continue to mature the engine by testing it in a variety of environments, including hot and cold weather and operation from high-altitude airports, says the manufacturer.

By early January, the GTF Advantage had completed more than 2,400 hours and 7,800 cycles of total testing, including a successful test on 100 per cent sustainable aviation fuel (SAF), says P&W. Engine certification testing will continue through the first half of 2023, including





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flights currently under way on the P&W flying test bed in Mirabel, Quebec, as well as extensive endurance testing to ensure product maturity at entry into service, expected in 2024.

Revolutionary innovation

Engine manufacturers have even greater ambitions in the medium to long-term. CFM, for example, is targeting more than 20 per cent lower fuel consumption and CO₂ emissions, along with 100 per cent SAF compatibility for the next generation of single-aisle aircraft through its CFM RISE – Revolutionary Innovation for Sustainable Engines – programme.

RISE is focusing on the development of new, disruptive technologies for future engines that could enter service by the mid-2030s. RISE is based on an open fan architecture to deliver fuel efficiency, as well as hybrid-electric capability to optimise engine efficiency.

The manufacturer and its partners are following a comprehensive technology roadmap for RISE, including composite fan blades, heat resistant metal alloys, ceramic matrix composites, hybrid electric capability and additive manufacturing, aimed at “pushing the technology envelope, redefining the art of the possible and helping to achieve more sustainable long-term growth for our industry”, according to Gaël Méheust, president and CEO, CFM International.

Testing on a RISE demonstrator engine is planned around the middle of the decade followed by flight testing. CFM has partnered Airbus for flight testing of

the open fan engine architecture on an A380 in Toulouse in the second half of the decade, with ground tests and flight test validation performed at GE Aviation’s flight test centre in Victorville, California.

Hydrogen and hybrid propulsion technologies feature in the roadmaps of all engine manufacturers to deliver long-term improvements. CFM announced last year it is partnering with Airbus on a hydrogen demonstrator programme, with the aim of flight tests on an A380 flying testbed in the middle of this decade for entry into service on a zero-emission aircraft by 2035. Airbus’ ZEROe project includes three concept hybrid-hydrogen aircraft – a turboprop, turbofan and blended-wing body aircraft. CFM is modifying a GE Passport turbofan for the project to run on hydrogen, while Airbus is also developing a hydrogen-powered fuel cell as one of a number of potential solutions for its zero-emission aircraft.

P&W, meanwhile, was selected last year by the US Department of Energy to develop high-efficiency hydrogen-fuelled propulsion technology as part of the Advanced Research Projects Agency-Energy (ARPA-E) programme. The Hydrogen Steam Injected, Inter-Cooled Turbine Engine (HySIITE) project will use liquid hydrogen combustion and water vapour to achieve zero in-flight

ALL MANUFACTURERS ARE EXPLORING HYDROGEN AND HYBRID PROPULSION

CO₂ emissions, reducing NO_x emissions by up to 80 per cent and reducing fuel consumption by up to 35 per cent for next-generation single-aisle aircraft.

P&W says it is developing the proof of concept and key technologies – combustor, condenser and evaporator – to low TLR levels through to 2024; further technology development and demonstrations are planned for 2024-2030; and the potential introduction of key technology elements into a product and entry into service from 2035-2040.

Meanwhile, in hybrid technology developments, P&W’s Hybrid Thermally Efficient Core (HyTEC) project, part of NASA’s Sustainable Flight National Partnership, will see it demonstrate a technology-infused core comprising a high-pressure compressor, high-pressure turbine and combustor from 2024 to 2027.

Green Hydrogen

Late last year, Rolls-Royce and easyJet successfully conducted the first run of a modern aero engine on hydrogen. The ground test, at the UK Ministry of Defence’s Boscombe Down facility,

1. Rolls-Royce have conducted a modern aero engine on hydrogen

2. P&W’s regional hybrid electric flight demonstrator in action



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1. Rolls-Royce aim to show hydrogen could power a range of aircraft
2. P&W's GTF Advantage will lower fuel consumption and CO₂ emissions

involved an early concept demonstrator based on a converted Rolls-Royce AE 2100-A regional aircraft engine using green hydrogen created by wind and tidal power, according to Rolls-Royce. Further tests are planned, leading to a full-scale ground test of a Rolls-Royce Pearl 15 jet engine. "We are pushing the boundaries to discover the zero carbon possibilities of hydrogen, which could help reshape the future of flight," says Grazia Vittadini, chief technology officer at Rolls-Royce. The partnership with easyJet is intended to demonstrate that hydrogen has the potential to power a range of aircraft, including narrowbody types, from the mid-2030s onwards.

Rolls-Royce is engaged in numerous European Union Clean Aviation programmes aimed at accelerating sustainable propulsion, including the Hydrogen Engine Architecture Virtually Engineered Novelty (HEAVEN), Consortium for the Advent of aero-engine demonstration and aircraft integration strategy with hydrogen (CAVENDISH), and Hybrid Electric propulsion system for regional aircraft (HE-ART) projects.

HEAVEN is developing Rolls-Royce's scalable UltraFan architecture and technologies for future civil aviation opportunities, including providing a platform for hydrogen and hybrid-electric technology; CAVENDISH will integrate liquid hydrogen systems into a modern engine for ground testing, as well as exploring a dual fuel combustor system, a cryo-compressed tank system and define requirements towards flight



2



1

HYDROGEN'S ZERO CARBON POSSIBILITIES MAY RESHAPE THE FUTURE OF FLIGHT

testing; and HE-ART will demonstrate enabling technologies for hybridisation of a hybrid-electric thermal turboprop as well as taking steps towards an optimised hybrid propulsion system for a future regional aircraft.

