

Issue

2

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FLIGHT EVENING NEWS

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Overair president Benjamin Tigner: electric flight is "very compelling"

NBAA in 2050 net-zero pledge

NBAA today vowed to double down on sustainability, promising that business aviation would be an industry with net-zero emissions by 2050.

The goal aligns business aviation with the commercial airline industry and resets NBAA's previous commitment to halve net carbon output by 2050.

"We will be carbon-neutral by 2050," NBAA chief executive Ed Bolen said at an event this morning. He outlined how the industry might achieve that ambitious goal, with sustainable aviation fuel, new propulsion technology and operational efficiencies.

Pete Bunce, Bolen's counterpart at the General Aviation Manufacturers Association, noted that business aviation is tracking at 2% annual efficiency gains over the next decade.

NBAA also named Martine Rothblatt (pictured) as winner of its "Meritorious Service to Aviation Award". Rothblatt helped found the company that became SiriusXM, which provides satellite-based weather information to pilots, and healthcare company United Therapeutics.



Electric charge

eVTOLs could be bigger than business aviation, vow developers

Jon Hemmerdinger

Electric air taxis have descended on the show this year, with several developers promising the emerging sector could soon eclipse traditional business aviation in size.

The start-ups, exhibiting in an advanced air mobility zone, insist that electric vertical take-off and landing (eVTOL) propulsion technology has sufficiently progressed to make "advanced air mobility" (AAM) viable, and capable of carrying fare-paying passengers over congested cities within years.

"The world of urban air mobility is quite possibly going to be even larger than today's business aviation community," claims Benjamin Tigner, president of Overair, a California company developing a six-seat, two-winged eVTOL with four props called Butterfly.

Overair aims for Butterfly, which will have about 87nm (161km) of range and 174kt (322km/h) top speed, to be certificated around 2025.

Tigner calls electric flight "very compelling... for today's business aviation industry", noting the aircraft can connect city downtowns to business aviation airports.

That is a message NBAA chief executive Ed Bolen gets behind.

"The embrace of this technology is very fundamental to business aviation," he says. "Business aviation has always been about getting people where they need to be, when they need to get there."

Next to Overair's booth, Silicon Valley aviation technology start-up Kitty Hawk is displaying its single-seat eVTOL, Heaviside.

"We want to make this a ubiquitous and equitable type of transportation service," says Kitty Hawk director of flight operations Chuck Taylor. "From a traditional aviation perspective, it's really pushing the boundaries to make things cheaper and more effective."

Heaviside, an eight-rotor electric-powered autonomous aircraft that has a range of about 87nm and can fly at speeds of up to 156kt, was launched in 2019.

"Several dozen" have already been built and flight testing is well under way, Taylor says. The company hopes to begin testing the aircraft with passengers "in the next few months".

The Palo Alto-based start-up, backed by Alphabet's co-founder, Larry Page, is looking to establish an eVTOL market that will be accessible to a large swathe of the population.

Other companies exhibiting in the advanced air mobility zone include aircraft developer Jaunt Air Mobility and avionics heavyweight Honeywell.

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FSI and GE Digital double up on data

FlightSafety International and GE Digital are teaming up to deliver data-driven training that cuts flight risks.

Under the partnership, announced today, GE Digital will provide corporate flight operations quality assurance (C-FOQA) insights to FlightSafety, which will use them to “enhance training and ensure pilots are prepared for any possible threat, before these risks are real”. FlightSafety says more than 300 operators, responsible for more than 1,000 aircraft, are part of the “C-FOQA community”, able to use automatic processing of flight data with a library of more than 200 events that monitor everything from incidents where aircraft limitations are exceeded to advanced risk-based modelling.

“Actual flight data will allow us to tailor training to address safety threats before crews even experience them,” says Brad Thress, president and chief executive of FlightSafety International. “FlightSafety employs a risk-based approach to training and partnering with GE Digital for their C-FOQA data will have incredible applications for us on approach stability, touch down point control, procedure compliance and runway safety, among others.”

Thrive shops local



Longitude is the largest in the Cessna Citation series, seating 12.

Textron Aviation

Las Vegas-based Citation operator signs for three Longitudes

Pilar Wolfsteller

Thrive Aviation did not have to come far to sign a deal for three more Textron Aviation Citation Longitudes at the show – the private charter operator is based here in Las Vegas’s Henderson airport.

First delivery will be in December, with Textron saying the order will boost Thrive’s fleet of Citations to 15. The company already operates Cessna Citation Longitude,

Sovereign+, XLS+, CJ3+ and M2 types.

“Our relationship with Thrive continues to grow,” says Lannie O’Bannon, senior vice-president, global sales and flight operations at Textron.

“As they expand their operations, the Longitude will provide the lowest direct operating cost of any super-midsize jet.”

Thrive says that the private jet landscape has changed in the past 18 months, and that it has more than doubled its fleet during that time.

“With the addition of three more Longitudes to our fleet, we are better equipped to serve our growing demand nationwide,” says Scott Musselwhite, Thrive’s senior vice-president of commercial aviation.

The Longitude was launched at BACE in 2015, and certificated in the USA in September 2019. The jet is the largest in the Cessna Citation series, and seats 12. It has a range of 3,500nm (6,480km) and is powered by FADEC-equipped Honeywell HTF7700L turbofan engines.

Bombardier lines up Signature Aviation for joint service offer

Bombardier and Signature Flight Support are to together offer a suite of services to operators of Bombardier business jets, in a partnership involving joint service offerings and promotion of sustainable fuel.

A memorandum of understanding between the companies calls for Bombardier’s mobile response team to be available at some of Signature’s facilities in the USA and Europe. “This will ensure customers have quick access to OEM service capabilities for maintenance events and other critical aircraft needs,” Bombardier says.

The Montreal airframer’s mobile team deploys on short notice to address maintenance issues keeping aircraft on the ground.

Signature and Bombardier “envison to further evolve this initiative through jointly collaborated response to [aircraft on ground] events and faster access to Bombardier [mobile response] personnel”, the companies say.

Additionally, the agreement involves



Jean-Christophe Gallagher (left), executive vice-president services and support and corporate strategy at Bombardier, and Tony Lefebvre (right), interim chief executive at Signature Aviation, celebrate their companies’ partnership agreement

Signature being a “preferred concierge service provider” at Bombardier service centres in the USA and Europe – a move announced earlier this year. Signature is currently the preferred provider in Tucson, Hartford, Fort Lauderdale, Dallas and Wichita in the USA, and at London Biggin Hill airport.

Florida fits for FACC in America

Austrian airliner cabin fittings manufacturer FACC is increasing its presence in the US business aviation market by opening a site in Melbourne, Florida, home to several companies in the sector, including Embraer.

The company, which is exhibiting at BACE, is expanding its aftermarket services division to include the refurbishment of cabin interiors for business jets.

FACC says it offers customers a “broad portfolio”, from minor repairs of tables, galleys and seats to “high-end” refurbishments and customised modifications.

The Melbourne facility joins those in Ried, Austria, and Montreal, and will allow FACC to “optimise the time span for refurbishment and modernisation projects while always meeting the latest standards in the business aviation industry”, says William Jewer, director business aircraft, FACC aftermarket services.

Storm shuts static

The static aircraft display reopened to visitors today after weather-related safety concerns forced the closure of Henderson airport.

In a statement yesterday, NBAA said: “Due to a high-wind warning at Henderson Executive airport, with expected gusts of up to 100km/h (60 mph), [we have] made the decision to discontinue all aircraft operations and other activity at the airport, in accordance with the association’s focus on the safety of all exhibitors and attendees.”



Frederic Lemos: "Market is coming back in North America"

Airbus buoyed after helicopter sales jump

Airbus Corporate Helicopters (ACH) is expecting a "stellar" year in 2021, buoyed by a broad sector recovery that seems likely to push the company's orders well beyond 2020 figures.

The executive division of the helicopter maker logged orders for 43 aircraft in the first half of 2021, a strong start for a year characterised by increasing demand for all types of corporate aircraft, Airbus executives said at the show.

The strong start to 2021 follows a year during which ACH logged a total of 62 orders – a tally that included 22 ACH125s, 19 ACH130s, four ACH135s, 15 ACH145s and two ACH160s.

Airbus Corporate Helicopters received orders for 66 aircraft in 2019.

"It looks like a stellar year," says ACH head of marketing Nitin Sareen. "I think we are getting back to the 2019 market. The market is very dynamic."

Of its 43 orders in the first half of 2021, nine were from North American customers. ACH logged 13 orders from North American customers last year, including for five ACH125s, one ACH130, six ACH145s and one ACH160.

"That shows that the market is coming back here in North America," says ACH head Frederic Lemos. ACH's top markets are the USA, Europe and Brazil.

Steve Spatafore/BillyPik

VerdeGo green to go on new engine

Hybrid powerplant developer says it has carried out more than 500 tests of prototype in the past year

Pilar Wolfsteller

Propulsion specialist VerdeGo has validated its VH-3 hybrid powerplant with a series of tests, bringing the industry one step closer to electrification of aviation and sustainable flight.

The Daytona Beach-headquartered company says that it has performed more than 500 full-scale tests of its prototype since mid-2020. These included endurance tests of up to six hours, and at temperatures between 29°C (85°F) and 31°C.

The low-fuel-consumption powerplant, it says, performed to all expectations during the campaign.

Testing was done simulating hover conditions – zero airspeed, with all cooling systems operational – "which is the most challenging case for powertrain cooling and efficiency," VerdeGo says.

"The resulting specific fuel consumption (SFC) was 227g/kWh at 150kW of output, with a very flat efficiency curve that demonstrates high efficiency during all phases of a typical flight," VerdeGo says.

That translates to about 0.37lb/hp hour. The SFC of competing turbine hybrid powerplants is 49% to 76% higher than that, VerdeGo says.

The company is working with electric vertical take-off and landing (eVTOL) developer Jaunt Air Mobility on its hybrid air taxi, which Jaunt hopes to certify by 2026. That aircraft will have twin VH-3 powerplants.



VerdeGo

VerdeGo is hoping to validate the VH-3 for 100% SAF

While the VH-3 runs on conventional fossil fuels, VerdeGo is also preparing it for the future.

"Our latest experimental data for efficiency, combined with models of operating cost for next-generation aircraft, shows that the VerdeGo VH-3... can be paired with sustainable aviation fuels to offer the highest performance, lowest technology risk, lowest-cost method of achieving low or zero net carbon emissions," says VerdeGo chief executive Eric Bartsch.

The company is working on validating the engine's compatibility with various blends of SAF and fossil fuel, as well as a 100% SAF option. The hybrid VH-3 can be used for passenger, cargo, autonomous, civilian, and military next-generation aircraft and will be available for non-certified applications in late 2023, with certified powerplants available two years later.

Refreshed G650 gets new Flying Colours



Charcoal carpet contrasts with the pearl leather seating

Canadian completions firm Flying Colours is highlighting a cabin update on a Gulfstream G650 that it carried out over the summer.

As part of the project, six single seats, two double seats and a three-piece divan were stripped to the frames and rebuilt with new foam cushions, then sanded and painted to match the new trims. Seats were covered in a pearl-coloured leather, with the seat backs featuring a contrasting textured material.

