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the Echelon



A mock-up of the aircraft on Honda's stand

Jon Hemmerdinger

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Honda Aircraft yesterday announced the plans for its in-development light jet, formerly called the 2000, the HondaJet Echelon. Chief executive Hideto Yamasaki and his team are at the show to generate interest in the Echelon, which they insist will set a new standard in the light-jet segment when it enters service in 2028 or 2029.

"This is not just another light jet. This is a milestone in our product line and a critical path for our future," Yamasaki says. The Echelon "is no longer a concept... it is a reality".

HondaJet has revealed other details about the Echelon programme, including that possible buyers have signed letters of intent

covering the potential purchase of more than 350 examples.

"Obviously, there is tremendous support... [and] excitement in the market," says Honda Aircraft chief commercial officer Amod Kelkar.

Honda Aircraft has designated the Echelon as the "HA-480" model and intends to achieve certification in 2028 under an amendment to the existing HA-420 HondaJet's type certificate.

The HA-420, a light jet, and larger HA-480 will have different wings and structures. But the jets will have a sufficiently similar design, for instance sharing an over-wing engine configuration, and with sufficiently common systems, including their Garmin G3000 avionics, that Honda Aircraft expects the Federal Aviation Administration (FAA) will green-light the amended type certificate route, says vice-president of

product planning Adam Gagnon.

The manufacturer has a goal of having the first Echelon enter service before the end of 2028. But that milestone will likely come three months following certification and could slip into 2029, he adds.

Honda Aircraft also aims for the Echelon to share a common pilot-type rating with the HA-420, meaning crews could easily transition between models. But executives caution that certification and pilot-rating decisions rest with the FAA.

The Echelon will move Honda Aircraft one step up the size range, competing with established light jets like the Embraer Phenom 300, Cessna Citation CJ3 and CJ4, and Pilatus PC-24.

Powered by twin Williams International FJ44-4C engines, the single-pilot Echelon is to carry up to 10 passengers, cruise at 450kt (833km/h) and have range of 2,625nm (4,860km)

with five people aboard.

Honda Aircraft's detailed design work for the Echelon is "well under way", and its aircraft-level critical design review should be completed by summer 2024. It plans to begin assembling the first Echelon flight-test vehicle in 2025, to roll out that aircraft in 2026 and to complete first flight before the end of that year.

Ongoing supply chain troubles have kept it from finalising the Echelon's price. The company will do so when those issues sufficiently ease, at which time it will have better insight into production costs, Kelkar says.

In terms of size, the jet will be roughly 17.4m (57ft) long and 4.9m high at the top of its tail, with a 17.1m wingspan. Honda Aircraft expects the type's maximum take-off weight will be 7,938kg (17,500lb).

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Issue

1

TUESDAY
17 October 2023

FLIGHT DAILY NEWS

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Upper Echelon

Newly named jet will vault Honda into higher category



A mock-up of the aircraft on Honda's stand

Jon Hemmerdinger

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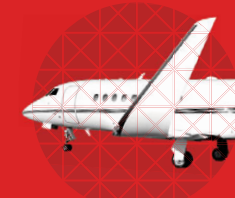
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Green dream machine

Bombardier steps up tests of blended-wing-body EcoJet demonstrator



Flight testing has taken place at an undisclosed location

Dominic Perry

Bombardier has begun accelerating tests of its latest EcoJet blended-wing-body technology demonstrator as it looks to prove the fuel-saving benefits of the radical new configuration and better understand its flight characteristics.

An unmanned 16%-scale aircraft, the EcoJet design is part of a push by the Canadian airframer to deliver a 50% cut in fuel consumption for a future generation of business jets.

The latest pilotless demonstrator first took to the skies last year, but since the resumption of test activity earlier in 2023 the EcoJet has accumulated 10 flights,

Stephen McCullough, senior vice-president of engineering and product development told a pre-NBAA press conference yesterday.

Bombardier had previously flown a smaller 7%-scale model of the EcoJet and was sufficiently encouraged by the results of that test programme to build the larger demonstrator, which will generate results more

representative of a full-size aircraft.

If scaled up, the EcoJet demonstrator's 5.4m (18ft)-long wing would equate to an aircraft with a wingspan of around 35m.

Besides validating the improved aerodynamic performance, Bombardier says the flight tests are needed to improve its understanding of the new control laws re-

quired by the "quite unconventional shape".

"What does this aircraft do? One of the advantages in a larger aircraft is that it gives us the ability to fly a bit longer, a bit faster and a bit higher," says McCullough.

"What this does is it gives us real data to go and optimise and configure the next phase of testing... and keeps us focussed on our North Star of getting to the 50% net reduction in emissions."

McCullough says the flight-test programme will last for "at least a couple of years" as the airframer hones the BWB design.

Although it is too early to detail any results from the test activity, he says the process has allowed Bombardier's engineers to rapidly make iterative changes to the configuration and then return the vehicle to flight.

Bombardier's eventual goal is to have a "tool kit" it can offer to engineers that can be applied to any future aircraft design.

Although applicable to the smaller Challenger series, McCullough says the BWB configuration is "more friendly" for an aircraft the size of the 6,000nm (11,000km)-range Global 6000.

Of the total 50% fuel-burn saving targeted for a future aircraft, around 20% will come from the improved aerodynamic performance of the BWB design, a further 20% from a next-generation propulsion system, and 10% from weight saving.

Flight testing has been conducted at an undisclosed North American location.

New look for CJ3

Textron Aviation is developing an updated variant of its Cessna Citation CJ3, bringing several cabin and cockpit changes to the light jet, including an auto-throttle system.

Revealed yesterday, the \$11 million CJ3 Gen2 is targeted for service entry in 2025. The manufacturer also named fractional operator FlyExclusive as fleet launch customer.

The move marks continued investment by Textron in the middle of its light-jet line-up. The nine-passenger, single-pilot CJ3 sits between the smaller M2 Gen2 and larger CJ4 Gen2.

Textron Aviation is showing off a mock-up of the CJ3 Gen2's cabin at NBAA.

"The upgrades to this airplane, front and back, really came out of customer suggestions," says Textron

Aviation chief executive Ron Draper.

"We conducted a customer advisory board and brought in a number of current owners and had them spend days here working through with our engineers on what features they would really love in the airplane."

Textron Aviation's most recent upgrade of the light jet, which took place last decade, resulted in the CJ3+, a model featuring new Garmin G3000 avionics and updated cabin features.

For the CJ3 Gen2, Textron Aviation is sticking with the same Williams International FJ44-3A engines and holding to the jet's current 2,040nm (3,778km) range.

While the CJ3 Gen2 still has the G3000 flightdeck, it gains an auto-throttle as standard, helping to reduce pilot workload and improve

safety.

Additionally, CJ3 Gen2s will boast 11.4cm (4.5in) more legroom for pilots, an optional enhanced vision system and a Garmin GDL 60 datalink, which can transmit flightplans, automatic database updates and aircraft diagnostics data, says Textron Aviation senior manager of technical marketing Jimmy Beeson.