Hybrid-electric propulsion offers considerable opportunity to improve the efficiency of next-generation regional and commuter aircraft. P&W achieved the first engine run of its regional hybrid-electric flight demonstrator in December at its Longueuil, Quebec innovation centre. The system featured a 1MW electric motor developed by Collins Aerospace and a P&W fuel-burning engine adapted for hybrid-electric operations. Engine testing will continue through this year, with flight testing using a De Havilland Canada Dash 8-100 turboprop targeted for 2024. The project is aiming for a 30 per cent reduction in fuel burn and CO₂ emissions compared to a modern regional turboprop.

One of the latest hybrid electric industry projects launched is the SWITCH - Sustainable Water-Injecting Turbofan Comprising Hybrid-Electrics - project launched late last year. A consortium headed by MTU Aero Engines, and including Airbus, Collins, GKN Aerospace and P&W, is aiming to demonstrate the potential of hybrid-electric and water-enhanced turbofan (WET) technology for future short- and medium-range aircraft. The EU Clean

Aviation-supported project will combine WET and hybrid-electric propulsion with P&W's GTF engine architecture to enhance efficiency and reduce emissions across the full operating envelope of an aircraft. Phase one, through to 2025, will include testing of a hybrid-electric GTF engine, WET technology and sub-system laboratory testing, as well as design activity for an integrated hybrid-electric and WET cycle propulsion system, to be followed by ground and flight tests.

SWITCH is just one of MTU's numerous emissions-reducing initiatives under its Clean Air Engine (Claire) technology agenda, focused on improving geared turbofan technology (MTU is responsible for the high-speed low-pressure turbine and the first four stages of the high-pressure compressor for P&W's GTF) and developing revolutionary propulsion technologies - including WET, driven by hydrogen or SAF, and the Flying Fuel Cell (FFC). The FFC electrifies the entire powertrain using liquid hydrogen, with MTU aiming for a 2035 product launch for short commuter and regional operations and from 2050 for short- and medium-range flights. A Do228 is being used as the technology platform, with flight tests planned for the middle of this decade.

Engine manufacturers worldwide are working on a plethora of technology programmes with the industry's 2050 emissions goal the focus of their efforts. 

AIRCRAFT DOOR BARRIER (SAFETY NETS)

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- Used by MRO engineers.



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A GREEN REGIONAL REVOLUTION

Hydrogen-powered flight is poised to play a significant part in delivering a green revolution in the way we travel



1

Following UK-based Cranfield Aerospace's selection by Air New Zealand as the sole hydrogen-powered aircraft as part of the airline's Mission Next Gen Aircraft programme, CAeS CEO Paul Hutton reflects on the opportunity presented by hydrogen-powered aircraft in delivering a green revolution to the way we fly.

Changing the way we fly and travel

The introduction of zero-emission aircraft will enable us to re-think our approach to regional connectivity and the way we currently fly. As we outlined with many others in our recently published NAPKIN report, zero-carbon emission

flight is entirely possible from the middle of this decade on sub regional routes, on aircraft that range in size from 7 to 19 seats. The report also projected that it could be cost-effective to replace the entire UK regional fleet with safe, certified, zero-carbon emission larger aircraft by 2040, comprising 50-90 seats.

As the ATI's FlyZero study pointed out, and as Airbus revealed at the company's 2022 technology summit, significant progress can – and is – being made within R&D for larger aircraft powered by hydrogen, with larger aircraft potentially using hydrogen combustion from the mid-2030s.

But hydrogen technology in aviation is closer than you think and it will start small. We are working to convert the propulsion system of a Britten-Norman Islander 9-seat aircraft to that of gaseous

hydrogen via a fuel cell system with the goal of bringing it into commercial service by 2026, flying routes of up to 200km.

There is an immediate role for hydrogen, and we are encouraged that greater consideration to the so-called sub-regional element of air travel is occurring. Adjusting to net-zero aviation by 2050 – and, in some cases, even more stringent targets in certain countries – means operators across the world are viewing shorter journeys in a new light.

Newer, sub-regional routes, relying on smaller, zero emissions aircraft, flying from smaller airports close to the communities that they serve are increasingly being viewed as crucial building blocks and a way to prove the technology before it is matured to larger aircraft.

2040



In terms of aviation, Norway has a target of zero-emissions internal flights by 2040

Air New Zealand is leading the way in considering how shorter routes could actually be served by smaller zero-emissions aircraft where traditionally much larger aircraft have been used, albeit inefficiently. This will of course have knock-on effects for fleet management and operational models but in this new age of aviation, everything needs to be reassessed.

With kerosene prices predicted to rise significantly owing to carbon taxes, and the price of hydrogen predicted to fall owing to more renewable energy coming on stream for production, the cost equation is now changing.

Further investigation should also be given to how many sub-regional airports could be resurrected to serve sub-regional passenger services. The infrastructure is already there – it just needs an upgrade but one that could serve as a local hydrogen generation hub, powering not just the aircraft but the airport itself and possibly the surrounding community.

From an industrial competitiveness point of view, whichever nation takes a lead on delivering these early sub-regional green aircraft will have a significant strategic advantage over their competitors. The UK is sending the right signal with the publication and now implementation of the Jet Zero Strategy.

But there needs to be a greater sense of urgency. Policy can drive innovation and through innovation, the world has a unifying pathway towards addressing the climate emergency while multiplying jobs and creating economic opportunities.