The divan was recovered with a pearl fabric. An Ultraleather cabin curtain and reupholstered front and aft lavatory seats were included. Flooring was removed and replaced with a smoked charcoal coloured carpet.

"This aircraft had previously been painted by Flying Colours, and the customer was so delighted that they brought it back for the interior work. Repeat business is the highest accolade we can be paid, and the gorgeous new interior is as breathtaking as the exterior," says executive vice-president Eric Gillespie.

Flying Colours

Fly-by-wire puts Praetors in front

Embraer highlights exclusive features of super-midsize pair



The Praetor 600 arrives at Henderson on Sunday

John Hemmerdinger

Three years after their launch, Embraer's Praetor 500 and 600 are back at NBAA. So is Embraer's message: that Praetors lead the super-midsize segment in technology and performance.

"This airplane has features you will only find in much bigger and more expensive airplanes," says Embraer Executive Jets director of product strategy Alvadi Serpa.

He points to the Praetor's fly-by-wire (FBW) system, which Embraer developed in house and which prevents dangerous manoeuvres but otherwise leaves full control in the pilots' hands. The system has "hard" limits that pilots cannot override; these prevent, for instance, stalling or exceeding speed or load limits, Serpa says.

The FBW also has "soft" limits on parameters like bank angles. Pilots can override them, but the system

returns the jet to within those limits when pilots release the stick.

"Theoretically, a pilot could do a barrel roll with this airplane, as long as he stays within the hard limits," Serpa suggests.

The system continually senses the aircraft's flight profile, making corrections to counter flightpath variations. That means a smoother ride through turbulence, according to Serpa.

He stresses that comparable FBW systems are found only on more expensive longer-range business jets like Gulfstream G500s and Bombardier's \$75 million Global 7500. "We offer that technology on a \$21 million super-midsize aircraft," Serpa says.

Praetors can take off in shorter distances than competing jets; with full fuel and four passengers, Praetor 600s need 1,352m (4,436ft) of runway, says Embraer. This enables the aircraft to operate from short-runway airports like Santa Monica, Miami-Opa locka, Rio de Janeiro's

downtown airport, and Saint-Tropez. "We have the runway performance of a light jet," Serpa says.

Embraer launched the Honeywell HTF7500E-powered Praetors at the 2018 NBAA-BACE in Orlando. It manufactures Praetors, which are Legacy 450 and 500 updates, in Brazil, completing them in Melbourne.

The 8-12-passenger Praetor 600 is based on the Legacy 500 but has two belly tanks capable of holding 1,361kg (3,000lb) of fuel, bringing range to 4,018nm (7,441km), up from 3,100nm for Legacy 500s. The 600's engines have 500lb (2.2kN) more thrust than the Legacy engines.

Praetor 600s can fly routes like Miami-Sao Paulo, Santiago-Fort Lauderdale and London-New York. "It's not just a marketing number," Serpa says of advertised range. "It's a practical number."

The 7-9-passenger Praetor 500 has additional fuel cells in its wings, giving 3,340nm of range, up from the Legacy 450's 2,904nm.

Cabin length is 7.3m (24ft) for the 500; 8.4m for the 600. A Praetor 600 might be outfitted with one divan and six club seats; pairs of club seats can be folded into beds, meaning 600s can sleep at least four people.

Embraer gave Praetors auto-throttles and head-up displays. An enhanced vision system with three cameras uses an algorithm "to display the best image possible on the head-up display, so that in bad weather, terrain, poor-visible conditions, you can have a clear view", says Serpa.

"That's a piece of technology that you will only find on much bigger airplanes, much more expensive airplanes."

The jet's cabin pressure is equivalent to 5,800ft when cruising at 45,000ft, and 4,800ft at 41,000ft. "Very few airplanes in this market have such a low cabin altitude," Serpa says. "In practical terms, that means when we get there we will not be as tired."

Universal aims to open up awareness of Aperture

Aperture is a sensor fusion and augmented reality (AR) platform from Universal Avionics (UA), designed to provide improved situational awareness and thus aid decision making by flight crews and mission specialists. Initially oriented towards multi-sensor video management, this product family can process a variety of video and sensor inputs to deliver real-time content analysis, such as visual positioning, obstacle detection, taxi guidance and traffic awareness.

Certification and delivery is scheduled for the third quarter of 2022. The initial release

of Aperture will process eight video inputs supporting up to four video outputs with near zero latency at Design Assurance Level A, the highest criticality attainable in aviation.

Aperture's advanced video processing and flexible design provides unique capabilities, claims UA, whose parent company is Elbit Systems. It can, for example, stitch and blend multiple sensor inputs to provide a 360° composite visual to flight crews wearing Elbit's SkyLens head-wearable display (HWD), which is used on ATR aircraft as part of the ClearVision system.

Meanwhile, UA has also announced the launch of its FlightPartner and FlightReview applications. Hosted on an iPad and initially connected to UA's WAAS/SBAS1-enabled flight management system (FMS), these applications make possible comprehensive two-way interactions between the FMS and the apps, and between the tablet and UA's cloud-based infrastructure for data analytics.

The applications will be available by the end of the first quarter of 2022 and are the first step to UA's goal of creating a connectivity-enabled ecosystem across its avionics solutions.

Constant adds three more US response sites

Constant Aviation has expanded its AOG (aircraft on ground) mobile response network in the US to 27 locations with the addition of three new sites at Van Nuys, California; Bedford, Massachusetts; and Sugar Land, Texas.

The company's AOG service has been expanding rapidly in 2021 because of growing demand stemming from increased private aviation activity.

During this year, technicians have been called from the AOG centres to more than 300 airports to provide repair, maintenance or avionics services or to help return to service aircraft that had been parked during the most severe periods of the Covid-19 pandemic.

Constant Aviation AOG mobile teams now support 86 aircraft models from 14 manufacturers, and each AOG vehicle is fully equipped and supplemented with expanded tooling strategically placed around the country, so aircraft can be serviced wherever they are located – whether in a hangar, at an fixed-base operator or on a ramp.

In addition to its nationwide network of mobile technicians, Constant Aviation operates full-service aircraft maintenance facilities at Cleveland Hopkins and Orlando Sanford airports, where it provides airframe and engine maintenance, major repairs, avionics, interiors and painting.

Thrust reverser first for Liebherr

Liebherr-Aerospace is to supply the thrust reverser actuation system for the Rolls-Royce Pearl 10X engine, selected for the Dassault Falcon 10X.

It is the first time Liebherr will have built a thrust reverser and the German manufacturer describes it as "an important milestone in the company's history".

Liebherr, which specialises in landing gear, flight controls, actuation and gearboxes, will supply the component, manufactured at its Lindenberg facility in southern Germany, to Spirit AeroSystems.

Although developing a thrust reverser is a first for Liebherr, the company says it profits from a "knowledge of hydraulic and mechanical actuation that is proven by uncountable flight hours in commercial and business aviation".

The Pearl 10X is one of three variants of the Pearl family, which also powers the Bombardier Global 5500 and 6500, as well as the new Gulfstream G800.

ViaSat offers direct connectivity plan

Bernie Baldwin

Viasat is now offering a new direct service model for business aviation Ka-band inflight connectivity (IFC).

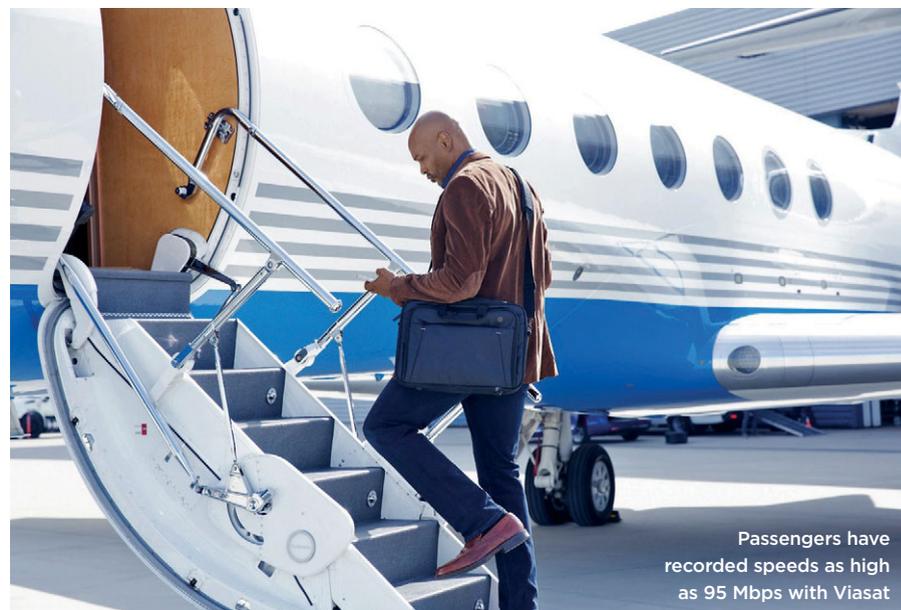
Viasat Select tailors service plans to a business aircraft's specific operational profile. The new model includes global and regional unlimited plans that feature uncapped data paired with Viasat's "No Speed Limit" Ka-band IFC.

James Person, Viasat's senior director, global business development for business and VVIP aviation, says that Viasat Select brings "an unprecedented combination of performance, flexibility and value" to this market segment.

"The flexibility comes in those plans for regional operators. If you have a super-mid-cabin aircraft based in Europe or the USA, you are primarily going to keep it in Europe or the USA. So we have regional plans for them," Person says.

"Flexibility also comes from the fact that, for the first time, operators can get this directly from Viasat. In the past, they were limited to going through one of our resellers."

Last year, Viasat decided to uncapped its IFC speeds, which has attracted considerable attention. "In the past, you might pay more if you wanted faster speeds, but now with Viasat you will typically get greater than 20Mbps to the cabin. We have people do speed tests and send us their results on social media and



Passengers have recorded speeds as high as 95 Mbps with Viasat

Viasat

Company says Select service combines performance, flexibility and value

they will see 40Mbps, 50Mbps and even 95Mbps to a business jet," Person reports.

"What we are also doing within Viasat Select is offering some unlimited plans in terms of the amount of data you can use. Users no longer have to worry about whether they have multiple devices streaming. Or if it's a large cabin aircraft with multiple people on board every day, they don't have to worry about how much data they

are consuming because now there's an unlimited plan.

"If you are a large-cabin operator on a global plan, you can get an unlimited plan for under \$14,000 a month, which for business aviation is an attractive price," he continues.

"If you are in the super-mid-size, our initial plan there includes 15Gb of data and it's under \$3,000 per month – nobody comes close to that."

CAE opens up for Las Vegas training

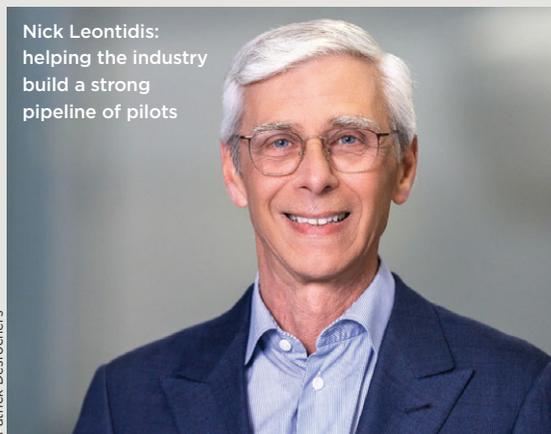
CAE is to open its first West Coast US training centre for business aircraft pilots, here in Las Vegas. The facility, which the Canadian company says meets its objective of being close to where customers operate their aircraft, will open in summer 2022.