"The CJ3 series is built upon 20 years of success in the marketplace," says Textron Aviation senior vice-president of global sales and flight operations Lannie O'Bannion. "There is nothing else in the market that competes with the CJ3 Gen2's cabin and performance."

Cabin updates include new upholstery on seats and an "enhanced swivel" feature that lets owners position



Textron Aviation is showing off a mock-up of the CJ3 Gen2's cabin

seats to best accommodate the number of people aboard, says Beeson. "That little feature allows you to change that cabin in a way that best fits your mission for the day."

Textron Aviation offers the twinjet with "sustainable" cabin materials like wool carpets. The CJ3 Gen2 will have new forward steps with a handle, improved entrance lighting, USB-C ports at every seat and a "top-loading" cabin table that deploys

upward from its stowed position and folds down in a "single-handed operation", Beeson says.

In the forward area of the cabin, customers can opt for either a cabinet or a side-facing seat that folds down, providing more storage.

In another change, the CJ3 Gen2's lavatory will be serviceable from outside the cabin, rather than inside, as with previous iterations of the jet.



Embraer says seats and aisle have been widened without the fuselage changing

EX appeal

Latest version of Phenom 100 with revamped interior on display

Jon Hemmerdinger

Embraer's newly unveiled Phenom 100EX is making its global debut at NBAA, with the upgraded light jet on show at the static display.

The Brazilian airframer revealed the enhancements to the smallest executive jet in its portfolio in the run-up to the show, adding new cabin and avionics features, including a runway overrun awareness system.

"We have revamped the complete interior," says Jay Beever, Embraer's vice-president of design operations. "The seats got wider. The aisle got wider. The headliner got taller. And we didn't change the fuselage."

Embraer, which assembles Phenoms in Melbourne, Florida, has priced the Phenom

100EX at \$5 million. The first of the type - scheduled for delivery later this year - will remain with the airframer as a demonstrator; customer deliveries are expected to begin in 2024.

Launched in 2005, the Phenom 100 was last updated in 2016 when Embraer rolled out the 100EV variant, with higher-thrust engines and the addition of Garmin G3000 avionics.

The 100EX retains the same twin 1,730lb- (224kN) thrust Pratt & Whitney Canada PW617F1-E engines as the 100EV, and offers the same 1,178nm (2,182km) range with four occupants.

Phenom 100s can be flown by a single pilot and carry five passengers in a typical configuration but can accommodate up to seven passengers.

"This product reimagines

the entry-level flight experience, offering enhanced comfort, empowering pilots and enriching journeys," says Embraer Executive Jets chief executive Michael Amalfitano.

New standard features on the 100EX include a stabilised-approach system that monitors the jet during approach and warns pilots of abnormal conditions.

Additionally, the 100EX gains a Runway Overrun Awareness and Alerting System (ROAAS) as an option. During approaches, the technology - which employs AI - analyses variables like environmental conditions and aircraft speed, altitude and attitude to predict how much runway distance the aircraft will require and warns pilots of possible overruns.

Embraer director of

market and product intelligence Alvadi Serpa calls ROAAS particularly valuable because the Phenom 100 is a single-pilot aircraft. The company has offered ROAAS on its larger Phenom 300 since 2020.

"It works as an additional pilot [during] a very critical phase of the flight," Serpa says. "It will let the pilot know whether he's well-positioned to stop the aircraft on the available runway."

Garmin's Flight Stream 510 system, which allows the wireless transfer of data between personal electronic devices and the G3000 avionics suite, is also now offered as an option.

Other updates include optional weather-safety technologies, including a wind-shear prediction system and a "3D volumetric weather feature" which can

warn pilots of threats such as lightning and hail, says Serpa: "We are working to make the pilots' lives better and easier, and the operation as a whole safer."

Beever says the 100EX's cabin stands out, noting Embraer equipped it with features found on its larger jets. Engineers also designed the 100EX to be easily maintained - meaning, for instance, that cabin systems are simple to access.

"It's not just about being comfortable sitting in a seat. It's also about, can I fix it easily?" says Beever.

Compared to the 100EV, the 100EX has a wider aisle because the seat armrests now retract into the seats, freeing up space, says Beever. And those seats are redesigned to be 5.1cm (2in) wider where they meet passengers' shoulders, with larger headrests and more cushioning where they meet passengers' knees.

The 100EX's cabin has 1in more headroom than the 100EV thanks to headliner changes and redesigned air vents, Beever says.

To further improve the 100EX's cabin spaciousness, Embraer reduced the width of the two bulkheads behind the pilot seats. Now, those bulkheads do not extend as far into the centre of the cabin, which helps "bring the pilot into the cabin with his friends", says Beever.

"When you're on autopilot and you want to talk to your wife or your friends or your husband, you can. It's a completely different interior experience environment because of the cockpit bulkhead modification."

Embraer had hoped to eliminate the bulkheads entirely, but that idea proved unfeasible due to certification rules.

The 100EX also has a redesigned cabin table that provides 35% more flat space than previously - enough to accommodate two place settings and a tablet computer, Beever says.

Embraer embracing sustainability

With the difficult-to-abate business aviation sector increasingly embracing carbon-cutting technologies, Embraer Executive Jets is "doing its part", according to chief executive Michael Amalfitano.

The business jet manufacturer is hyper-focused on "sustainable technology solutions to propel aviation forward", he said ahead of the show yesterday.

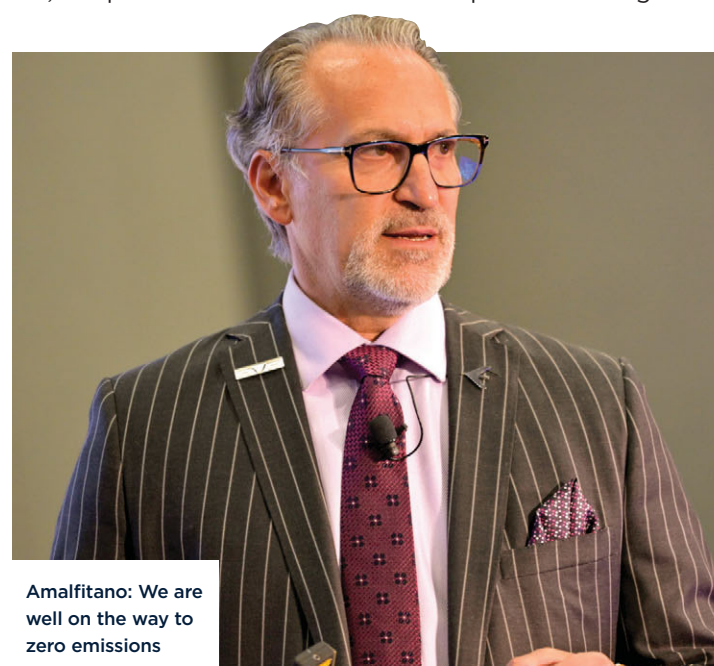
"Advancing greener propulsion solutions is a part of that future," Amalfitano says. "When you look at our enterprise efficiency, it's how you build things -- you have to reduce production time, you have to reduce cycle time, you have to improve quality."