The importance of targets

Targets are essential to maintain focus and to help sustain the momentum that is required to reach our environmental goals. It is encouraging that in aviation

1. Cranfield Aerospace is converting a Britten-Norman Islander's propulsion system
2. The sub-regional element of air travel will be crucial for the development of hydrogen models

“HYDROGEN TECHNOLOGY IN AVIATION IS CLOSER THAN YOU THINK”

stringent targets are not only being agreed upon, but some nations are choosing to set even more challenging ones. The newly adopted International Civil Aviation Organisation (ICAO) long-term global aspirational goal of net-zero carbon emissions by 2050 marks a turning point by providing an international policy framework for the global aviation community. But this should only be considered as the bare minimum.

There is much ground to cover between now and 2050, and many countries are throwing down the gauntlet by implementing more near-term targets. Take, for example, the US states of California and Hawaii, both of which require net zero to be reached by 2045 and not 2050. In terms of aviation, Norway has a target of zero-emissions internal flights by 2040 and, closer to home, the UK government will consult next year on a target for domestic flights to reach net zero by 2040.

These targets clearly demonstrate the commitment to decarbonise aviation and have an important signalling effect in driving industry – and associated investment – to accelerate sustainability developments.

Concluding thoughts

The road to true zero-emission aircraft will be complex. Different technologies will coexist for a certain period until a complete switch towards zero-carbon and zero-emissions aviation can be achieved. But whatever the technology, there must be no let-up in pace: as an industry we must not be complacent; we must assume that eventually governments will intervene in response to public pressure and curtail air traffic volumes if the aviation sector does not meet its environmental goals.

Countries like the UK can flatten the research and development curves of the technologies, drive down costs and make adoption easier on a global scale. And we must all play our part – on the small scale and on the large, collaborating at home and with our compatriots on the other side of the globe. 



Paul Hutton is chief executive, Cranfield Aerospace Solutions



2

DOING MORE WITH LESS

For those airlines which have leased aircraft fleets and limited cash reserves, green-time engine leasing is an attractive option. However, as *Alex Preston* discovers, the effects of the past two years are still being felt

The reduction in the number of parked aircraft as flight schedules return to pre-Covid levels may be good news for passengers, but its consequence is being profoundly felt elsewhere in the industry.

"The pressure on lease rates and engine values is increasing," states Alex Vella, chief operating officer of Lithuanian-based Magnetic Leasing. "However, due to the postponement of shop visits and increased TAT (turnaround time) to get engines through the shop, demand is starting to outstrip supply." At a time when airlines are expanding their short-haul networks with new holiday season routes, Vella warns that, "We are expecting summer 2023 to see a shortage of narrowbody engines on the market."

It's an overall sentiment shared by others in the industry. For Wasim Akhtar, director of engines, AJW Group, the negative impact of Covid on the global supply chain is still being felt across the

aviation industry worldwide. "There is still a lack of available resources – not only serviceable used material but manpower resources too," he explains. "There has been an exodus of qualified people and technicians out of the aviation industry into other industries, which has affected the level of qualified personnel available to service components."

The result of this and a lack of part availability have led to high turnaround times for part processing and an increase in maintenance costs across multiple MRO sectors. "The industry needs to recoup the financial losses incurred due to Covid. By changing their business and MRO strategies, companies are looking at low-cost alternatives to new components and engines," asserts Akhtar. He adds, "The trend toward green-time engine leasing opens the door for growth in engine services across the globe, and also moves the aviation industry closer to a more sustainable way of doing business."

Panacea?

But what is green-time engine leasing, and can it be a panacea for airlines and aviation alike? "Green-time is the remaining life of an engine assuming no continued use at end of life," says David Archer, head of general aviation and aftermarket value at aviation consultancy IBA. "The idea being that a mature engine which may not be economically viable to repair can still contribute value by 'burning off' the remaining life through a shorter lease."

Or as Akhtar bluntly puts it: "Green-time engine leasing involves harvesting engines from newly retired aircraft tear-downs and using them with their useful life left, which could be anywhere between three and 36 months."