The site, which is under construction, will house eight full-flight simulators, including at least one Gulfstream G550 and G650, and Bombardier Global 7500.

"This new training centre is an important addition to our global network, and underscores our

commitment to helping the industry build and grow a strong pipeline of pilots," says Nick Leontidis, CAE's group president civil aviation training solutions.

Nick Leontidis: helping the industry build a strong pipeline of pilots



Patrick Desrochers

In brief...

Bombardier picks Collins for support

Bombardier has chosen Collins Aerospace as its preferred service provider for fleet-wide connectivity services.

Under the agreement, customers who subscribe to Collins' ArincDirect flightdeck and cabin connectivity services can view and manage their connectivity subscriptions through ArincDirect digital tools, which will be integrated into Bombardier's digital platform.

Bombardier operators will also benefit from on-site support from ArincDirect representatives at the airframer's service facilities.

Five up for St Paul

Duncan Aviation's St Paul satellite facility in St Paul, Minnesota has installed its third Garmin G5000 integrated flightdeck in a Textron Aviation Citation Excel. It is Duncan's fifth overall such project.

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FLIGHT OPERATIONS, SIMPLIFIED.

A virtual reality tour of its BR725 is on offer on the UK propulsion specialist's booth

Murdo Morrison

Rolls-Royce is offering visitors to its stand a chance to get under the skin of its BR725 – the engine that powers the Gulfstream G650 – using virtual reality goggles. The technology from the UK-based propulsion specialist allows technicians and others to study the inner workings of the powerplant remotely, avoiding the need to attend in-person training sessions.

Rolls-Royce launched the feature – which it plans to extend to other engines including the Pearl family and the BR710 – in July last year. The timing, while hugely beneficial during a time when lockdowns and border closures meant many employees were unable to fly, was coincidental.

“We didn’t develop this because of Covid; we were launching it anyway. But the particular circumstances of the past 18 months have helped to make it a success,” says Andy Robinson, senior vice-president services, business aviation.

According to Robinson, the experience is more effective than a face-to-face demonstration. “With a real-life engine, you can’t strip it down to the level we can with virtual reality,” he says. While technicians will need hands-on training to become certified to work on an engine, the virtual version has been “hugely successful” with brokers, who want to understand its workings, says Robinson. Rolls-Royce’s own sales team have also been through the virtual course.

Rolls-Royce is also exhibiting Pearl 700 components on its stand as it highlights the “continuing success” of the Gulfstream G700 flight-test programme. The campaign has suffered some bumps, however. In July Phebe Novakovic, chief executive of the airframer’s parent General Dynamics described the Pearl 700-powered G700’s certification effort as “difficult”, but insisted the large-cabin, ultra-long-range jet remained on track for service entry in late 2022. And that has also not stopped Gulfstream



Robinson: Initial lockdown in 2020 led to an unexpected surge in demand for engine maintenance

Rolls-Royce’s X-ray vision engine

selecting the Pearl 700 to power the new G800 as well.

It has been a very good year for Rolls-Royce’s flagship business aviation engine family. In May, Dassault became the latest airframer to commit to the powerplant when it chose the Pearl 10X variant to power its Falcon 10X, its largest business aircraft yet, due to reach the market in 2025. It means that all three ultra-long-range jet families will feature Rolls-Royce propulsion, with the exception of Bombardier’s GE Aviation Passport-powered Global 7500.

In August, Rolls-Royce delivered

its 100th Pearl 15 to Bombardier. The engine powers the Global 6500 and Global 5500, unveiled in May 2018 as successors to the BR710-powered Global 5000 and Global 6000.

Robinson says the past 18 months have been challenging for Rolls-Royce’s service operation, but not necessarily in the way its managers thought would happen. “When we saw the drop-off in flying in April 2020, a trend we were not expecting was that customers became very proactive about maintenance, and there was a surge in demand. That was as we were preparing as a larger organisation for short working

weeks and furloughs,” he says.

Supporting all that hangar activity when much of aviation was grounded and technicians could not travel was not easy, but Robinson says his department achieved it by “being extremely creative”. Teams travelled by road rather than air. “One time, for an AOG [aircraft on ground], we drove from Berlin to Vienna to change a fan belt,” he says.

Quarantine was another obstacle. Engineers who did travel abroad often had to isolate at home on return. And lack of airline freight capacity was another when it came to transporting parts. “There were times when we had to charter aircraft, to get a team to the Maldives, for instance,” says Robinson.

Robinson says the rebound in business aviation this year has been “much quicker than we predicted” and that the roughly 3,650-strong Rolls-Royce-powered fleet is now back to more than 100% of its pre-pandemic flying hours. That is all the more remarkable, he says, because Rolls-Royce engines power larger jets that tend to fly internationally, and many travel restrictions still apply.

Another important theme for Rolls-Royce at this year’s show is the push to reduce the industry’s carbon footprint, particularly efforts to promote sustainable aviation fuel (SAF) and develop more environmentally friendly forms of propulsion.

In June, Rolls-Royce said it was joining with Shell to progress the use of SAF in aircraft engines. It includes promoting the engine company’s SAFinity service, for which Rolls-Royce purchases fuel to supply to the market, with Shell as exclusive fuel provider. Rolls-Royce has also been developing so-called energy storage systems that enable aircraft to perform short-range zero emission flights on a single charge.

“All our engines can run on at least 50% SAF, with the Pearl 700 able to run at 100%,” says Robinson. “We are the only [engine maker] committing to buy SAF. We are hoping that will help boost demand and availability, which have been among the barriers to its wider use.”



The virtual reality tool allows participants to grasp the inner workings of the engine



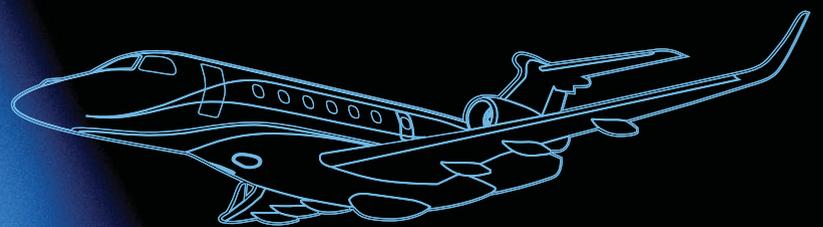
The Pearl family now powers jets from Bombardier, Dassault and Gulfstream

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FlightSafety International has been a leader in business and general aviation training since the 1950s, but changing times mean a different strategic approach for its new chief executive



Upset recovery and go-arounds are two areas FlightSafety is focusing on

Murdo Morrison

FlightSafety International has long been synonymous with pilot training and promoting a culture of safety in aviation – the clue is in the name. Along with CAE, it is one of two prominent providers of simulator instruction to business and general aviation, although, unlike its larger Canadian rival with its extensive airline business, the sector represented at BACE is FlightSafety's major focus.

However, as it celebrates its 70th anniversary, FlightSafety is undergoing a transformation under chief executive Brad Thress, who joined 18 months ago from Textron. Its original ethos remains, but Thress is concentrating the company's offer on areas and behaviours that typically cause accidents, many of which he believes are not sufficiently covered by minimum regulatory requirements.

In addition, after shedding a non-core business late last year – FlightSafety's large ab initio flight school in Florida – Thress is investing in technology that will allow the business to manage its simulator capacity more efficiently across its US network, and updating the brand and its many touchpoints, such as its website.

All this on top of having to chart a course through an ongoing pandemic that has at times not only disrupted customers' ability to travel to training sites, but made the Berkshire Hathaway-owned company's main activity – simulator-based training with two strangers sharing a confined space for hours

at a time – difficult to carry out.

While the industry has made in-roads when it comes to remote tuition, simulator training "does not offer a tremendous capacity for colleagues to work at home", notes Thress. The business's priority when Covid-19 struck was to "protect the safety of clients and instructors, and put protocols in place".

With 31 locations across 16 US states and five other countries this meant dealing with a "patchwork" of local and national rules, but "we pulled it off", says Thress. "Our Covid statistics are better than for the nation as a whole. We are scrupulous about cleaning, and strict about checking for symptoms. We keep colleagues out of the simulator even if they have a cold."

Like many across the industry, FlightSafety took an initial heavy hit from Covid-19, plummeting to half its forecast revenues in April 2020 before "recovering slowly". Sales from the US market are back to 2019 levels, thanks to a strong domestic recovery in both business and regional aviation – about a fifth of FlightSafety's business comes from regional jets such as the Embraer E-Jet family.

The bounce back in Europe has been more sluggish. FlightSafety's overseas network includes large facilities at Farnborough airport, near London, and Paris Le Bourget, but there is a narrower range of types than in the US, and the region's business aviation sector has also been affected by a plethora of travel regulations that has made, until very recently, intra-European trips complicated.

Thress says his three "pillars"

for FlightSafety are: "World-class instruction, advanced technology to deliver customised training, and the creation of an elite and trusted community of FSI-trained pilots globally." Safety areas that the company will prioritise include upset recovery and go-around decision making, "two of our industry's most vexing and enduring challenges".

In addition, FSI will offer custom scenarios, says Thress, including for frequently used or challenging airports, incorporating customer FOQA [flight operations quality assurance] data. The company will also "look at schedule flexibility for pilots who demonstrate proficiency ahead of schedule", as well as improved distance learning.

With the changes in focus comes a brand update: "The client experience starts with our website, so we are modernising that," says Thress. An "enterprise-wide" scheduling system will allow staff in Savannah, with no availability on a certain simulator,

to see there is capacity in Dallas. FlightSafety has also been "investing in our team", bringing in educators to explain how students learn.

FlightSafety's biggest OEM relationships are with Textron Aviation and Dassault, its partner in the Le Bourget centre. The Textron link goes back more than 40 years to a tie-up with Cessna, which was followed 10 years later with a similar arrangement with then-Wichita rival Beechcraft. "They are our longest and emotionally most cherished customer," says Thress.

Thress says the big fractional and charter operators have "become really busy...The growth of these clients has been crucial to our recovery this year." However, Cessna and Beechcraft simulators at Wichita and Orlando have been "bursting at the seams", with demand from owner-operators. "These guys have relied on their planes during the pandemic," he says.

Thress made the decision to sell the ab initio training school in Vero Beach to UK-based Skyborne because he could not justify devoting resource to that market. "It's a tough business with a lot of people operating on very thin margins," he says. "I felt we could not deliver the quality of training that is our hallmark, so we divested the business to a company that will be a better steward."

Thress is keen to expand FlightSafety's footprint in other areas, particularly its overseas simulator centres. Farnborough, for one, has scope to grow, he says. The challenge, however, is often scale. Unlike in commercial aviation, there are often not enough of a particular type in a region to justify the investment. "The fleet size gets thin in certain parts of the world like Asia," he says.