He adds that Embraer Executive Jets is working to reduce costs and boost efficiency at its plants in Brazil, Portugal and the USA.

"We have targets within Embraer to achieve by 2030 fully renewable energy on all our sites," he says, adding that the company is ahead of schedule. Next year, its production facilities in Brazil and Portugal will be powered with 100% renewable electricity, while its plant in Melbourne, Florida will begin conversion to 100% solar power in 2024.

"We are well on our way to achieving the goal of zero emissions, using all renewable energies in how we produce our aircraft," Amalfitano says.

Those initiatives reflect the broader change under way throughout the sector. He cites recent market surveys showing that business jet operators are embracing sustainable aviation fuel as a means of cutting future operational emissions.



Amalfitano: We are well on the way to zero emissions

Boeing offers off-the-shelf interiors

Initiative will help speed and simplify buying process, says airframer

Pilar Wolfsteller

Boeing Business Jets has unveiled "BBJ Select", a new offering which allows potential customers to configure their aircraft interior through a modular concept as well as simplifying and accelerating the purchasing process.

"We've streamlined the engineering, the design, the build and installation processes," BBJ president Joe Benson said yesterday.

"We accomplish this through custom modules that customers can select, throughout different zones in the aircraft, and all of this also enables us to not only compress the overall completion timeline, but also to drive out one-time costs and pass those savings on to our customers, so as to offer this completed turnkey BBJ at a very attractive fixed price," he adds.

The BBJ Select offering will be available on the US airframer's 737 Max 7 aircraft, and first deliveries are expected in 2026.

BBJ is working with partners ALOFT Aero Architects



Boeing has released a series of impressions of the interior concepts

and Greenpoint Technologies to make this new service available to potential customers.

In order to shave time off production timelines, Americas sales director Drew Gough says that the pre-engineered aircraft interior modules and the auxiliary

fuel tanks will be installed concurrently.

That said, the company is offering 144 interior layout options in three colour palettes, with additional material choices within those colour schemes, the company says. That ensures that "it's likely we never build

two identical BBJ Select airplanes", Gough says.

The company is offering BBJ Select exclusively for the Max 7, and in addition to the traditional purchasing process of a completely bespoke aircraft which Boeing has been offering for 27 years, the company says.

SF50 hits 500

Cirrus Aircraft arrives at NBAA highlighting the 500th delivery of its ultra-light SF50 Vision Jet, an achievement that came seven years after the manufacturer handed over the first example.

To mark the occasion, Minnesota-based Cirrus is designing five limited-edition variants of the seven-passenger jet.

"With the delivery of the 500th Vision Jet, Cirrus Aircraft celebrates the marketplace success of a category-defining aircraft," Cirrus chief executive Zein Nielsen says.

He notes Vision Jets come with advanced features that include the Cirrus Airframe Parachute System and Garmin's autoland system.

"Five Limited Edition Vision Jet liveries were created by Cirrus Aircraft's Xi Design team to celebrate this industry milestone," Cirrus says. "Owners chose from five exterior color options to complement the obsidian black and Vision blue paint."

Xi is a Cirrus programme that allows customers to customise aircraft designs. The five unique Vision Jets will also have a touch of customisation in

their cabins, which will be adorned with badges reading "500th Limited Edition".

Cirrus was among a few manufacturers to have essentially created the very light jet segment when in 2007 it revealed the Vision Jet development project.

Powered by a single Williams International FJ33 turbofan, the type made its maiden flight in 2008 and Cirrus delivered the first Vision Jet in 2016. It updated the aircraft in 2019 to the G2 version, which had a higher maximum altitude and an auto-throttle system, and in 2021 introduced the G2+ variant with better take-off performance.

Vision Jets can cruise at 311kt (576km/h) and have 1,275nm (2,361km) of range.

One of the limited edition SF50s



Cirrus

Back to normal for industry

While the Covid-19 pandemic was a "great accelerator" for the business aviation sector, the market for private jets has cooled back to familiar-looking levels.

That is according to consultant Rolland Vincent, one of several industry experts who outlined their views on the strength of the industry as part of an NBAA panel on the eve of the show.

"Whether it's utilisation or deliveries, we're back to pre-pandemic levels," he said.

Vincent forecasts 775 business jet deliveries this year - provided that Gulfstream's G700 is certificated soon - compared with 800 aircraft deliveries in 2019.

"The industry was basically dead from the financial crisis until 2018," added Ron Epstein, a senior equity analyst at Bank of America. "In 2018, we started to have an earnest recovery. Then Covid happened and everything was weird; the market got white-hot. Now, we are just normalising back to where the recovery was in 2018."

Ongoing supply chain issues are a double-edged sword for the business aviation sector, Epstein said. "The good news is that it probably extends your cycle because nobody can deliver anything to you," he says. "So, that means there's going to be more pent-up demand for aircraft for a longer time."

Looking ahead, Jeffries research analyst Sheila Kahyaoglu forecasts 8% year-on-year growth in 2024 and similar levels the following year, with a murkier outlook for the rest of the decade.

Emerging low-emissions technologies will likely take hold among business jet manufacturers sooner - rather than later, Vincent added. "Hybrid-electric is coming," he said. "I think that's the next stage." However, he noted that all-electric propulsion technologies are unlikely to power "capable jets" in the business aviation sector for "25 or 30 years".

Business aviation's increasing interest in low-emissions technologies - including ramping up adoption of sustainable aviation fuel - promises to be a major theme of the week.

TwoTwenty twosome

Comlux completes deal for pair of narrowbody-derived jets



The aircraft is making its NBAA debut

Dominic Perry

Airbus Corporate Jets and Comlux have taken orders for another two ACJ TwoTwenty VIP airliners, with completion activi-

ties to be undertaken by the Swiss company under its exclusive arrangement with the airframer.

The news came as ACJ gave an NBAA debut in Las Vegas to the ACJ TwoTwenty, its first appearance at the show since the model's

launch in October 2020.

Outfitting of the jets – ordered by two separate clients – will take place at Comlux Completion's facility in Indianapolis, Indiana.

Under its deal with Airbus, Comlux is the exclusive completions partner

for the first 15 ACJ TwoTwentys, which are based on the A220 narrowbody airliner.

Earlier this year it delivered the first example to Dubai hotels and resorts operator Five, which is flown on its behalf by

Comlux Aviation. A second aircraft is set to be handed over to an undisclosed customer in February 2023, while the third will be delivered in the coming days direct from Airbus's A220 production line in Mirabel, Canada.

Christophe Pelet, head of Comlux transactions says: "We are proud to count these two new TwoTwenty orders, days before our US cabin completion facility receives its third ACJ TwoTwenty directly from Airbus Canada."

ACJ argues that the modified twinjet is creating a new market segment – what it calls the "Xtra Large Bizjet".