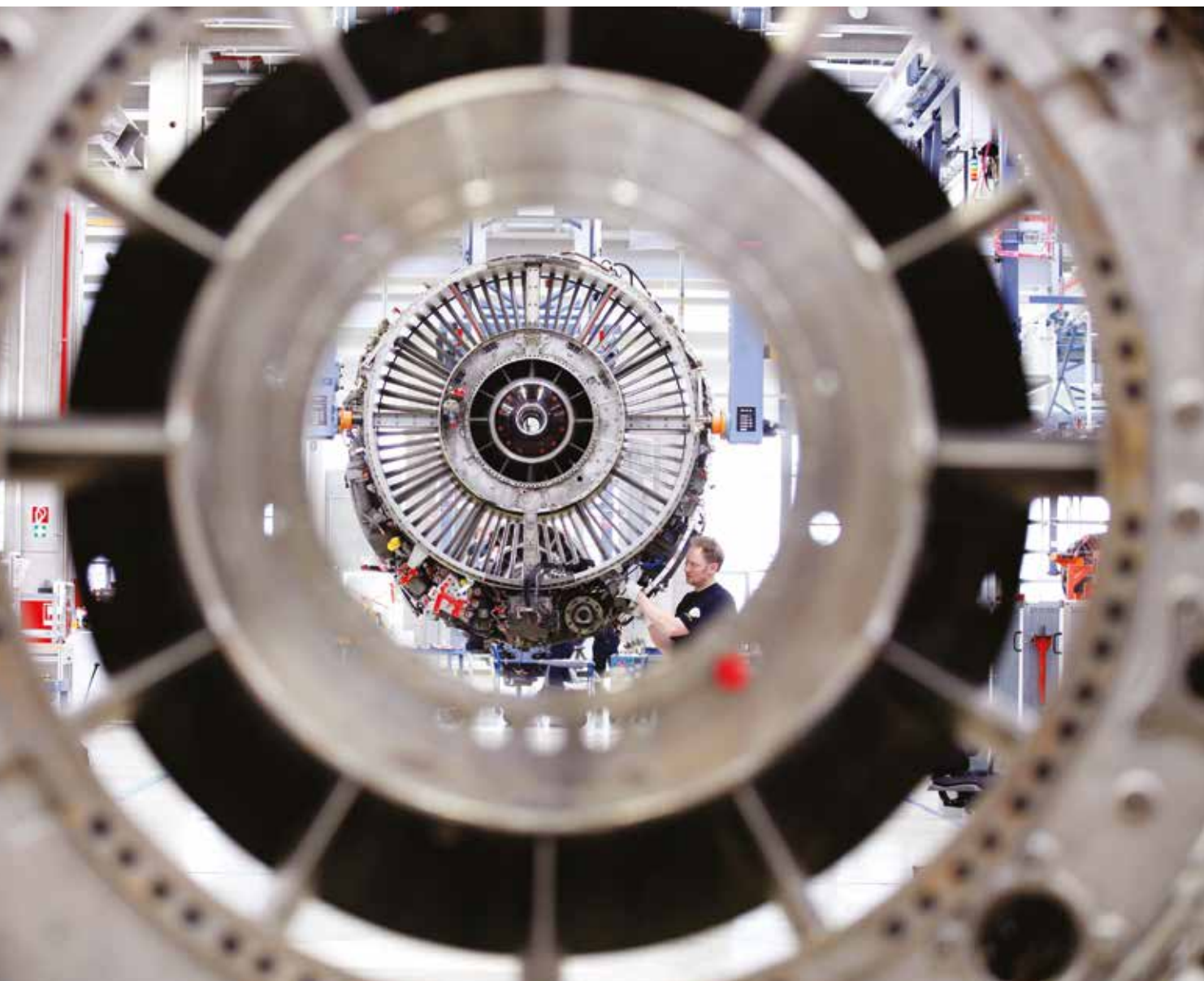
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He explains that having these engines with remaining time-on-wing allows the airlines to conserve cash and avoid hefty end-of-lease shop visits, or to bridge the gap in their operation when engines are undergoing any repair or downtime. "Airlines who own their assets could also be interested in green-time engines as it gives them flexibility, reducing downtime, and saving on maintenance costs," he says.

According to Vella, green-time engine leasing is a popular option for airlines that wish to avoid or postpone an expensive shop visit. "They can lease in an engine that is suitable for the remaining time they envisage the aircraft to remain operational or for long enough to keep the aircraft flying before committing to the significant cash outlay of the overhaul."



3



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GREEN-TIME ENGINE LEASING OPENS UP GROWTH ACROSS THE GLOBE

Financial considerations are at the heart of this scenario, as Vella explains. The operator will pay the engine lessor a fixed rent lease rate plus maintenance reserves for the hours and cycles operated. If an engine becomes unserviceable earlier than planned, a lessee could normally return the engine. In this case, they pay minor or no compensation to the lessor, as green-time engine leases usually contain no obligation to redeliver the engine in a

serviceable condition. (Excluding rare situations where the lessee has misused the asset or failed to perform the correct maintenance during the lease term).

User community

On the question of what type of airline customer is best positioned to take advantage of green time engine leasing, there is no definite list of airlines says Akhtar. “The subject is a very broad one, and hence it will vary depending on whether you’re discussing it with an airline or a lessor. Based on our experience, it will be the tier 2 and tier 3 airlines that work on utilising green time engines from the open market rather than going through engine repairs, which can be costly and time consuming.”

Archer agrees. “Most likely you are looking at operators of mature assets such as 737 Classic or early 737/A320s as examples where it is not worth investing in increasingly costly maintenance.” Typically, that means airlines with engines with between one to three years of life remaining before a shop visit is required, and sometimes even a little less, such as one summer season. Says Vella: “This fits within the optimal period that an airline would be better served financially by leasing in a green-time

1. Wasim Akhtar, director of engines, AJW Group
2. Green-time engine leasing can contribute to sustainability
3. Alex Vella, Magnetic Leasing’s COO



2

engine versus investing in a major overhaul of the existing engine.”

When looking at the most suitable engine candidates, Archer says the list is extensive. “Older examples include CFM56-3C, RB211-524, PW4000-94/100/112 and CF6-80C, but we are also now moving to the point that newer CFM56-5B, CFM56-7B and V2500-A5 are mature enough to see levels of this behaviour particularly as maintenance costs rise at such rapid rates.”

When an airline decides to enter into a green-time engine lease agreement, there are a number of specialists ready to assist carriers with flexible leasing solutions and support to meet the needs of individual customers.

As engine stock is constantly being refreshed, Vella says that when dealing with brokers/dealers, airlines will want to know “the commercial elements such as rent and reserve rates and understand the engine’s technical condition.” The redelivery conditions required at the end of lease are also assessed.

Engine life

Archer adds further considerations: “What limits are on the Life Limit Part (LLP) stack, how much exhaust gas temperature (EGT) margin remains at desired thrust, any inspection intervals that could disrupt operations – in general, an understanding of the remaining life of the engine and any potential issues that could impact its operation.”