Looking ahead, Thress says he is confident about "a 2022 that is back to, and possibly stronger than, 2019". And, despite the changes in strategic direction and training focus, FlightSafety's mission will remain, above all, to "enhance the readiness of clients who train with us", says Thress. "After all, safety is in our name." ▶



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Chief executive Eric Martel has led the final stage of the Canadian company's transformation from aerospace and rail group to a pure-play corporate aviation player. After putting its troubles behind it, could a clean-sheet aircraft be next?

Jon Hemmerdinger

Bombardier's chief executive has a relaxed, engaging style. He's optimistic. He leans forward in his chair when he speaks. He smiles as he discusses Bombardier's recent transformation, which he insists will leave the company leaner, more focused and financially secure.

Eric Martel took Bombardier's top job in March 2020, succeeding former chief Alain Bellemare and arriving as the pandemic cloud descended.

During the last 18 months, he has overseen the final stages of a years-long restructuring that has left the Montreal company focused exclusively on selling and servicing business jets.

The transformation will be close to complete early next year when Bombardier ends production of Learjets. And though Martel declines to specify where Bombardier might next deploy its impressive engineering heft, he says the company is evaluating several potential new jets.

"We're at least looking at... four or five possibilities," he tells FlightGlobal, speaking in Montreal in September. "Eventually, we're going to say, 'It's this one', and we're going to put the entire company behind it."

Bombardier's transition away from everything not business jets began before Martel took the reins. After struggling for years under financial strain brought about by the CSeries development programme, Bombardier handed majority control of that project to Airbus in 2018, where it was renamed the A220. It sold the Dash 8 turboprop programme to Longview Aviation Capital in 2019.

Martel was at the helm in 2020 when Bombardier divested its CRJ programme to Mitsubishi Heavy Industries and its aerostructures manufacturing business to Spirit AeroSystems. Bombardier completed its divestitures with the January sale of its rail business to French company Alstom.

The moves left Bombardier a "pure-play" business-jet company. But Martel was not done.

In February, with the pandemic raging, Bombardier announced a new restructuring: it would end Learjet production, concentrate aircraft completions work in Montreal, cut some 1,600 jobs (mostly office workers) and reduce its Montreal footprint – changes aimed at saving hundreds of millions of dollars annually.

Efficiency improvements and the end of CRJ production left Bombardier with too much space in Montreal, Martel says. The company is divesting land and buildings at its "Plant 1" aerospace manufacturing site in the Montreal suburb of Saint-Laurent, where it produces Global



Bombardier means business

and Challenger components. That could leave Bombardier with just 40% of its current Saint-Laurent footprint, it says.

"We are going to be completing that transaction any time. Soon," Martel says.

The company intends to use proceeds from the sales to help finance its new Global production facility, now under construction at Toronto Pearson International airport.

The decision to wind down Learjet – production is to end in the first quarter of 2022 – stemmed from the simple fact that Bombardier's medium-cabin jets (its Challengers) and large-cabin jets (its Globals) generate 90% of its business-jet revenue, Martel says.

"Learjet was a smaller piece" in a "more-competitive, more-crowded" market, he adds. "When I have \$1 to invest, where do I put that dollar? Today, it's pretty clear... It's either on the Global, on the Challenger, or in

the service business."

But Bombardier insists it will make good use of its Learjet facilities and staff in Wichita.

"Wichita has a lot of talented people," says Martel. "We are keeping the workforce busy in Wichita, and with potential growth."

Bombardier plans to "pivot" the Wichita site into a "Learjet Centre of Excellence" – an aftermarket hub for the roughly 2,000 Learjets still flying, says Bombardier vice-president of OEM parts and services Chris Debergh.

The company is transitioning Learjet production hangars into service bays and expanding Wichita's aftermarket capabilities – changes that will give the company capacity in Wichita to also serve Challengers and Globals, he says.

Additionally, Wichita will remain home to Bombardier's flight-test programme and its special-mission aircraft work.

The Wichita realignment chimes with Bombardier's broader goal of expanding its aftermarket business. The company aims for aftermarket services to generate 27% of company revenue by 2025, or an estimated \$2 billion, up from \$1.2 billion in 2019.

To hit that goal, Bombardier must capture about half of all Learjet, Challenger and Global aftermarket work.

"It's about bringing jets back home to the OEM, which mean these jets were [serviced] somewhere else before," says Jean-Christophe Gallagher, executive vice-president of services, support and strategy. "That [is] a direct consequence of us having the necessary space,

necessary manpower and, obviously, the necessary expertise."

Bombardier intends to increase its aftermarket hangar space from about 186,000sq m (2 million sq ft) today to 279,000sq m. It has been expanding its aftermarket presence in places like Opa-locka in Florida, Berlin, London, Dubai, Singapore and Melbourne, Australia. The company expects to boost its aftermarket workforce from about 2,500 people today to near 3,000 by 2022.

"We are into a massive recruitment campaign around the world for technicians," Gallagher says.

The business-jet industry, like the broader aerospace sector, sagged as the pandemic took hold last year. But demand has since returned, leaving Martel optimistic.

"We've clearly seen a major trend [of] more people flying business jets," he tells FlightGlobal. "And we believe it's going to stay."

In August, Martel described Bombardier's second-quarter results as "exceptional on all fronts", citing improved revenue, profitability and sales. In response, the company upped its 2021 revenue expectation by \$200 million, to more than \$5.8 billion.

Bombardier's competitors Dassault and Gulfstream also this year reported encouraging market conditions.

Martel says business-jet fleet operators have seen demand surge amid the pandemic – at least partly a result of the troubled state of the commercial airline sector. As airlines slashed schedules, some travellers made the leap to business jets, he says.



Bombardier chief executive Eric Martel

Demand has likewise buoyed the used-aircraft market, to where only 3-4% of the global used-aircraft fleet is up for sale, says Martel. Previously, he had not seen that figure be less than 7%.

"The other day, I was trying to find a Challenger 350 for a customer – there [were] three for sale in the entire world," Martel says. "And they're selling at a very high price."

That anecdote suggests Bombardier may have perfectly timed the July launch of its "Certified Pre-owned aircraft programme". The airframer has long brokered used jets. But the certified programme marks Bombardier's official entry into the business of buying, fixing up and selling pre-owned jets.

The "fixing up" part goes well beyond a bit of maintenance and a shine, says Chris Milligan, vice-president of Bombardier's pre-owned aircraft services. Rather, Bombardier makes the jets "look and feel new". That means new paint, refurbished cabins and updated avionics and connectivity systems, plus a one-year Bombardier-backed warranty. Think of it like buying a "certified" used car from a local dealer, except Bombardier's customers are buying multi-million-dollar jets.

In recent years, well before announcing the decision to shutter Learjet, Bombardier's business aircraft division had been pumping much of its resources into its larger jets.

It brought the clean-sheet



7,700nm (14,300km)-range Global 7500 – a \$75 million machine – to market in 2018, then in 2018 achieved certifications for its 5,900nm-range Global 5500 and 6,600nm-range Global 6500, which replaced the 5000 and 6000.

Then on 13 September, Bombardier revealed it is updating its Challenger 350 to have a modern cabin, a reduced cabin-pressure altitude and new features including an auto-throttle. Bombardier aims for the "Challenger 3500" to enter service in the second half of 2022. The company also manufactures the Challenger 650, an update of the Challenger 600, which entered service in 2015.

Ultimately, however, Bombardier will turn its attention back to

engineering a clean-sheet jet.

"There'll be a time [when] we're going to say, 'Okay, the market is ready. We need a new product,'" Martel says. "I'm studying all kinds of options."

Many factors will play a role. The company must, of course, "understand where the market is going", Martel says, meaning his team must identify the features – range or cabin size – that customers most value.

"The challenge with our industry [is], you don't design this for the next five years," Martel says. "You design this for the next 30 to 35 [years], so you need to anticipate."

He sees potential for Bombardier's next aircraft to fill possible gaps in the existing market, perhaps an

aircraft with capabilities differing from today's products.

Martel does not discount Bombardier moving forward with development of the Global 8000, the intended sister ship to the 7500. The company launched the 8000, which was to have 7,900nm of range, alongside the 7,000nm-range 7000 in 2010. But the 7000 became the 7500 in 2018 when Bombardier upped its range to 7,700nm. Development of the 8000 has since stalled.

"We're looking into this. That's an option," Martel says. "There's a remaining option... on the Challenger also."

Which path Bombardier takes will depend also on the state of engine technology and other factors, such as pressure to cut carbon output.

Martel thinks Bombardier could, within ten years, develop a jet that burns 40% less fuel – savings achievable through greater use of "sustainable aviation fuel", aerodynamic improvements and advances in engine technology.

"We believe it's possible," he says of a 40% emission reduction. "The majority of our R&D spending is focused on how... we get an airplane flying with much lower emissions."

Exactly when Bombardier might make news with a clean-sheet product launch remains unclear, but such a move may not be imminent.

"We're not there yet," Martel says. "I promised the... financial market to be very disciplined in the next five years".



Seamless¹ is just the surface

The charter and completions specialist is highly invested in the new corporate aircraft version of Airbus's smallest narrowbody, as chief executive Richard Gaona outlines

TwoTwenty is a 'real business jet': Comlux

Bernie Baldwin

"It's not quite a joint venture, but it's full co-operation. On the one hand we are the exclusive partner for the first 15 cabins, and at the same time we are a customer - we bought some planes - and we are really developing the product jointly."

Richard Gaona, executive chairman and chief executive of Comlux, is enthused about his company's work with Airbus on the ACJ TwoTwenty programme, which brings to the market a business jet based on the A220-100 airframe.

Comlux is also a launch customer with two aircraft orders, the first of which is scheduled to enter service in early 2023. The aircraft will enable up to 18 passengers to travel in comfort on long-range flights of more than 12.5 hours non-stop. As noted, Comlux - with its ACJ approved completion centre in Indianapolis - has been selected as the exclusive outfitting partner for the first 15 cabins. "We are working on the design with Airbus and will be the ones developing the cabin from A to Z in terms of technical elements and certification," Gaona reports.

He notes that it took 2-3 years to assess what the aircraft could become in the corporate jet market. "Then, together with Airbus, we defined the requirements in terms of range, flight altitude and so on. The difference between this and other ACJs is that this is a real private jet, whereas the others are more VIP airliners," he declares. "While the natural competitor for Airbus is almost always Boeing, in this case, it's not; it's Gulfstream, Bombardier and Dassault aircraft."

The ACJ TwoTwenty will be able to fly 5,650 nm (10,500 km), on city pairs such as Dubai-Tokyo or London-Los Angeles. "But it's done in the spirit of a new business jet, not a new VIP airliner. That's why, when it comes to the cabin, we have designed 80 different layout configurations. On the ACJ319/A320s you have a white page and are asked what you want," Gaona explains.

"We have solutions over six zones in the aircraft. The forward of these is the kitchen and the last zone is the bathroom. In between, we



have four different zones where the client can choose from a range of modules. We are offering three different colours for the interior, while Airbus has also co-operated with contemporary artist Cyril Kongo to offer a special edition cabin," he continues. "But at the end, it's still with the same modules."