It claims the ACJ TwoTwenty offers more floor space – allowing a six-zone cabin – and better operating economics and maintenance costs than traditional ultra-long-range business jets.

"The ACJ TwoTwenty is set to become a game-changer in the business aviation market," says Sean McGeough, vice-president commercial ACJ for North America.

"It offers a unique combination of unmatched cabin space, intercontinental range, state-of-the-art amenities, and competitive pricing."

Powered by twin Pratt & Whitney PW1500G engines, the ACJ TwoTwenty benefits from the global maintenance and parts support network for the commercial A220 family.

Hartzell has new owner

Tailwind Technologies has sold Hartzell Aviation to Arcline Investment Management, a private equity firm with \$8.9 billion in cumulative capital commitments.

"As investors exclusively focused on critical suppliers to critical industries, Hartzell's portfolio of flight-critical propeller and engine subsystems for a large and long-lived installed base fits perfectly with Arcline's strategy," the new owner says. The companies are not disclosing the terms of the deal.

Hartzell, which is exhibiting at NBAA this week, operates two complementary business units: Hartzell Propeller, which makes high-performance propeller systems and components, and Hartzell Engine Tech, which designs and manufactures aircraft engine accessories and adjacent products.

Pilatus perks up PC-24

Pilatus has revealed an update to its PC-24 light jet, with the new variant seeing improvements to payload and range, as well as upgrades to its passenger cabin.

Although the enhancements were revealed in the run-up to NBAA on 10 October, the Swiss airframer has brought the first updated example of the twinjet to Las Vegas.

Changes see the payload increase by 272kg (600lb) to a maximum of 1,410kg, while range with six passengers grows by 200nm (370km) to 2,000nm. Maximum take-off weight rises to 8,500kg from 8,300kg previously.

Deliveries of the upgraded version are due to start in 2024, Pilatus says. The modifications will be incorporated from MSN501 onwards.

Cirium fleets data lists MSNs for the current model running up to MSN335, with a break to MSN501; that aircraft is registered as HB-VGA and is owned by the manufacturer.



The latest variant is on display at the static

Igor Medici, PC-24 chief engineer, says a 300-strong product improvement team performed "a lot of detailed work to scratch and reduce the weight down without changing the heart and how the aircraft flies".

Bruno Cervia, vice-president of engineering, says the team refined "both wing and fuselage structural elements to reduce the airframe empty weight while simultaneously increasing the maximum gross take-off weight limit."

Updated manufacturing processes included "new ways of making parts that gave us more design freedom", adds Tobias Waerber, PC-24 upgrade project engineer.

In addition, the airframer has incorporated a predictive maintenance system on the PC-24. This will see automated transmission of key aircraft data on landing to Pilatus which will analyse the data and issue a "predictive recommendation" if necessary.

Changes to the cabin see the introduction of a large side facing divan which can be converted into a bed, a reduction in ambient noise levels, and space optimisation through the refinement of cabinets and storage areas.

Pilatus has also incorporated a new integrated cabin management system from Lufthansa Technik, featuring a 10in touchscreen controller with 3D moving map, four high-fidelity cabin speakers with a sub-woofer option, mood lighting, USB ports, and a media storage server.

It is the first time the German cabin specialist has collaborated with Pilatus.

Launched in 2013, the PC-24 entered service in 2018.

It is powered by twin Williams International FJ44-4A engines.

Cirium data shows 217 of the twinjets are in service, with a further 29 on order.

Meanwhile, Pilatus has approved the installation of Aviation Clean Air's Ionization Purification System for factory- or retrofit on the PC-24.

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First-timer effect

Business aviation still buoyed by demand during pandemic, says Honeywell



Jimenez-Serrano: Pace of new orders slowing although deliveries still high

Jon Hemmerdinger

Honeywell predicts business jet manufacturers will deliver 8,500 aircraft worth almost \$300 billion over the next 10 years, a figure unchanged since its last forecast in 2022.

Unveiling the 2023 edition of its Global Business Aviation Outlook on the eve of NBAA, Honeywell sees a sector still buoyed by

the increased demand for private aviation experienced on the back of the Covid-19 pandemic.

Business jet operators are expanding their fleets rapidly and aircraft manufacturers are making progress in hiking production and delivery rates to match demand, the report notes.

"We have seen fleet-expansion rates increase for the third year in a row," says Honeywell strategy manager Javier Jimenez-Serrano. He

says the trend reflects the surge of orders that came during the pandemic, driven partly by demand from first-time buyers.

Honeywell expects manufacturers will deliver 8,500 new business jets, worth an estimated \$278 billion, between 2024 and 2033, based on surveys of operators, manufacturers' production plans and economic analyses.

Of the total 8,500 expected deliveries, about 500 will

go to new business jet users and 4,000 will take place within five years, Honeywell anticipates.

North American operators will likely receive 64% of jets to be delivered within five years, while those in Europe will take 14%, Asia-Pacific 11%, Middle East 6% and Latin America 5%.

Large-cabin, long-range business jets will account for 69% of all business-jet sales over five years, Honeywell predicts.

"Our industry is on the upswing. Operators are showing confidence with plans to expand their fleets at a faster rate than any time in the previous decade," says Honeywell president of aftermarket Heath Patrick.

The Covid-19 pandemic prompted aerospace suppliers to slash staff and production, but also triggered a spike in demand for private aircraft.

Manufacturers rushed to ramp up production but struggled due to material and worker shortages.

The sector is still rebounding but has been making real progress: Honeywell expects 2024 deliveries to be 10% above 2023 levels, with the value of those sales expected to jump 13%.

While deliveries are up, Honeywell notes that fol-

lowing pandemic highs, "the pace of new orders for jets has slowed". So has demand for business aviation travel.

Honeywell predicts full-year 2023 business aviation flight activity will be down 4% from 2022 levels due to "factors such as inflation and the resumption of commercial air service on key routes". But flight activity this year will still be about 10% above pre-pandemic 2019, Jimenez-Serrano notes.

"It is anticipated that flight activity will stabilise in 2024 and return to growth in 2025," Honeywell says.

Jimenez-Serrano says used jets remain in short supply and that purchase rates for those aircraft have not significantly changed since last year.

What has changed is aircraft operators' interest in reducing their carbon output.

Honeywell's survey has for several years included questions on sustainability. The 2021 survey revealed that two-thirds of operators had no plans to cut emissions, falling to 40% in 2022 and to 33% this year.

"It's flipped," says Jimenez-Serrano. "People are aware of the options... People are starting to plan what they are going to do."



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Rolls-Royce runs Pearl pair on SAF

Rolls-Royce has successfully run its Pearl 15 and Pearl 10X engines on 100% sustainable aviation fuel (SAF) in a series of ground tests conducted at its Dahlewitz site in Germany.

In addition to validating the SAF compatibility of the two engines – powering the Bombardier Global 5500/6500 and Dassault Aviation Falcon 10X, respectively – Rolls-Royce ran the same Pearl 10X back to back with conventional jet fuel and the waste-derived alternative to assess the latter's environmental performance.