That said, such conversations could be moot due to the current constraints

“OEM CURRENT PRICES WENT UP AT RECORD LEVELS IN 2023”

the market faces. “At present, we see a significant increase in TAT for major shop visits,” says Vella. “There is a shortage of labour as many experienced people left the industry during Covid. This has impacted not only maintenance facilities but also part repair facilities.”

The point is picked up by Akhtar: “There are also technical challenges facing maintenance teams dealing with Entry into Service (EIS) issues for newer technology engines. Lack of training and maintenance resources for technicians leaves maintenance companies unable to develop skills and technician knowledge for the newer engines. As a result, companies continue to service older legacy engines and are unable to move forward into servicing current technology engines, which results in these engines not coming to the market.”

“Looking at mature engines, the most obvious difficulty will be in material supply but this of course then feeds into cost,” according to Archer. New material will be too costly but, as fleets mature and increased levels of green-time leasing take place, the supply of good used material becomes very limited as has been experienced by a number of markets. This puts upward pressure on material and engine values if they are in good condition.”

Vella agrees, pointing out that, “as for the parts, they are in lower supply, with fewer engines disassembled in the past two years and higher scrap rates due to less experienced staff in repair shops.” He notes that OEM current low prices (CLP) went up at record levels for 2023; for example, the CFM56 & V25 LLP prices escalated by 12-13 per cent. Historically, these were around 6-7 per cent.

In general, as the market avoided shop visit events, there was significant increasing green-time demand, consuming large amounts of the remaining usable engines and material. “The lack of supply has led to stronger values and lease rates which in turn make green-time leasing less attractive,” says Archer. “However, OEM price escalation behaviour in the past year will likely help to counteract this.”

However, Akhtar offers a different perspective. “Before the pandemic, the demand for aircraft engines exceeded supply, resulting in costs related to the sale and leasing of engines soaring. As the travel industry was strong at the time, most airlines had the equity to fund new engines and did not see the need to lease green-time engines. Moving on two years, a significant decrease in global travel left airlines financially vulnerable and watching their bottom line, forced to retire fleets early. The result – a stock of healthy spare engine supplies.

“Having a good supply of cheaper, serviceable engines with favourable lease rates now available, the trend among airlines is to save costs by delaying the replacement or restoration of ageing engines and opting instead for the green-time engine leasing opportunities that are available.” 

1. David Archer, head of general aviation and aftermarket value at IBA

2. Parts are in low supply due to fewer engines disassembled in the past two years

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RETAINING THE ADVANTAGE

Paul Eden argues that, ironically, today's turboprops are likely to herald the next generation of propulsion solution – the future has propellers!

Always more efficient over shorter regional routes than a jet, the turboprop continues to provide essential connectivity to airports unsuitable for jet services.

Twenty-five years ago, regional airlines were looking towards a future where small-capacity regional jets would replace turboprops, delivering improved passenger experience and reduced flight times. Jets were modern and customers would embrace regional flying like never before, since propellers equated to 'old' and, therefore, 'less safe'; so long as fuel prices were favourable, the turboprop would remain in the jet's shadow.

Now, in an era where the imperative to reduce carbon emissions is usurping fuel costs, the turboprop is again recognised for its unsurpassed efficiency on regional routes. And, regarding passenger perception, Brad Cicero, director of communications and public affairs at Canada's Porter Airlines, says: "We are long past the turboprop versus jet conversation. It is a non-issue among passengers."

Porter Airlines was founded on Bombardier's – more recently De Havilland Aircraft of Canada's – Dash 8-400, or Q400. "It has been a critical component of our business and the experience we offer passengers. It enabled us to establish service in 2006

using Billy Bishop Toronto City Airport as our main base, taking advantage of its exceptional proximity to downtown. All 29 aircraft brought into service over the years continue to operate," says Cicero.

The Dash 8 typically works sectors with 1- to 2-hour flight times and, since jets are not permitted at Billy Bishop, the type was essential to Porter's foundation. Today, across all its Dash 8 routes, Cicero notes there is little to no flight time difference compared to a jet.

In 2006, Viking Aircraft acquired the type certificates for the previous line of de Havilland Canada products, including the DHC-6 Twin Otter and DHC-7 Dash 7 turboprops. In 2018, Longview Aviation Capital, Viking's parent, added the



1

1. De Havilland has plans to produce a revamped Dash 8-400
2. The ATR 42 is part of Loganair's fleet which serves a complicated network



While remaining faithful to the Dash 8, in February Porter expects to introduce the first of 50 firm-order Embraer E195-E2 jets

Q400 programme to its portfolio. Then in February 2022, De Havilland Canada (DHC) became the operating brand for the companies that previously operated as Longview Aviation, Viking Air, Pacific Sky Training and de Havilland Canada.

In September 2022, De Havilland Canada announced its plan to begin building the latest DHC-6 Series 400 model as well as a revamped Dash 8-400 at a new facility in Alberta, De Havilland Field. Meanwhile, a company spokesperson reports: "We continue to invest in the Dash 8 platform and support the in-service fleet. We've introduced a series of cabin enhancement initiatives to help refresh and modernise the cabin for passengers, while many operators are exploiting the Dash 8's long economic life by transferring their aircraft to cargo operations and De Havilland Canada offers cargo conversion solutions.

"For all initiatives, including sustainable propulsion technology, we evaluate the capability for retrofit and forward-fit so that all operators can maximise the value of their assets."