"We have equipped the aircraft with the most advanced technology on the market. In the cabin, we have a 2Ku-band system delivering internet at 250 Mbps, provided by Astronics Custom Control Concepts, which is faster than most of us are having at home. We have chromatic windows which can be dimmed," Gaona remarks. "And the cabin enables clients to have options such as TVs at around 55 inches, a US king-size bed plus a 'rain' shower. For the same length of cabin, we have three times the cabin volume [vs the competitors mentioned earlier]."

Operationally, the space taken by the TwoTwenty on the ramp is the same as the Bombardier Global 7500. "Also, the takeoff distance is



Clockwise from top left: the TwoTwenty's dining area, en suite bathroom, master bedroom and business lounge

less with a TwoTwenty than with a Global 7500. That means we will be landing at Teterboro and Stans and London City where taking an ACJ319 is very challenging. That's a very strong advantage," Gaona asserts.

"We compete on maintenance with cost per hour less than the other business jets. This is because the aircraft was designed for more than 60,000 flight hours, but will operate under a low utilisation programme. We do the first C-check after six years, whereas others do it after two."

Of the two TwoTwentys that Comlux has ordered, one will be sold, with the other becoming the ACJ TwoTwenty future demonstrator. Additionally, Airbus Corporate Jets already has further orders from undisclosed customers.

"We're not an agent. We buy

aircraft like a leasing company, with the same commitment to take the aircraft at delivery, no matter what. If we can sell an aircraft before delivery, it's perfect. But if not, we will still take delivery. This is very important," Gaona emphasises, adding that the company will receive the first aircraft in December this year.

On the topic of sales, he reports that some clients comment on the TwoTwenty being "a new model", but he has his answer ready. "There are more than 200 A220s in airline service today, so performance data is real. I know exactly the fuel consumption, because Airbus has all the data about the aircraft in service."

At NBAA, Comlux has a TwoTwenty virtual mock-up, so clients can put on their virtual reality glasses and navigate inside. ▶

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Two technologies of tomorrow – unmanned platforms and vertical take-off air taxis – are the focus of Wednesday’s sessions. Plus there is a chance for attendees to give some wings for Corporate Angel Network

The future of flying

Two of the most exciting new technologies in aviation will come under the spotlight in a packed programme of sessions on Wednesday, with several chief executives of start-ups taking part in an advanced air mobility (AAM) panel at 09:30, followed by a discussion at 12:00 in W228 on the future of unmanned aircraft systems (UAS).

The 09:30 keynote in the main auditorium features Eric Allison, head of product at Joby Aviation, Kyle Clark, chief executive of Beta Technologies, Martin Peryea, who has the same role at Jaunt Air Mobility, Sebastian Thrun and Benjamin Tigner, chief executives of Kittyhawk and Overair, respectively, and Melissa Tomkiel, president of Blade Urban Air Mobility.

The panel may be packed, but the segment is even busier, with more than 100 companies working on concepts for electric vertical take-off and landing aircraft or other AAM platforms. All of them face a number of hurdles beyond the straightforward technical challenges, including raising the finance to certificate and industrialise a product, and the fact that safety regulators will need much convincing before they are allowed to operate in the airspace over our cities.

UAS face many of the same difficulties, but, as with AAM, their potential to disrupt aviation is considerable, and their use is already growing fast in sectors such as security, agriculture and cargo. The 1h session at midday will look at issues such as remote

ID and beyond visual line of sight operations, and features speakers from NASA and the Federal Aviation Administration.

After lunch at 14:00, there is a chance to join a debate on ways to attract the next generation of talent to business aviation. Sponsored by Textron Aviation, the event features a panel of young professionals, who will share their experience and insights.

Meanwhile, do you dread having to confront a difficult co-worker, customer or boss? A session at 15:00 offers tips for “practical communication skills for success”.

The Embraer Phenom 100 and Phenom 300 have enjoyed huge success among those who fly their own aircraft. Over at the owner/single-pilot pavilion at the static

display, the Brazilian company’s director of sales engineering Ricardo Carvalho will outline some of the latest updates to the family.

Rounding off the day is the traditional Corporate Angel Network (CAN) Fund an Angel Cocktail Reception, on the West Hall terrace, where attendees have the chance to bid in a silent auction and network with fellow professionals at one of the most enjoyable social events of the week.

CAN performs a vital contribution, arranging for the transport of young cancer patients and their families to and from treatment, using spare seats on business aircraft. This is your chance to help the charity raise the funds it needs to continue its work, and have a fun end to the day into the bargain. ▶

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With two aircraft types, including the latest version of its Vision Jet, at the show, Cirrus chief executive Zean Nielsen tells us how the Minnesota manufacturer wants to remove the perceived exclusivity of private air travel

Q What aircraft is Cirrus showing at BACE, and what is your message to customers and potential customers?

A Cirrus Aircraft will be exhibiting the G2+ Vision Jet, which comprehensively meets mission demands for corporate owners, charter operators and special missions. The G2+ Vision Jet is certified by the Federal Aviation Administration and European Union Aviation Safety Agency.

With up to 20% increase in take-off performance enabled by optimised engine performance for expanded mission capabilities, Gogo Inflight wi-fi for a connected cabin experience, SmartLift for streamlined corporate flight department operations, and VisionAir, our turnkey jet ownership programme, business owners can leverage the G2+ Vision Jet as the ultimate business asset.

The G2+ Vision Jet offers more mission capabilities with greater weight and range capacity out of certain airports and improved climb gradient to get to altitudes faster. Performance modifications to the Williams International FJ33-5A engine provide owners with significant improvement in high density altitude (hot and high) conditions. Vision Jet owners now have access to more airports in a wider range of weather conditions like Aspen, Colorado in the summertime.

The G2+ Vision Jet has a host of industry-leading technologies including Safe Return Emergency Autoland and the Perspective Touch+ flightdeck from Garmin.

Q You joined Cirrus in 2019 from outside the industry. What attracted you to the company and how have you found the aviation business?

A I find the industry fascinating and enjoy discovering new ways to improve Cirrus Aircraft. There are several similarities between my prior ventures with Tesla, James Hardie and Bang & Olufson that directly correlate with what Cirrus Aircraft is accomplishing today. Strategically speaking, we are continuously innovating which is reflected by the aircraft we create, the avionics we integrate, and the industry-leading training programmes we develop. Additionally, we want to remove any barriers of perceived exclusivity in aviation, and to help do that we bring various backgrounds and experiences to the table to better understand how to achieve that.

Q How has Cirrus been impacted by the Covid crisis? What changes did you have to introduce in early 2020, and how has business been affected since?



A The personal aviation industry grew over the past year and was not greatly impacted by coronavirus like other industries. In 2020, we supplied PPE to all employees, increased our sanitation processes and incorporated a social distancing policy. We also let employees work remotely if their position did not directly involve hands-on work with either the SR Series or Vision Jet.

We have been working closely with individuals and several business owners who have been keen on finding a safe and efficient way to continue personal or business travel during these times. Owning an aircraft opens new doors and provides people with the freedom to safely travel the world to grow their business.

Q You certificated the Vision Jet Safe Return Garmin Autoland system last year. How has that been received by Cirrus operators and what difference is it making?

A Safe Return received type certificate approval from the FAA in 2020 and the EASA in 2021. It has been received extremely well and makes a difference to those

that are pilots or charter a Cirrus aircraft. Along with Safe Return, the Cirrus Airframe Parachute System is standard equipment on every Cirrus aircraft, adding yet another layer of safety systems that can save lives if the pilot becomes incapacitated.

Q Cirrus's core market is owner pilots. But you have also been very successful with the special mission market and with fleet users, particularly flight schools. Can you tell us a bit about how you are addressing these different segments?

A We supply the special mission and fleet user market with our specialized SR20 TRAC aircraft. The TRAC Series is a purpose-built configuration of the best-selling SR Series line of aircraft developed specifically for flight training institutions. The TRAC Series is crafted with reliability, durability and economy in mind to meet the rigours of high-tempo flight operations, while providing industry-leading safety and performance for both the pilot trainee and flight instructor. Combining the Perspective+ by

Garmin flightdeck along with the unrivalled performance and safety uniquely found in the SR Series, the TRAC Series includes tailored features such as rear seat push-to-talk functionality and a landing gear simulator aimed at increasing training productivity.

Q Why do you think Cirrus was successful in the single-engine jet market a decade or so ago when so many other contenders failed to see their projects to fruition?

A We have redefined performance, comfort and safety in aviation. The Vision Jet is a culmination of our drive to continuously invent. As the world's first single-engine personal jet, it excels in performance while being simple to fly and easy to own and operate.

With the Vision Jet, we've ushered in a new era of personal transportation where jet speed, jet comfort and jet convenience are accessible. Vision Jet has received numerous accolades, including the Robert J Collier Trophy which recognises the greatest achievement in aeronautics or astronautics in America each year. ■

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Air taxi developers have been buoyed by major recent investments in their advanced air mobility projects, but now the hard work begins on the path to achieving certification and service entry



Ready to rise

Embraer subsidiary Eve Urban Air Mobility plans to have its eVTOL aircraft flying passengers by 2026

Jon Hemmerdinger

Investors have long flocked to aerospace companies, eager to back visionary projects that may or may not get airborne. The romanticism of flight draws the dollars. So does the sector's ability to connect the world, and the sheer marvel of soaring above the earth.

In recent times, the start-ups du jour have been developers of electric aircraft, including fixed-wing types and electric vertical take-off and landing (eVTOL) models. The companies say their concepts can transform short-distance travel.

The visionaries are back at NBAA-BACE in Las Vegas, grouped in the northwest corner of the show floor in a section called the "AAM & Emerging Technologies Zone".

Such entrepreneurs have been mainstays at NBAA shows for several years. But since 2019, despite the pandemic, the electric-aircraft sector – also known as advanced air mobility (AAM) – has expanded rapidly. Easy access to capital, technology improvements and social pressure to curb carbon emissions have helped to fuel the rise.

Developers, now racing towards ambitious service-entry goals, have recently announced billions of dollars in new investments and billions more in purchase commitments. Several have recently embarked on efforts to become publicly traded, jumping aboard the so-called "SPAC" – special-purpose acquisition company – bandwagon. These entities are shell companies

established to bring promising start-ups public.

Still, much about electric aircraft remains unproven. Analysts question whether designs can be financially successful, either as air taxis or business or executive transports. They cite technology and infrastructure hurdles, certification challenges, questions of public acceptance and the enormous cost of developing and producing a new breed of aircraft.

"Thanks to vast pools of cash sloshing around in the economy, AAM concepts are now proliferating," Teal Group analyst Richard Aboulafia wrote in a July paper. However, he notes: "The bigger the bubble, the bigger the collapse."

Aboulafia questions whether start-ups can ever sell enough eVTOL

aircraft to offset steep development and production costs.

Exhibitors at the show this year will include electric aircraft developers Bell, Jaunt Air Mobility, Kitty Hawk, Overair, Samad Aerospace and XTI Aircraft, according to NBAA.

The companies are targeting similar markets, but with differing designs.

Jaunt, for instance, is developing Journey, a "slowed-rotor compound" all-electric aircraft designed to take off vertically using a main rotor, then transition to forward flight, propelled by wing-integrated propellers. It will have a 70-87nm (129-161km) range and a top speed of 152kt (282km/h), Jaunt says.