These evaluations confirmed SAF's "cleaner combustion", producing lower levels of particulate matter; previous studies have shown soot particles are a major factor in contrail formation, a large contributor to atmospheric warming.

"In combination with the low NOx combustor technology of the Pearl 10X and its additive manufactured combustor tiles, a reduction of all emissions was achieved," says Rolls-Royce.

Meanwhile, the manufacturer has celebrated the 10th anniversary of its round-the-clock operational service desk for business aviation customers.

Located in Dahlewitz, the customer support operation has, since its 2013 introduction, helped Rolls-Royce achieve an average missed trip rate of 99%.



Odegard (pictured left with Starling): Overall feeling of dealers is extremely positive

Staying positive on pre-owned

Pilar Wolfsteller

The International Aircraft Dealers Association (IADA) says the pre-owned business jet market continues to be strong in most categories, even as it adjusts to a more normal post-pandemic environment.

"The overall feeling of the dealer group is extremely positive," IADA vice-chairman John Odegard tells *Flight Daily News*. "I'd say we're cautiously optimistic.

IADA, which recently published its market report for the third quarter of 2023, says that aircraft valuations remain stable overall, with prices of newer models and

higher pedigree aircraft coming off their peak by between 5% and 10%, and older models have reduced in value by 15-20%.

"Pricing adjustments have really been minimal, which surprised us – we expected to see more," says Wayne Starling, IADA's executive director. Pre-owned high-quality late models are most in demand, he says, with sellers asking for premiums on those kinds of jets.

"The inventory there is still down so that keeps the prices up," Starling adds. "We're seeing price reductions in the older, less-desired aircraft, and that's affecting the overall pricing."

But, moving into the fourth quarter, "Demand is still there and activity is still there," Odegard says.

While sales are encouraging – with buyers looking to cash in on tax benefits before the end of the year – 2024 could be tougher as more supply could creep into the marketplace, in addition to external factors which may play a role.

"When you see geopolitical stuff going on, the economic situation, a presidential election year coming up – I think there's a sense that we could see a little bit more of a slowdown," he says.

The organisation surveyed more than 1,000 IADA members, consisting of accredited dealers and certified brokers, OEMs, and IADA Products and Services members.

Viasat signals Ka-band boost

Communications company Viasat is unveiling enhanced in-flight broadband service options that blend its Ka-band offer with Jet ConneX from Inmarsat, its former rival that it acquired earlier this year.

The services will be available to business aviation customers that use Viasat's existing GAT-5510 terminal as well as three Jet ConneX terminals, Satcom Direct's Plane Simple, Orbit's AirTRx30, and Honeywell's JetWave X, and will be available in early 2024.

Viasat claims its network has more Ka-band capacity than any other other wi-fi provider.

Kai Tang, Viasat's head of business aviation, says: "We're excited about the positive impact that Viasat's acquisition of Inmarsat will deliver to our business aviation customers."

Ahead of the show, Viasat's Ka-band GAT-5510 in-flight connectivity system was approved by the Federal Aviation Administration for use on the Dassault Falcon 900EX.

Satcom Direct has also said at the show that it will be offering business jet operators the chance to pay an hourly rate for Jet ConneX for the first time.



Tang: Customers will benefit from acquisition

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In brief...

InSight STC

Part 145 repair station Trimec Aviation and Universal Avionics (UA) are completing the first Dassault Falcon 2000/EX supplemental type certificate installation of UA's InSight flight display system. The new system replaces the Collins Pro Line 4 and includes satellite-based augmentation system (SBAS)-capable flight management systems, UA's connectivity ecosystem, and a UniLink communications management system.

Sheltair scholars

FBO network Sheltair and Avfuel have announced six recipients of their annual Future Takes Flight scholarship. The initiative provides \$5,000 to six people "dedicated to business aviation" to allow them to further their education within the sector. This could include learning to fly, advancing their pilot skills, or technician training. They are Lei Huot, Joel Mink, Justin Hernandez, Katrina Kienitz, Bailey Pollard, and Kyle Keyser.

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2X will take part in aerial demonstrations at the static



Volo that!

German developer in eVTOL flying first at NBAA

Murdo Morrison

Visitors to the static display have a chance to see daily live flights by an electric vertical take-off and landing (eVTOL) aircraft for the first time at the show.

German firm Volocopter is to demonstrate its 2X – the

prototype for its planned two-seat Volocopter air taxi – over Henderson Executive Airport, with each sortie lasting about 4min and at an altitude of up to 200ft, with a single pilot on board. Timings have not been announced.

Volocopter, which is exhibiting at the static, aims to be possibly the first eVTOL

developer with a certificated aircraft in service, with plans for passenger flights during the Paris Olympic Games next summer.

It is targeting certification from the European Union Aviation Safety Agency in early 2024, with Federal Aviation Administration approval shortly after. The Bruchsal-based company says it

was granted a special permit by the FAA to fly at the airport during the show, under its light sport category.

Volocopter, which is headed by former Airbus Defence & Space chief executive Dirk Hoke, hopes the demonstrations will help convince the business aviation community of the potential of advanced air

Show takes big step on SAF

Aircraft flying into Las Vegas's three airports for the convention this week will be able to fill up with sustainable aviation fuel (SAF) supplied by World Fuel Services.

World Fuel will provide 150,000 litres (40USgal) of fuel at Henderson Executive Airport (HND), more than double the SAF available there for the 2021 event, and will also offer the fuel at North Las Vegas Airport (VGT) for the first time. Signature Aviation and Atlantic Aviation will be the agents for the fuel at Harry Reid International (LAS).

"Providing SAF for aircraft departing from this year's convention not only makes the event more sustainable but allows NBAA members to take an active role in helping the industry to achieve our net-zero tar-

get," says NBAA President and CEO Ed Bolen.

Atlantic Aviation says it will also be supplying SAF to customers during the show from its Californian FBOs at Los Angeles International, Long Beach and Stockton, as well as offering a book and claim service.

Book and claim is a transactional process that lets customers buy SAF that is not available locally but is consumed elsewhere. The purchaser of the SAF receives credit for the environmental impact of the renewable fuel that is dispensed as a drop-in fuel elsewhere in the world. Proponents claim the method reduces the environmental impact of physically trucking SAF from refineries, while increasing its use across the sector.

Around 600 Twin Commanders are still in service.



Life goes on for Twin Commander with Ontic

Thirty-seven years after the last example was built, the Twin Commander retains a loyal band of operators, and legacy parts specialist Ontic – the latest owner of the type certificate – is at the show to support them.

The UK-based company – which is best known for buying the rights to mature components from their original manufacturers and continuing to produce them for the aftermarket – took

on responsibility for Twin Commander support when it bought Firstmark in 2018.

There are around 600 Twin Commanders still in operation, more than half of them in the USA. The Honeywell TPE331-powered twin turboprop was introduced in 1960 and production ended in 1986.