Loganair

While remaining faithful to the Dash 8, in February Porter expects to introduce the first of 50 firm-order Embraer E195-E2 jets. The airline has made a serious commitment to combined jet/turboprop operations, an area which Glasgow-based Loganair has long since

"THE TURBOPROP VERSUS JET CONVERSATION IS A NON-ISSUE AMONG PASSENGERS"

mastered. The regional carrier serves a complicated network with a diverse fleet of ATR 42 and 72, DHC-6 and Saab 340B turboprops, ERJ145 jets and piston-engined Islanders.

Loganair provides a snapshot of turboprop operations as it nears the end of a fleet renewal process later in 2023. Chief executive Jonathan Hinkles explains: "We started around 2018 when the Saab 2000s went. We found them complex and expensive to operate, but the Saab 340, which has been with us since 1999, has been the fleet mainstay. Now, maintenance costs as the aircraft have aged mean they are being withdrawn. We're down to five from a peak of 17, while ATR 72s have replaced four Saab freighters. I anticipate that the remaining passenger Saabs will have gone by September.

"We have an ATR delivery in March that will replace one of them and we are sourcing more ATRs to replace the rest; we're finding availability of ATR 72 aircraft easier than 42s. We should finish 2023 with 11 ATR 42-500/600 passenger aircraft, up from five -500s and two -600s; seven ATR 72-600 passenger

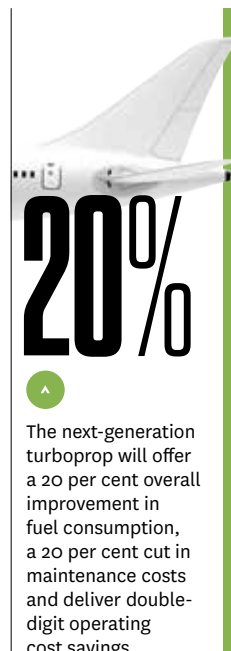
aircraft and four ATR 72-500 freighters; one Twin Otter Series 300 and two Series 400s; two Islanders; and 13 ERJ145 jets."

The mix of ATR variants creates fleets within the fleet, moderately complicating pilot training but not maintenance, as Hinkles notes: "There's no difference between the ATR 42-500 and 72-500, but the -500/-600 are quite different. We train and stream pilots according to variant and base. The only pilots who fly both are based in Aberdeen, while Dundee, Edinburgh and Inverness, for example, are -500 bases, and the Isle of Man is a -600 base. For the Twin Otter we train pilots onto the Series 300 and then they do a differences course onto the 400."

Loganair serves several airports unsuitable for the ERJ145, but the type plays an important role alongside the turboprops. "We use it on the longer north-south sectors and from Newcastle to Norway, where there is a significant delta in flight times between the turboprop and jet. There are other factors too, though. We fly the Norwich-Aberdeen service pretty much always with the jet, because with the ATR we can't take the direct route down the east coast.



2



“THE TURBOPROP IS ALREADY SIGNIFICANTLY MORE EFFICIENT THAN A COMPARABLE JET”

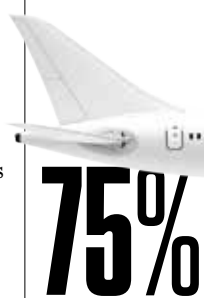
It's in airway space that begins at 26,000ft and the turboprop can't fly high enough to enter it, leading to a cross-country route around Birmingham,” Hinkles continues.

ATR

Considering the OEM's global customer fleet, ATR's Damien Eprinchard, head of product marketing, explains: “Today, there are more -600 aircraft in operation than all ATR legacy models combined, and our 24/7 technical and logistical support organisation works with customers daily to support them all – roughly 130 operators worldwide. Dispatch reliability is above 99.5 per cent on the -500 series, almost matching the 99.7 per cent of the -600.”

Its ATR 42-600 and larger 72-600 dominate the market for new regional turboprops, and Eprinchard expects demand to remain strong based on ATR's prediction of 2,450 new turboprop deliveries in the next 20 years. “The primary driver is the replacement market, accounting

↑
Porter has been a leader in initiating single-engine taxiing and working with partners to operate RNP-AR approaches



75 per cent of ATR's orders in 2021 were for aircraft to replace older-generation turboprops. Replacement opportunities also exist in the regional jet market

for 1,500 aircraft,” he says. “In 2021, 75 per cent of our orders were for aircraft to replace older-generation turboprops. There are also replacement opportunities in the regional jet market.”

All the traditional metrics, including economy in operation, reliability, safety and passenger comfort, remain critical to ATR's future offer, alongside sustainability, the new imperative that is driving fleet renewal and critical to expansion. Incremental improvements will keep the -600 aircraft viable until the ambitious EVO arrives.

Eprinchard again: “We recently introduced the new PW127XT engine. It offers a 20 per cent reduction in maintenance costs and a three per cent improvement in fuel consumption compared to the PW127M. It means 45 per cent less fuel burn and CO₂ emissions compared to similar-size regional jets and will soon become standard on all new ATRs.

“We've also announced plans for the ATR ‘EVO’ (for EVolution), the next generation of our aircraft family. We are working with airlines, engine manufacturers and systems providers and aim to launch the programme soon. This next-generation turboprop will offer a 20 per cent overall improvement in fuel consumption,

a 20 per cent cut in maintenance costs and deliver double-digit operating cost savings. It would enter service by 2030.”

While the next generation of regional aircraft is defined, Porter Airlines and Loganair are improving the sustainability credentials of their in-service fleets. “The turboprop is already significantly more efficient than a comparable jet, which is a real plus for emissions,” says Cicero. “And Porter has been a leader in initiating single-engine taxiing and working with partners to operate RNP-AR [required navigation performance – authorisation required] approaches.”