Jaunt's partners include BAE Systems, which is helping with flight controls, power management



Joby Aviation is involved in joint flight-test activity with NASA

and energy storage, and CAE, which is developing an engineering simulator. Jaunt aims for Journey to be certificated in 2026 and to enter service in 2027.

Bell, which made a splash unveiling its air taxi concept, Nexus, in 2019, will be back at NBAA. Nexus was originally designed as a hybrid-electric aircraft with six ducted fans. Bell has since tweaked to its latest "4EX" variant, which has four fans and an all-electric propulsion system.

Kitty Hawk is developing a single-passenger, eight-propeller eVTOL called Heaviseide. Kitty Hawk also formed California eVTOL maker Wisk Aero through a joint venture with Boeing in 2019. Wisk is developing a passenger eVTOL model and plans to start a trial programme in New Zealand.

Business angle

California-based Overair is developing a five-passenger, four-propeller eVTOL platform called Butterfly, targeting first flight in 2023, US Federal Aviation Administration (FAA) certification in 2025 and service entry in 2026.

UK company Samad, meanwhile, is developing e-Starling, which it calls the "world's first hybrid-electric business jet". The five-passenger aircraft will have four ducted fans, cruise at 250kt and have 540nm of range, the company says.

Another exhibitor, Colorado-based XTI, partnered this year with public holding company Xeriant Aerospace to help develop a fixed-wing, hybrid-electric aircraft called the TriFan 600.

In a January report, consultancy Deloitte estimates the US AAM market will be worth \$115 billion annually by 2035, with passenger and cargo operations each accounting for about half. More than 200 companies globally are developing eVTOL aircraft, and private eVTOL players had invested \$2 billion in such projects as of September 2020, Deloitte says.

The consultancy and others stress that the sector needs government support with regard to certification, standards development and airspace integration.

Alex Krutz, managing director of aerospace and defence advisory firm Patriot Industrial Partners, notes that there are numerous hurdles facing electric aircraft developers.

They must meet stringent certification standards, develop sophisticated supply and production systems, deal with local noise regulations and address battery density and infrastructure challenges. Commercial success requires their aircraft to be competitive with established transportation options, meaning developers must keep a lid on costs – a difficult task, because initial designs are intended to be piloted,)

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says Krutz. Eventually, developers hope to transition to full autonomy, which will reduce expenses and open an extra passenger seat.

Developers say eVTOL designs will be financially viable as air taxis partly because they will be less expensive to operate than conventional aircraft.

But Aboulafia says operating expenses are only part of the equation.

“AAM backers focus on operating costs because they look great,” he says. “But capital costs are the real problem.”

Certificating an eVTOL aircraft will probably cost several hundred million dollars, and manufacturing costs will be steep, Aboulafia says.

“The gap between manufacturing costs and sales prices obliterates manufacturers,” he adds. “With AAM, everyone pretends that... capital costs aren’t a problem at all. The result is a market valued in the trillions.”

Business aviation consultant Brian Foley sees parallels between eVTOL products and the very light jets developed in the early 2000s. Those aircraft – types such as Cirrus Aircraft’s SF50 Vision Jet, Cessna’s Citation Mustang, Eclipse Aerospace’s Eclipse 500 and Honda Aircraft’s HondaJet – were also envisioned as air taxis. That dream never materialised.

“All that air taxi nonsense is flooding back, albeit with much shorter aircraft ranges,” says Aboulafia.

Comparing eVTOL operations to Uber “neglects the fact” that Uber cars might cost only \$10,000, while eVTOL aircraft are expected to cost several million dollars each, he adds. Securities documents show that Lilium has pegged the price of its Lilium Jet at \$2.5 million, and Archer Aviation has suggested a \$5 million price tag for its eVTOL offering.

Countless other electric-aircraft developers have made news this year. US company Eviation tweaked the design of Alice, an in-development, clean-sheet, fixed-wing electric aircraft. Alice now has a T-tail, changed from a V-tail, two aft-fuselage-mounted propellers, instead of an earlier configuration with one on each wingtip and also on the aft fuselage, and will use two 850hp (634kW) Magnix Magni650 electric powerplants: it initially had three 375hp Magni250s.

The nine-passenger Alice will have

XTI Aircraft is developing hybrid-electric TriFan 600



XTI Aircraft



Virgin Atlantic will be a customer for Vertical Aerospace’s VA-X4 air taxi

Virgin Atlantic

a 440nm range, 250kt maximum cruise speed and enter service in 2024, the company has said.

Public benefit

Embraer also has skin in the game, having in 2020 formed Eve Urban Air Mobility, a subsidiary aiming to have its eVTOL aircraft flying passengers by 2026. Eve has landed orders for hundreds of aircraft and signed operating partnerships with companies worldwide.

California electric aircraft developer Joby Aviation became a public company in August after merging with a SPAC called Reinvent Technology Partners. The deal left Joby with \$1.6 billion in cash and proceeds.

Joby is developing a single-pilot, four-passenger eVTOL platform that will fly at up to 174kt and have more than 130nm range. It aims for 2023 certification and to begin commercial flights in 2024.

On 1 September, Joby kicked off a 10-day flight-test programme in partnership with NASA, which is working with several eVTOL developers as part of an effort to advance the technology.

The Joby-NASA tests “will help identify gaps in current Federal Aviation Administration regulations and policies to help incorporate AAM aircraft” into national airspace, NASA says.

The FAA has also been collaborating with NASA, and in 2020 released its urban air mobility “Concept of Operations”, a document broadly describing the envisioned air taxi ecosystem and the FAA’s role.

The administration says it can certificate electric aircraft through existing regulations, though “some certifications could require the FAA to issue special conditions or additional airworthiness criteria, depending on the type of project”.

The FAA has also established a “Center for Emerging Concepts and Innovation”, through which it helps certificate applicants meet requirements.

Several other eVTOL developers are pursuing SPAC-enabled go-public plans. They include Archer, which in February agreed to complete the process by merging with SPAC Atlas Crest Investment.

The companies previously pegged Archer’s enterprise value at \$2.7 billion, but in July slashed the figure by 38%, to \$1.7 billion. Despite the shift, Archer says its manufacturing, sales and pricing plans remain unchanged.

Also in February, Archer said United Airlines had committed to buy up to 200 of its in-development aircraft, a deal potentially worth \$1 billion. Aboulafia notes though that commitments to purchase such in-development products often involve little or no money changing hands.

On target?

Archer aims to achieve certification of its four-passenger eVTOL platform in 2024. In June, the company unveiled a two-seat demonstrator called Maker, which has 12 wing-mounted rotors, a 52nm range and can cruise at up to 130kt.

Archer has partnered with auto giant Stellantis, which will assist with manufacturing and supply, and with Reef Technology, which operates parking facilities – possible eVTOL operating bases. On 2 September, Archer co-founder and co-chief executive Adam Goldstein said he expects passengers will pay \$3-4 per mile to travel on Archer’s air taxis. The company has also been embroiled in a lawsuit with Wisk, which sued Archer earlier this year, alleging patent infringement and trade secret theft.

Lilium’s go-public plan, disclosed in March, involves merging with a SPAC called Qell Acquisition. The eVTOL developer has targeted a 2024 service entry for its six-passenger Lilium Jet, which will have a 135nm range and 152kt cruise speed. In September, Lilium said David Neeleman, founder of Azul, Breeze Airways and JetBlue Airways, will join its board.

UK company Vertical Aerospace made big news in June, announcing that American Airlines, Virgin Atlantic and aircraft lessor Avolon had agreed to purchase up to 1,000 of its in-development VA-X4 air taxis. American and Avolon also said they intend to become equity investors in Vertical.

On the same day, Vertical became the latest eVTOL developer to reveal a go-public plan, saying it intends to merge with Broadstone Acquisition. The five-seat VA-X4 will have about 87nm of range and a top speed of 176kt. Vertical aims to achieve type certification in 2024.

Other US players include eVTOL developer Beta Technologies and two developers of electric short take-off and landing aircraft: Airflow and Electra Aero.

UK-based Faradair Aerospace, Sweden’s Heart Aerospace and France’s Aura Aero are working to bring electric or hybrid-electric commuter aircraft to market.

If the developers are right, electric aircraft might actually be shuttling passengers within a few years.

But Aboulafia notes that start-ups can become more financially precarious as they near “the finish line” – that is, when they start shelling out big money to fund development, certification and production. Indeed, supersonic aircraft developer Aerion shuttered in 2021.

“Carnage is guaranteed,” Aboulafia says. ■



Archer’s technology has attracted United Airlines

Archer Aviation



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- 1** **NBAA-BACE**
October 12-14, 2021 | Las Vegas, NV
- 2** **ABACE**
April 12-14, 2022 | Shanghai, China
- 3** **EBACE**
May 23-25, 2022 | Geneva, Switzerland
- 4** **NBAA-BACE**
October 18-20, 2022 | Orlando, FL

Complete agendas, exhibitor applications and registration will be available online in the months preceding each event. Sponsorships are also available at a range of price points.

CONFERENCES & REGIONAL FORUMS

- 5** **Schedulers & Dispatchers Conference**
January 18-21 | San Diego, CA
- 6** **Regional Forum**
February 2 | Opa-locka, FL
- 7** **Leadership Conference**
February 7-9 | Fort Worth, TX
- 8** **International Operators Conference**
March 14-16 | Los Angeles, CA
- 9** **Maintenance Conference**
May 3-5 | San Antonio, TX
- 10** **Regional Forum**
June 22 | White Plains, NY
- 11** **Tax, Regulatory & Risk Management Conference**
October 16-17 | Orlando, FL

The business aviation industry will use this year's gathering to take stock of its sustainability credentials at a show expected to place more emphasis on the environment than ever before

Green shoots



Technologies and programmes for cutting carbon emissions will feature strongly

Mark Pilling

Whether it is devastating forest fires in Siberia, a decade-long drought in Chile, or unprecedented floods in China's Henan province and in Germany, the evidence of rising greenhouse gas emissions on our planet is plain to see.

For many, at both an individual and business level, the issue of tackling climate change and what that means to our behaviour is increasingly becoming part of our daily lives and workplace agendas.

2021 may be looked back upon as the year when not only did the Covid-19 pandemic finally come under control, but also the point when climate change was properly recognised as a crisis requiring urgent action.

In aerospace, where all sectors are working towards a world where they use less fossil fuel and pay for the

carbon they emit, the business and general aviation industry believes it is playing its part, and will use the NBAA-BACE event to demonstrate its commitment and leadership on sustainability.

It is an issue that has seen the industry globally coalesce as one, especially around the need to develop and promote the use of sustainable aviation fuel (SAF). "When you see the business aviation associations of Europe, North America, at the international level, GAMA [the General Aviation Manufacturers Association], the OEMs and many others, coming together with one voice on sustainability, that is a huge indication of the support behind this important technology to deliver sustainable aviation," Kurt Edwards, director general at the International Business Aviation Council (IBAC), tells FlightGlobal.

Business aviation leaders are quick to point out that the industry

has taken a leadership stance on sustainability for years, delivering the "important milestone" of the Business Aviation Commitment on Climate Change (BACCC) – promising to reduce the sector's impact – as long ago as 2009, explains Edwards.