"It's an interesting business for us that is proving really resilient," says Matthew Pritchard, vice-presi-

dent of customer engage-

ment. "There is a ton of life left in the airframes. I don't see it declining significantly."

Ontic manages the supply chain for the type, as well as a network of approved service centres, and partners with wholesaler AAR to provide parts. It also has the original tooling for the programme, so could fabricate large components or pieces of structure if needed, says Pritchard.

He says there is a "fantastic operating community" of Twin Commander Owners. "That's the bit that's different. They are passionate. We have a very close connection with them."

Ontic also recently made its "largest ever" acquisition, the Honeywell thrust reverser actuation system fitted to the GE Aerospace CF34 that powers the Challenger 605/650 among other types.

The company will move production from Phoenix to its new factory in Staverton, near Gloucester that it acquired from Triumph in 2021, along with several product lines.

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Pace shuttle

Fancy travelling between the convention center and Henderson Executive airport in 11min, while enjoying breathtaking aerial views of the Las Vegas Strip?

After debuting in 2021 – the last time NBAA was in town – the Blade helicopter shuttle flights are back at this year's event, with delegates able to buy them on a per-seat basis.

Blade describes itself as a "global urban air mobility platform" that sells helicopter and other short-distance flights via an app, enlisting the services of independent operators.

At this year's show, Blade is working with Los Angeles-based tour specialist Orbic Air, with each Airbus Helicopters H130 flight seating up to six passengers.

However, expect space to be in short supply. "In 2021, every seat was sold out," says NBAA president and CEO Ed Bolen.

While Blade currently uses helicopters on routes such as Nice-Monaco, JFK-Manhattan, and Vancouver-Vancouver Island, its goal is to offer flights on electric vertical take-off and landing (eVTOL) types.

"This programme not only demonstrates the efficiency of urban air mobility, but highlights use cases that are relevant as we transition from conventional rotorcraft to quiet, emission free electric vertical aircraft," says Blade president Melissa Tomkiel.

To book seats visit blade.com/nbaa



Every seat was sold out in 2021

Bombardier goes all in with Elite

Bombardier has introduced the latest enhancement to its Smart Services per-hour support programme.

Smart Services Elite allows customers to purchase a single package that covers everything from scheduled maintenance to mobile repair under a single point of contact and bill.

The Canadian airframer says its latest offer, which it announced at EBACE in May, is "the most comprehensive peace-of-mind cost-per-flight-hour programme that brings budget predictability".

According to Bombardier, more than 1,600 aircraft, representing more than 10 million flight hours, are enrolled in its Smart Services programmes.

"Smart Services Elite is the ultimate easy button for our customers when it comes to budget predictability and cost protection for all their maintenance needs," says Paul Sislian, executive vice-president, aftermarket services & strategy.

Jet Support Services move is just capital

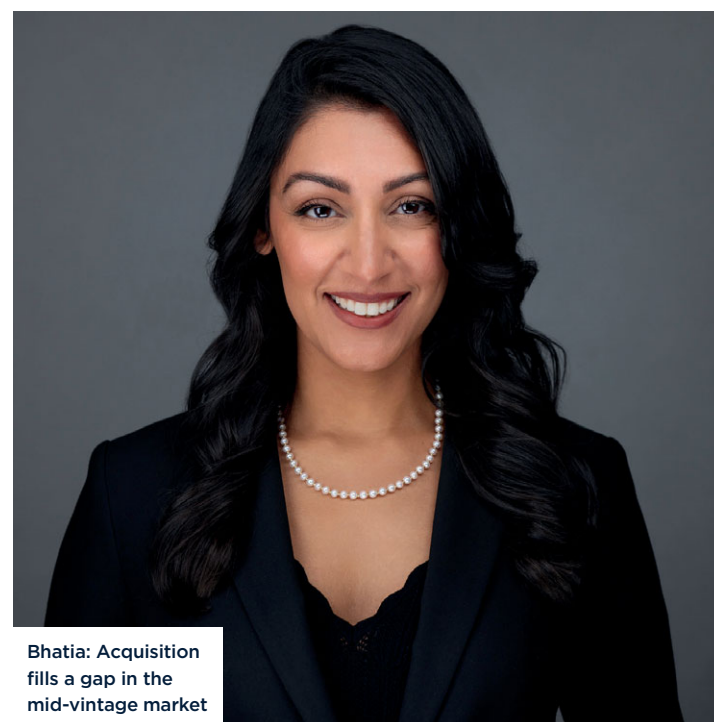
Murdo Morrison

Maintenance support and advisory specialist Jet Support Services (JSSI) is debuting its latest business aircraft financing business at the show, after buying Shearwater Global Capital in May.

The newly renamed JSSI Aviation Capital "fills a gap" for asset-based lending for acquisitions of "mid-vintage", or 10- to 20-year-old aircraft, according to JSSI's chief marketing and strategy officer Megha Bhatia.

It is a segment of the market on which traditional lenders tend to focus less, she says.

It is the latest expansion for the 30-year-old company which is known for its brand-agnostic hourly-cost maintenance programmes but has expanded over the past decade into parts leasing, maintenance tracking software, and consultancy services, through a series of acquisitions and organic growth. It purchased software



Bhatia: Acquisition fills a gap in the mid-vintage market

companies Traxxal and SierraTrax, as well as Conklin & DeDecker, which provides independent cost benchmarking to operators and brokers.

The strategy has been to "encompass a full set of solutions, providing services

to customers at every stage of aircraft ownership", from acquisition and financing through managing maintenance and other ownership costs, says Bhatia, who joined JSSI in June from Rolls-Royce, where she worked on that company's

CorporateCare aftermarket programme.

One of the fastest growing areas of JSSI has been its parts and leasing business, which now operates two parts warehouses and has 100,000 lines of inventory, including 60 engines and auxiliary power units, sourced from more than 400 vendors, she says.

The business has come into its own during the past 18 months as pressures on the component supply chain have intensified. "Recent supply chain problems have shown the need for a single-source parts solution," she says. "If we don't have something in stock, our buyers have great relationships with vendors and work hard to obtain that part."

JSSI claims to be the largest independent provider of hourly cost maintenance programmes and has relationships with operators of almost one third of business jets in the global fleet.

"We see ourselves as an advocate for the customer," says Bhatia. "We are able to leverage our buying power to advocate for the operator."

Gogo is offering demonstrations of its exciting new LEO broadband service at the static



Why not give Galileo a go?

Gogo Galileo, the new low-Earth-orbit (LEO) global broadband service from Gogo Business Aviation, is on display and available for you to take for a test drive at the static display at this year's show.

Gogo has an aircraft at Henderson Executive Airport where it is conducting live demos throughout the event, and Gogo is actively scheduling appointments for in-person demos.

"We want people to come out and try the service for themselves," says Sergio Aguirre, Gogo's president and COO. "The demonstrations are on the Eutelsat OneWeb network, which is live today, and we're using our exclusive electronically steered antenna (ESA). You don't need to take our word for it. We conducted similar demonstrations at EBACE earlier this year and the system wowed."