Performance-based navigation saves fuel and time in the air, reducing an aircraft's noise and carbon footprint compared to the traditional long, straight line final approach to landing. Cicero explains some benefits: “It saves up to five minutes of flying time at active airports, with projected savings of more than 500,000 litres of fuel and 2.2 million kilograms of CO₂ emissions annually throughout our network. It also means a significant reduction in overflights of Toronto residential areas – almost 34,000 residents will see their exposure to overflights reduced.”

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2

RESEARCHERS ARE EXPLORING A DIVERSE RANGE OF ALTERNATIVE PROPULSION SYSTEMS

sustainability programme including a mandatory carbon offset charge on each ticket. Its turbine fleet could use SAF, but Hinkles notes that limited availability makes fuelling with it almost impossible. “Offset is a short- to medium-term commitment,” he emphasises, “until we can replace it with net-zero technology, eliminating emissions at source.”

The availability of SAF is a challenge for Porter too, although De Havilland Canada has supported several Dash 8 operators in successful SAF trials. The spokesperson confirms: “Currently, some SAF blends are permissible up to 50 per cent across all Dash 8 models and DHC is an active member at ASTM in the development of pathways and specifications for drop-in and non-drop-in SAF.”

Meanwhile, Loganair’s ATRs burn considerably less fuel than its Saabs, and Hinkles notes another serious fuel saving possibility: “We’ve been very vocal about air traffic routing.

1. Loganair has a robust GreenSkies sustainability programme
2. De Havilland Canada has been involved with several SAF trials



The ATR route from Dundee to London City is convoluted and takes on average 20 minutes longer than the route from London City to Dundee, which is virtually a straight line

The ATR route from Dundee to London City, for example, is convoluted and takes on average 20 minutes longer than the route from London City to Dundee, which is virtually a straight line.”

Future propulsion

The propeller will almost certainly remain a feature of the next generation of short-haul regional airliner, but the nature of the propulsion system behind it remains open to development. For its EVO, Eprinchard says ATR is preparing for the immediate and medium-term. “We are looking at hybrid propulsion, new propellers, improved cabin and systems. The aim is to further reduce operational costs while offering a more responsible aircraft with higher performance. The ATR EVO will remain a twin-engine turboprop, but designed as the perfect platform for continuous innovation, so that future disruptive technologies can be integrated swiftly.”

Meanwhile, GE Aviation’s Italian Avio Aero business is building the AMBER hybrid electric technology demonstrator. It will combine electrical components, hydrogen fuel cells and advanced technology gas turbine systems operating on a - yet to be - selected aircraft testbed.

The programme’s focus is on developing the new engine architecture and a roadmap for technology maturation, including rig tests, by the mid-2020s.

In California, Universal Hydrogen is working on a hydrogen fuel cell conversion, initially for the Dash 8. It is expected to fly with liquid hydrogen fuel during 2023; the company already has orders to convert in-service Dash 8 and ATR aircraft for several operators.

Brad Cicero says Porter is following sustainability projects from DHC, Pratt & Whitney and Embraer.

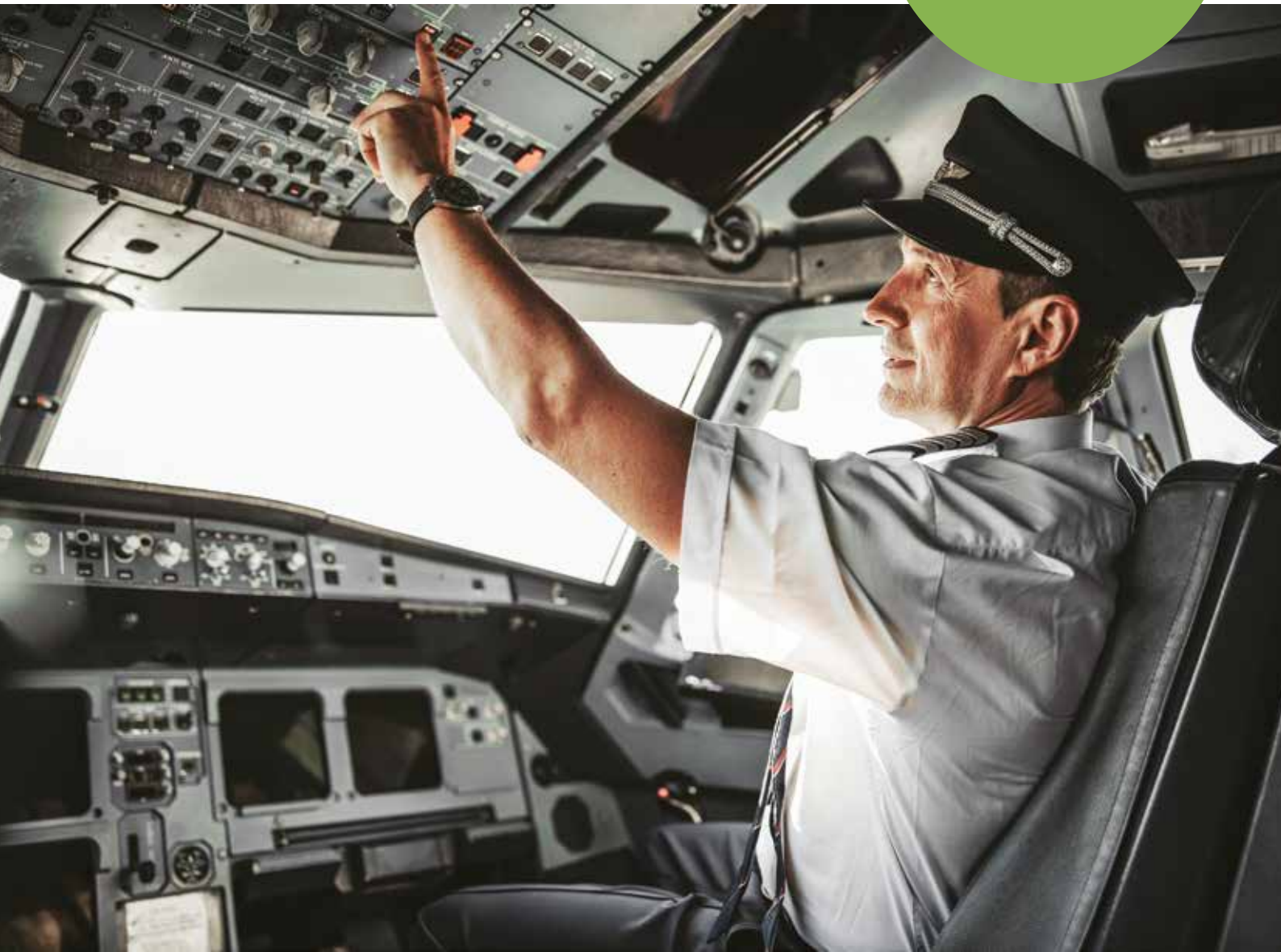
Loganair has been actively involved in trials with hydrogen, electric and hybrid propulsion. Hinkles and the team are keeping a close eye on developments and, to a degree, helping pioneer a new era in regional air transport. They are determined to reach net-zero, an ambition shared by the AMBER team, which is looking to accelerate the development of technologies that could enable a hybrid-electric powered aircraft benefitting from a low-emission thermal engine capable of burning SAF, and an electric motor powered by hydrogen fuel cells.