The sector's association heads and thought-leaders across industry are discussing – with the emphasis on doing "our best to provide some level of analysis" – whether the 2009 commitment should be updated, and made more ambitious, says Edwards.

Standard target

There are two main issues. The first is whether business aviation should align its commitment with what is fast becoming the standard – net zero greenhouse gas emissions by 2050. As it stands today, the BACCC commits to halving CO2 emissions by 2050 relative to 2005 levels.

That goal is a challenge,

30

Number of green guidelines prepared by NBAA to help exhibitors lessen the impact of their show attendance

considering the progress of SAF and technologies envisaged at present, but is possible, says Edwards. Today, he notes, although the analysis is "terribly fuzzy" looking 30 years ahead, the industry's thinking is that net zero could possibly be achieved by 2060-2065 without using carbon offsetting, according to the BACCC assumptions.

This brings about the second issue. For business aviation to commit to an ambition of net zero by 2050, "we would need much greater availability of SAF, important leaps in aircraft technology and be able to use offsets to some degree," says Edwards. In real terms, this would mean the sector using all these tools to eliminate far more CO2 emissions than planned.

Explaining the targets and ambitions – and how to meet them – to the sector is the critical, and complex, job of the IBAC and all

NBAA builds on environmental pledge

Shows and exhibitions can represent something of a throwaway affair – a lot of people travel to a pop-up event for a few days and then it disappears, leaving a lot behind (and material that is rarely used again). NBAA is taking a lead as a show organiser, to bring a greater degree of sustainability to events with its "green pledge".

"NBAA is engaging its exhibitors to be more sustainable – shows can produce a lot of waste, but it doesn't have to be that way," says Edward Bagsic, its senior manager of conventions, VIPs and budgets.

The organiser has produced 30 guidelines that exhibitors can follow to reduce their carbon footprint

– such as ordering local food for their chalets, or not using "build and burn" booths – and is asking participants to pledge to use at least five of them.

About 30 companies had signed up to the initiative by mid-August, and more will join as the green pledge scheme expands both at this show and at future events.

"When we started thinking about the 2020 show it was always top of mind to make a meaningful sustainability project on the ground to match the industry's sustainable initiatives in the air," says Bagsic. "NBAA 2021 will be the most sustainable show we have done, and we believe we are one of the first shows in aviation to be doing this."



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the associations. “Our message to operators is we need to find some way to make this not just affordable to them, but deliverable to them. They need the ability to operate to their sustainable goals and work with [SAF] producers to make this happen. We can set the targets, but ultimately everyone will have to agree to that ambition,” says Edwards.

Discussions are under way about updating the industry’s sustainability commitments and the question will be prominent at the show. In that respect, and for an industry super-keen to meet face-to-face once again and to show off its green credentials, NBAA 2021 comes at a good time.

Stewart D’Leon, director, technical operations at NBAA, says there are three sustainability initiatives planned at the show. The first will see the third summit meeting of the Business Aviation Coalition for SAF, made up of all the associations plus leading industry players; an in-person event in Las Vegas to educate and promote the use of SAF.

The second will be the launch of an NBAA accreditation programme, to “further advance a sustainability culture in business aviation organisations and recognise those that meet or exceed specified criteria”. Organisations will be able to obtain separate accreditations in four areas: flight, operations, ground support and infrastructure.

Practical help

“We have been working on the NBAA Sustainable Flight Department Accreditation Program for over a year with a pilot programme featuring a number of operators,” says D’Leon. Two of these have been the flight departments at US corporations Adobe and Starbucks. “They have been helping us refine the programme. We have been getting significant interest.”

The development of the first, formalised programme for



PW800 engines deliver a 10% increase in fuel efficiency for the Falcon 6X

Anthony Pecchi/Dassault Aviation

sustainability is exactly the type of work NBAA is renowned for with its practical assistance for operators, and will help make it a regular “doing business” topic, rather than something out of the ordinary.

The third feature of NBAA will be a practical one for exhibitors, who will be encouraged to sign up to a “green pledge” to help make the actual show more environmentally friendly.

After a two-year hiatus, NBAA offers an in-person opportunity for all to provide updates on their sustainability progress.

“Bombardier expects environmental issues to be front and centre at NBAA-BACE this year - and as an active member of the SAF Coalition, we recognise how increasingly important the environment has become to CEOs and flight departments, airframe and powerplant manufacturers, suppliers and indeed across the entire general aviation segment and business aviation sector,” the airframer says.

While Bombardier will keep the specifics back for the show, “our overall engagement at NBAA-BACE and our announcements will demonstrate the company’s

unrelenting commitment to sustainability”, it says.

“Sustainability and the journey to net zero will be an essential part of our show appearance”, says Rolls-Royce. “Of course, our Pearl engine family and its newest members, the Pearl 700 for the Gulfstream G700 and the Pearl 10X for the Dassault Falcon 10X, will be the focus of interest for our customers.”

With its PW800 family of engines, used on Gulfstream’s G500 and G600 and the Falcon 6X, delivering a 10% increase in fuel efficiency, Pratt & Whitney Canada (P&WC) is 100% committed to the industry’s goals to “significantly reduce CO2 emissions and to drive even further efficiency from propulsion technology”, says vice-president marketing Irene Makris.

“This commitment is demonstrated in our efforts to make current products environmentally ‘best in class’, bring customers options through our carbon offset programme, maximise the use of SAFs and invest in new technologies and architectures that increase engine efficiency,” says Makris.

Absent giant

Gulfstream, which has been pioneering sustainability for years and was an early adopter of SAF, has chosen not to attend NBAA this year, although it will return. “Gulfstream has made the decision to not attend NBAA-BACE or any large event this year. Our customers have shared that their preference is for smaller events right now, and we are hosting those accordingly,” it says.

NBAA has always been the fairground for major aircraft launches, with business jet makers working on a cycle of a new airframe every decade or so, compared with the 20- to 25-year cycle of Airbus and Boeing. “The competitive side of business aviation, with five mainstream OEMs and two to three peripheral ones, has undoubtedly driven development at such a pace,” explains Dan Hall, senior valuations consultant at Ascend by Cirium.

“The latest advances in aircraft development have been about greater range and greater size. With aircraft such as the G700 and Bombardier Global 7500 the industry has finished that mission,” says Hall. The pace of development will not necessarily slow down, he believes, but with the range and size targets achieved, there

is an opportunity for a switch to environmentally focused initiatives.

“What is the next battleground? It is not going to be an operating cost issue, it is going to be in green technology,” believes Hall.

The engine OEMs are working hard on two sustainability-related fronts: research and development into hybrid and electric engines, and pursuing the approval of their engines for use with 100% SAF.

Although announcements specific to business aviation are scarce, the R&D efforts can be applicable to all aircraft classes.

“Most recently, we announced a \$163 million investment in a hybrid-electric demonstrator project for regional aviation, backed by the governments of Canada and Quebec,” says Makris. “Targeting a 30% reduction in fuel burn and CO2 emissions, and flight testing in 2024, this demonstrator will show the potential of hybrid-electric propulsion technology to set new standards for sustainable aviation. We are confident this potential will eventually extend beyond regional aviation to other segments as well.”

Rolls-Royce has been busy in the urban air mobility (UAM) and commuter markets. “We announced that we will power Vertical Aerospace’s new [VA-X4] all-electric UAM aircraft and that we joined forces with Tecnam and Wideroe to deliver an all-electric [P-Volt] passenger aircraft ready for service in 2026.

“We are also quite busy in the electrification of the small propeller market. The impact in the long-range, large-cabin business aviation market will be rather evolutionary,” Rolls-Royce says. “We will see SAF-powered, ‘more electric’ engines that are able to deliver more electrical power which can then be used to power certain secondary systems - for example, mechanical/hydraulic systems. We are well positioned for all the coming opportunities.”

Offsetting course

Several of the OEMs also offer carbon offsetting services. In May, Rolls-Royce launched SAFinity, which will initially cater for business aviation users, enabling them to invest directly in SAF. P&WC recently launched a Carbon Offset Service, tied to its Eagle Service Plan maintenance programme for business jet engines. “We expect demand for carbon offsetting to grow, and we are actively working on expanding this service to other engines within our portfolio,” says Makris.

There will be plenty of SAF-related news at NBAA, as more fixed-base operators, such as Signature Flight Services, and fractional operators like NetJets, move as quickly as possible to offer it to customers. Users, too, as they seek to meet their Environmental, Social and Governance targets and drive towards net zero by 2050, will be asking how the industry is able to help them.

After a long wait, the show will be a celebration as the industry gathers once again. However, amid the talk of new aircraft orders and a return to growth, the discussion around sustainability and the environment will never be far away. ▀



Pratt & Whitney Canada

“We announced a \$163 million investment in a hybrid-electric demonstrator project for regional aviation, backed by the governments of Canada and Quebec”

Irene Makris Vice-president marketing, Pratt & Whitney Canada



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Maria Della Posta, president of Pratt & Whitney Canada, talks about recovery in the industry and how the engine manufacturer's array of programmes gives it a foothold in almost every segment of the market

Power to succeed

Q The business aviation market has fared much better than the commercial airline sector during the pandemic. Pratt & Whitney Canada has a foot in both camps. How has the past 20 months or so been, and how do you see the recovery taking shape?

A While Covid-19 has affected the entire industry, the recovery in business aviation has been sharp and we have recovered to above 2019 levels. Charter demand is 30% above pre-Covid levels. The market is expanding with an increase of more than 50% first-time private jet users and more than 35% first time buyers.

Our commercial aviation fleet, namely the regional turboprops and auxiliary power units, have lagged when compared to business aviation. Our regional turboprop fleet flies mostly domestic and has seen better recovery than international travel. When Covid-19 restrictions are lifted, our flying fleet recovers rapidly, and we are even seeing some countries flying above 2019 levels.

Despite lingering uncertainties, we are anticipating that a more lasting recovery is upon us. Our response is to introduce nearly 20 new programmes in the next five years.

Q Can you give us a progress report on the variant of the PW800 that powers the new Dassault Falcon 6X, and how are the engines on the Gulfstream G500 and G600 – the engine's other applications – faring in service?

A The PW800 engine has shown exceptional performance with more than 75,000 flying hours on the 125 flying G500 and G600 aircraft in service. Gulfstream will also power its new G400 business jet with our PW812GA engine. Gulfstream's repeated selection demonstrates the engine's mission-readiness, its flexibility and broad appeal in the mid- to large-business jet market.

The Dassault Falcon 6X, powered by the PW812D, successfully completed its first flight in March 2021. Pratt & Whitney Canada is in the final stages of the PW812D engine certification process, with all required certification testing complete. Final reviews are currently underway with Transport Canada and certification is expected to follow shortly.

Q How are prospects for the PT6 programme with the E-Series, and how do you view the emergence of a new competitor in this segment?



Pratt & Whitney Canada

A The PT6 E-Series builds on the reliability of the PT6 family and nearly a century of innovation to provide a whole new experience in flying and customer service. With more than 120 reliable enhancements to the trusted PT6 engine family in the last decade alone, we continue to invest in even more innovation.