Gogo Galileo is designed specifically for business aviation with two antenna options that will fit virtually any size business aircraft from large turboprops like a Pilatus PC-12, or a Beechcraft King Air 350, and light jets such as a HondaJet or an Embraer Phenom 100, to the largest ultra-long-range large-cabin aircraft. The Gogo Galileo HDX antenna has a small form factor that will fit on smaller aircraft, and earlier this year Gogo announced the FDX antenna with a larger form factor.

"The FDX antenna is a premier solution offering all the benefits of the more compact HDX antenna, while offering fast data speeds, higher throughput,

and lower latency than current geosynchronous (GEO) satellite systems," Aguirre says. "It will perform as well or better than anything else in the market today, supporting multiple unique VPN, interactive video, and gaming sessions simultaneously."

Gogo Galileo is one of a couple of new LEO-based offerings that will deliver low-latency performance comparable to terrestrial broadband services, but Gogo's offering has some distinct advantages. The Gogo Galileo network is enterprise grade so service-level agreements will be offered, and the system, including its exclusive ESA, is being built by business aviation experts.

"We are focused solely on business aviation versus other LEO networks which are serving a general consumer base on a massive scale on the ground," says Aguirre. "Business aviation is different. It requires a high level of service and a personal touch. We believe we have the best network for business aviation, an onboard system that is sustainable for the long haul with easy upgrades to new technologies, and a customer support organization that is second to none."

Eutelsat OneWeb, Gogo's network provider, has completed its full LEO constellation and the network is operational today. It is expected to be aero-ready in early 2024 compared to other LEO network constellations that are still being launched. In addition, Gogo and its antenna

provider, Hughes, completed preliminary design review of Gogo's exclusive electronically steerable antenna (ESA) assembly earlier this year.

"We're on schedule thanks to the work being done by our team in conjunction with the teams from OneWeb and Hughes, and testing with the antenna prototype on the AVANCE platform is underway," says Aguirre.

The Gogo Galileo system is compact, requiring just one AVANCE line replaceable unit (LRU) inside the aircraft, and the ESA antenna assembly, with a single cable in for power, and a single ethernet cable out for data.

That's a significant difference from today's geosynchronous satellite (GEO) systems which are big and heavy, require multiple LRUs, and a large antenna. And compared to other LEO offerings, with Gogo AVANCE customers can also take advantage of Gogo's air-to-ground network in North America – delivering improved performance and redundancy – with controlled costs from a single provider.

"We are focused on serving all of business aviation with Gogo Galileo, just like we did with our ATG network in North America several years ago," says Aguirre. "The majority of midsize and smaller aircraft operating outside the USA have no viable broadband solution today and Gogo Galileo will give everyone in business aviation the ability to have an exceptional inflight Wi-Fi experience."



Gogo Galileo brings broadband to many more small and midsize jets

Change means operators of older systems must act soon to stay connected

Gogo updates to LTE

Gogo is moving its Gogo Biz air-to-ground (ATG) network to LTE technology and if you own an aircraft that uses a "legacy" Gogo system (ATG 5000, 4000, 2000 or 1000) you will be impacted and need to take action.

Gogo expects to transition to the new LTE network, which stands for long-term evolution, early in 2026, and at that time anyone using a legacy Gogo system will lose their inflight connectivity unless they upgrade to an AVANCE L3, L5 or LX5 system before then.

And while 2026 might seem like a long time down the road, demand for shop space at MROs is already becoming limited, and with more than 3,000 aircraft flying with a legacy system on board today, a change to AVANCE should be scheduled soon before space gets even tighter.

Those who wait and don't act sooner than later are at risk of losing their ATG service before they receive the upgrade to AVANCE.

"The migration to LTE technology for our network is great news for our legacy customers," says Sergio Aguirre, Gogo's president and COO. "When operators put an AVANCE system on board, they'll see an immediate impact, and when the LTE network is turned on, they'll see another boost in performance. The key here is to get the upgrade done as soon as possible and we're offering significant incentives to make it affordable and as easy as possible."

The incentives being offered to customers who upgrade to AVANCE are significant: \$50,000 for an upgrade to AVANCE L5 and \$25,000 for an upgrade to AVANCE L3 (MAX and PLUS configurations only).

"The incentives will expire, though, and there will be limitations on dealer availability," Aguirre explains. "Getting the upgrade completed sooner than later ensures you'll get space at a participating MRO. The closer to the deadline we get, the less likely you'll get a dedicated slot."

As it relates to aircraft downtime, Aguirre says that the company's engineers have worked hard to develop installation guidelines for AVANCE systems so that upgrades can be completed as quickly as possible.

"It's not a difficult installation," he says. "For



Customers are being urged to make the move to LTE as soon as possible

the AVANCE L3, you change the LRU, add some additional I/O, and, in some cases, may need to and change cabling. AVANCE L5 also requires that you change the belly-mounted antennas to bidirectional units.

"Once the AVANCE hardware is in the airplane, then future upgrades will be as simple as downloading new software," Aguirre continues. "The simplicity of the installation is a big reason why we are encouraging customers to upgrade when their aircraft is in for routine maintenance or inspections. It's not extensive; it just takes planning."

Gogo has been planning for the move to LTE for a few years now.

"About seven or eight years ago, we recognized

that a few things were going to happen that would have a big impact on our industry," says Aguirre. "We recognized that our ATG network was getting a little long in the tooth and we were going to need to plan for an upgrade to LTE."

As a point of clarification, there is nothing wrong with Gogo's current network, which thousands of Gogo customers rely on today for their inflight connectivity, but Gogo says the transition to LTE was necessary because the global telecommunications industry is leaving 3G connectivity comprehensively.

That is why there's the need to upgrade to AVANCE. AVANCE systems come equipped with an LTE air card already installed so they'll be ready to operate when the new network goes live. ▶

Gogo raises bar with Vision 360

Gogo has set a new standard for inflight entertainment (IFE) in business aviation with Gogo Vision 360 – a premium IFE service that features a compelling and comprehensive suite of services, including the leading Hollywood releases and TV programming, news, digital magazines and a stunning 3D premium moving map.

No other connectivity provider in business aviation has a similar offering.

The service offers unlimited streaming and all of the content is stored on an internal server in an AVANCE LRU, so it doesn't require any network connection to use in flight, and therefore doesn't gobble up valuable bandwidth.

Another big benefit: all Gogo Vision content is updated automatically each month through an over-the-air delivery via Gogo Cloudport, either



in a customer's own hangar or at Gogo Cloud locations throughout the U.S. and in Europe. No other IFE service delivers content updates over-the-air.

There are 30 digital magazine titles available on Gogo Vision 360 from well-known titles including Golf Digest, Forbes, Wine Spectator, Newsweek, Wired, People, and Town & Country. Customers onboard will get the most current issue as well as the previous issue for each publication.

Gogo Vision 360 is available for activation via a call to Gogo customer care as a new service or as a free upgrade for existing Gogo Vision customers with a Gogo AVANCE L5, L3 or SCS system installed on their aircraft. Activation will occur automatically over the air with no downtime required.