Whatever the net-zero solution, the next-generation replacement for the turboprop is likely to be... a turboprop.

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Patrick Edmond, formerly group strategy director at Shannon Group and managing director of Shannon's International Aviation Services Centre (IASC) industry cluster, leads the Altair consultancy



Wizz Air says it plans to buy 185,000 tonnes of sustainable aviation fuel between 2023 and 2030



TAKING OUR TIME

Some things seem to happen pretty much every day. The sun rises and sets. There's another Twitter drama. And an airline announces a contract to buy a seemingly large amount of sustainable aviation fuel, reports **Patrick Edmond**

To take just one recent example, in November Wizz Air announced that it will purchase up to 185,000 tonnes of sustainable aviation fuel (SAF) between 2023 and 2030.

Let's put that in context. That's about 1.5 per cent of Wizz Air's current fuel consumption – not considering future fleet expansion. The EU's 'blending mandate' currently calls for a minimum 2 per cent of SAF by 2025 and 5 per cent by 2030. So, in other words, this SAF order is not even enough to reach the regulatory minimum: Wizz Air will have to buy more in the years ahead.

Don't get me wrong. It's good that airlines are buying SAF, and this will rapidly become the new normal. But the growing salience of environmental issues results in a lot of press releases like this one, which basically just says 'Airline

takes action to partially meet regulatory standards', but dresses it up in green.

By coincidence, around the same time as that Wizz Air press release, airline marketing consultancy Simplifying released a report on how airlines can 'avoid the greenwashing trap' in their sustainability communications.

The report warns that the airline industry may end up like Big Tobacco, for example with regulatory limits on its advertising. Simplifying suggests this will at least partly be self-inflicted, a result of airlines' poor sustainability messaging. It proposes two ways for airlines to communicate their sustainability efforts better:

- 'Tell the story' – put a narrative around the sustainability actions to make them more compelling to consumers;
- 'Don't mark your own homework' – have the sustainability programme validated by an expert third party such as SBTi, the Science Based Targets Initiative.

The consultants focus on the comms part of the puzzle, understandable since that's their speciality, and this is good advice

as far as it goes. However, in my view, we need to zoom out much further.

I fear that the prospect of aviation becoming a social pariah with its advertising or its growth restricted is an increasingly plausible outcome. That's not just a communications failure, but a much more fundamental failing: it's because a large part of the industry just isn't taking sustainability seriously.

Take offsets. Offsets have surged in popularity in recent years: they seem to be a simple, cheap 'solution' enabling 'business as usual' to continue. Indeed, many airlines' current 'sustainability' initiatives are centred on trying to sell passengers dubiously cheap offsets for 'guilt-free flying'. Compensate a Ryanair European flight? €1-2. A Norse Atlantic transatlantic? US \$6.

Awkwardly, though, SBTi stipulates that companies targeting net zero shouldn't use offsets to compensate for more than 5-10 per cent of emissions. That message hasn't reached the International Civil Aviation Organisation (ICAO), whose recently agreed 'Long Term Aspirational Goal' of net-zero by 2050 relies very heavily on offsets, demonstrating that, just like in the recent COP27 negotiations, the lowest common denominator between nearly 200 countries tends to be very low indeed.

Aviation is not yet at the Big Tobacco pariah stage. But every airline or UN agency that pretends no significant change is needed, and that there's an easy solution which will put only a few dollars or euros on the price of a ticket, is nudging the whole industry closer to that unhappy state and postponing any new dawn of sustainable aviation. 

“A large part of the industry just isn't taking sustainability seriously”

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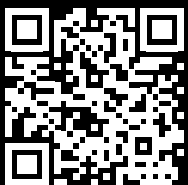
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