We are proud to have launched the first turboprop engine in general aviation to offer a dual-channel integrated electronic propeller and engine control system. The PT6 E-Series engine is certified to the latest standards and is in service worldwide on Pilatus's PC-12 NGX aircraft. More than 150 engines have been produced and 20,000 flying hours have been reached. And in as much as milestones are important to show the rapid progress of the PT6 E-Series engine, it's the customer feedback we're receiving about the flying experience that is most gratifying.

As for the competition, we believe that all innovation benefits the industry.

Q Can you talk about P&WC's initiatives when it comes to sustainability, including your

hybrid-electric regional aircraft demonstrator being developed with Collins Aerospace and De Havilland Canada, your carbon offset service, and the development of engines able to be fuelled by SAF?

A Pratt & Whitney Canada has a long-standing commitment to offering environmentally responsible products and solutions to its customers. Sustainability is a top priority at P&WC and we are committed to reaching our environmental goals to help move the industry to a greener future.

In July we announced our hybrid-electric propulsion technology and flight demonstrator programme, a \$163 million investment backed by the governments of Canada and Quebec. The demonstrator will target a 30% reduction in fuel burn and CO2 emissions, compared to a modern regional turboprop airliner. As this is a rapidly developing field, we are evaluating how these hybrid-concepts can be applied across different aircraft segments.

We were the first engine maker to offer a carbon offset service for customers to reduce their

environmental impact and help them reach their sustainability goals. The programme is administered through our ESP programme, enabling customers to pay for their carbon offsets based on the number of hours they fly.

As for sustainable aviation fuels, they have a key role to play in meeting our industry's emissions goals and we continue to support their use as "drop-ins" for all our engines – which today are 50% SAF compatible. We're now engaged in testing towards making our engines 100% SAF capable.

Q What aftermarket initiatives will you be talking about at BACE?

A We will be talking about recent ESP enhancements for engines that power the Embraer Phenom 100 and Phenom 300 business jets, and the Pilatus PC-12 NGX, with the latter potentially reducing their insurance costs.

We will also talk about how we expanded our P&WC SMART portfolio for PT6A engines, and have continued to appoint new designated maintenance facilities (DMFs) which provide local line maintenance and mobile repair team services; we currently have 17 DMFs worldwide.

Finally, we'll be celebrating the 50th anniversary of our turboprop MRO facility located in West Virginia. Today, the facility employs some 400 people and overhauls between 500 and 600 engines every year. The facility, and the calibre of employees it consistently attracts, make it a jewel in our global customer service network. In addition to serving as the MRO centre of excellence for turboprop engines such as the PW800, it provides MRO for PT6A engines such as the PT6 E-Series engines, which recently entered into service on the Pilatus PC-12 NGX.

Q P&WC does not have an offering in the largest-cabin and longest-range segment of the market – one that has been dominated by GE Aviation and Rolls-Royce. Is this a gap in the range for you?

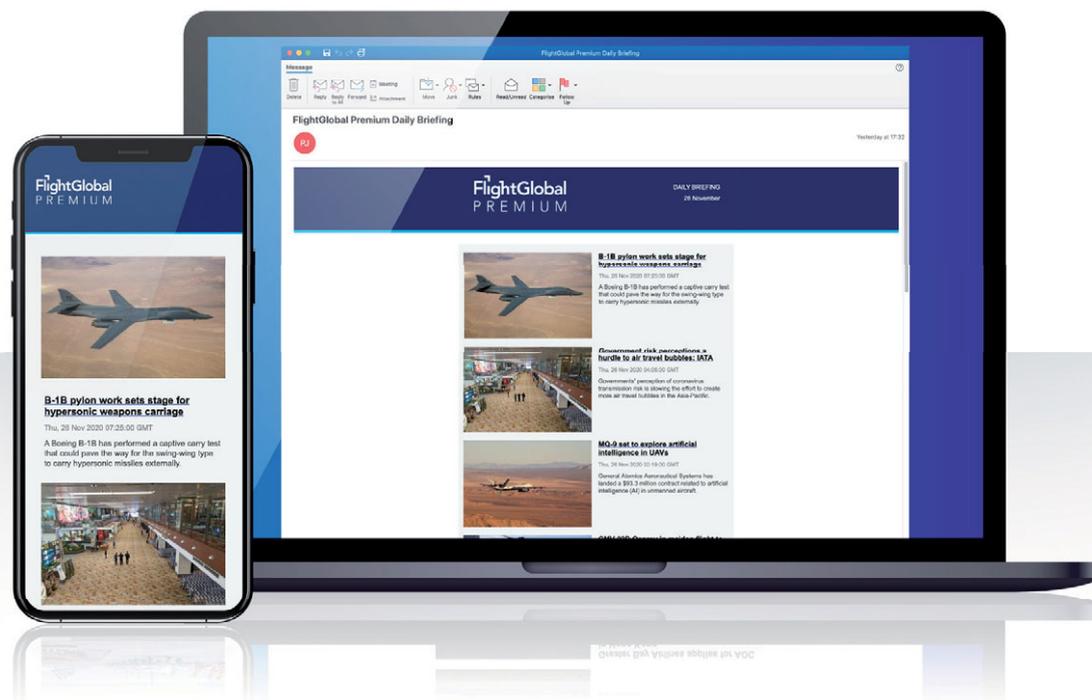
A Pratt & Whitney Canada is proud to offer many products and services across a broad range of applications and market segments. Our PW800 family has been chosen on four applications in the mid- to large-cabin category, covering a significant portion of that market. ■

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We profile two aircraft sure to catch the eye on the static display – VistaJet’s Bombardier Global 7500 plus the vintage Beechcraft Model 18

The past and the future



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Beechcraft Model 18

Fans of historic aircraft have a chance to indulge themselves at BACE, with a number of well-preserved veteran types on display. They include the Beechcraft Model 18 or Twin Beech, a 6- to 11-seat twin-engine, low-wing, tailwheel aircraft that was manufactured by the Beech Aircraft Corporation, which is now part of Textron Aviation, between 1937 and 1969. More than 9,000 were built and its missions included cargo, airliner, military transport and an early corporate aircraft. There are thought to be around 240 Model 18s still on the US registry. Other vintage types at the static include a Douglas DC-3, a Dassault Falcon 10, and a Howard 500.



Steve Spatzfore/BillyPix

Bombardier Global 7500

There are two examples of Bombardier’s largest and longest-range business jet on the static, one of the manufacturer’s own, and the other belonging to VistaJet. The European luxury charter provider took delivery of its first two Global 7500s earlier this year – it has commitments for up to 12 – and says it is the first operator in the world to offer the “game-changing” type. VistaJet says the 19-passenger Global 7500s, together with Challenger 350s – from an order placed in

2012 – will bring its global fleet to more than 90 Bombardier aircraft. The company also offers business jets through its US sister company XOJET. VistaJet says the Global 7500’s range of 7,700nm (14,300km) gives its customers access to “96% of the world”, including city pairs such as New York and Hong Kong, or Singapore and San Francisco.

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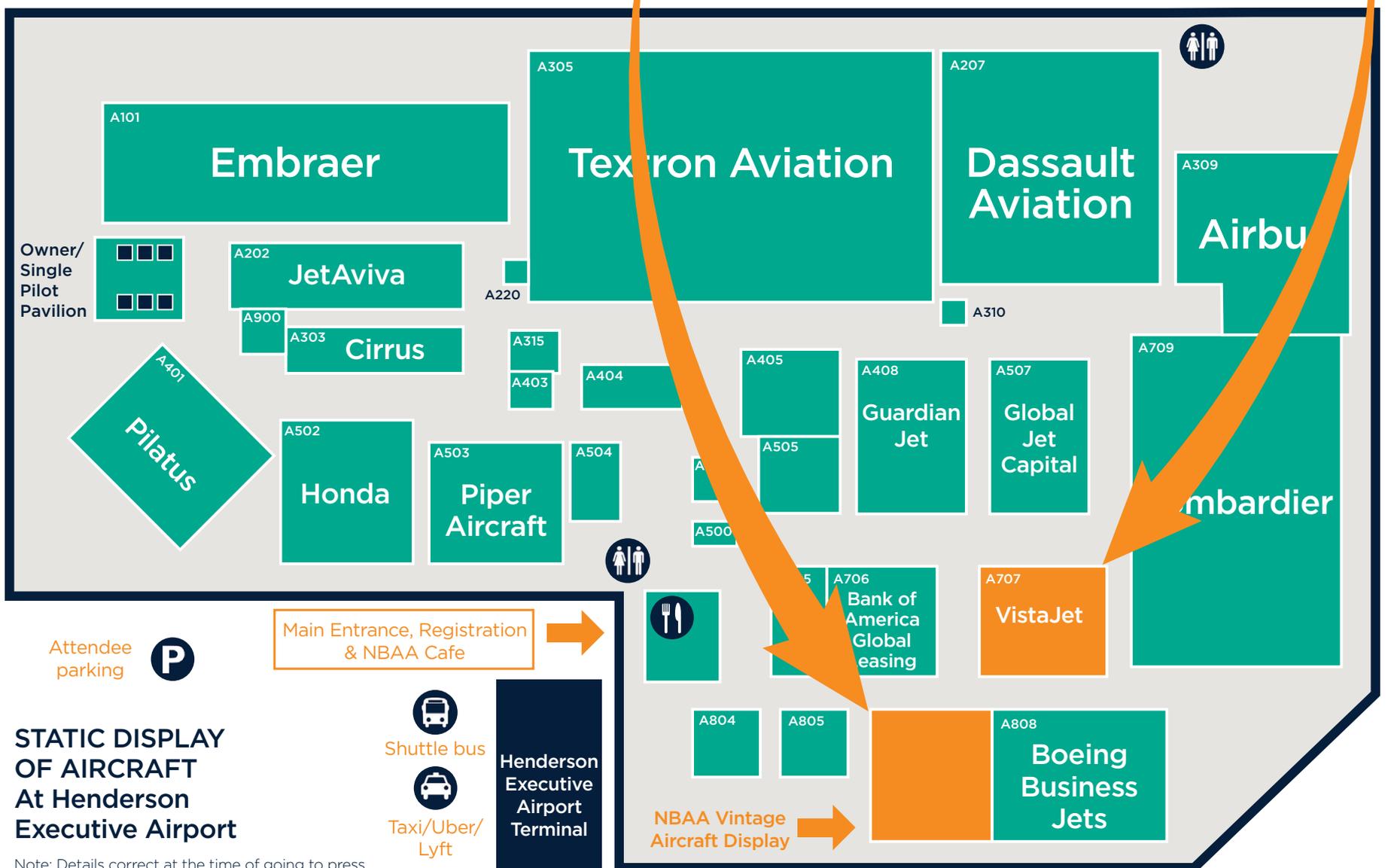
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Whether you manage a fleet or fly a single aircraft, business aviation operations are a challenge. From scheduling and dispatch to flight planning, maintenance and more, you depend on a wide array of digital tools and services to ensure your operations run seamlessly.

Izon brings your essential business aviation applications and data together in one place, accessible from anywhere on any device that has an internet connection. It's designed for integration and mobile use – technology that gets the job done without getting in the way.

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IZON INTEGRATED BUSINESS AVIATION SERVICES

- Simple
- Streamlined
- The future of business aviation