Pilots and operators cannot get enough of Gogo's latest system

AVANCE delivers the benefits

Gogo has been on a mission for the past three decades to continuously deliver the best inflight connectivity solution for every business aviation aircraft, regardless of the size of the aircraft or where it flies.

As part of that commitment to provide the best inflight connectivity experience, Gogo will be migrating its network to LTE, expected to be completed in early 2026.

Anyone flying with one of Gogo's legacy ATG systems (5000, 4000, 2000 or 1000) will need to upgrade to an AVANCE system by early 2026 – that is when the network will switch completely to LTE and the old network will be shut down.

The upgrade to AVANCE will deliver immediate benefits for legacy ATG customers, and another boost when the LTE network is turned on. Some customers have already made the switch and they are already noticing the advantages AVANCE provides, including an immediate boost in performance.

Jason Talley is a pilot who flies a Citation CJ2+ primarily for his multiple business ventures. He recently upgraded from a Gogo ATG 5000 to the AVANCE L3 and talked about the benefits he is enjoying as a result of the upgrade.

"I was blown away by the difference," Talley says. "I'm not easily impressed and the L3 is so much more than I was expecting. The ATG 5000 was adequate, but with the L3 it's a night and day difference. The AVANCE upgrade was 100% worth it. I was wholly unprepared for the difference in performance. Even the upgrade time was minimal,

just five days."

AVANCE also provides several exclusive features that bring benefits other systems in business aviation can't provide, such as Gogo DASH and Gogo Vision, the leading inflight entertainment service in business aviation. Both are standard with all AVANCE systems.

With DASH, operators receive staged updates via email or through the DASH app. When a notification arrives, they need do little more than click to receive the latest update, just like you do on today's smartphones.

"With AVANCE, we utilize the DASH tool to configure roles, show coverage maps, contact support, and monitor bandwidth," says Ryan Johnson, who is the pilot of a Dassault Falcon 900EX with an AVANCE L5 installed. "I fly a family-owned aircraft and at any given time there may be different generations on board from grandparents to young children. Sometimes there are as many as 15 people a flight. When the younger generations are on board, we notice the digital consumption increases tremendously and the L5 meets those needs."

Johnson also sings the praises of Gogo Vision. The family he flies takes several international trips a year, and when they leave the shores of North America, they are limited to very slow GEO L-band satellite service, for only low-bandwidth uses like email. But with Gogo Vision on the AVANCE L5, they can choose from hundreds of current and classic movies, TV shows, and e-magazines – all without using any bandwidth and it's available



Talley says L3 is 'so much more than I was expecting'

anywhere in the world the family flies.

"I used to go and buy a bunch of specific DVDs before flights and sometimes I would often need to bring 15-20 of them on the aircraft with me," Johnson says. "Gogo Vision eliminated all of that. The family loves it and it works well. And because we fly outside North America, I can't wait to get Gogo Galileo installed."

Since the AVANCE L5 is already installed, adding Gogo Galileo satellite service to the existing ATG service on the aircraft will be a relatively straightforward addition.

All that will be required is a single, small fuselage-mounted electronically steered antenna (ESA) and just two cables – one for power in and the other for ethernet out.

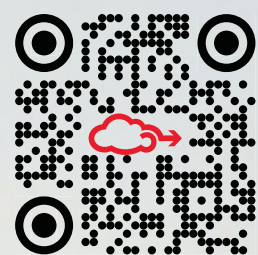
And with ATG and satellite service both being provided through a single provider, Johnson will be able to manage costs and simplify operations with a single bill. ▶



Johnson: Aircraft owner's family can access hundreds of movies

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From tennis superstars to a pioneering woman pilot, this year's show will serve up a not-to-be-missed programme of speakers, discussions, and educational sessions

Look who's talking

As ever, alongside the static park display and the extensive exhibition halls, the NBAA convention offers visitors a packed programme of educational sessions, panel discussions, and inspirational talks from celebrity guests.

Husband-and-wife tennis greats Andre Agassi and Steffi Graf open today's keynote sessions. Beyond their sporting successes - Agassi is an eight-time major champion and Graf has won a staggering 22 Grand Slam singles titles - the pair are highly successful entrepreneurs and philanthropists, funding several charitable and educational projects. The couple - who live near Las Vegas - are regular users of business aircraft.

Agassi launched his Andre Agassi Foundation for Education, which promotes educational access, in 1994. Since 2001, the foundation has run a tuition-free academy in West Las Vegas that has 1,200 students. Graf founded Children for Tomorrow in 1998. The organization provides psychological help for children and families who have suffered trauma from war or abuse.

Also appearing today is Jared Isaacman, the aviator and entrepreneur, who is best known for commanding Inspiration4, the first all-civilian mission to orbit, in 2021. Isaacman, and three others, flew a three-day, low-Earth orbit journey on a SpaceX Dragon spacecraft. The journey was part of a fundraiser for the St Jude Children's Research Hospital, to which Isaacman, the founder of the Draken airborne adversary support military company and payment processor Shift4, donated \$100 million. A pilot since the mid-2000s, he set a world record for circumnavigating the



Tennis greats Andre Agassi and Steffi Graf are the stars of today's opening session



Daymond John is famous for appearing on TV's Shark Tank



Nicole Malachowski was the first female member of the United States Air Force Thunderbirds display team

globe in 2009.

Tomorrow's keynote stars are television personality Daymond John, famous for being one of the Shark Tank panel, and Col (rtd) Nicole Malachowski, the first female member of the United States Air Force Thunderbirds display team.

John overcame dyslexia to launch FUBU, a sportswear brand, from his mother's house in Queens, New York City, building it into a \$6 billion revenue business. He has been a regular on Shark Tank since 2009.

Malachowski first flew in public with the Thunderbirds in 2006 and later took command of the 333rd Fighter Squadron at Seymour Johnson AFB, North Carolina. She served briefly in the White House as executive director of an initiative for supporting veterans and their families.

NBAA's educational sessions also

begin today, covering everything from sustainability to safety, and recruiting and retaining talent to understanding the latest regulations.

Some of today's highlights include a one-hour talk at 11:00 (Learning zone 2) on how to advance your career through networking, both face-to-face events and using social media.

At 13:00 (N255), there are tips on how to provide high quality in-flight meals, even on short flights and without impeding clients' productivity on board. If used aircraft prices are more your thing, at the same time, an expert panel of brokers and appraisers (N259) will explain how to understand valuation trends.

Alternatively, those with an interest in safety might want to turn up at N250 at 13:00 for a session on safety management systems. In

N2635, you can find out about book and claim, the process by which operators can purchase sustainable aviation fuel even though the fuel is not being used in their actual aircraft, rather like carbon offsets.

Remember the recent scares about onboard fires caused by lithium-ion batteries in electronic goods such as laptops? They still occur. At 14:30, there is an opportunity to find out more about the risks and potential causes of these blazes, and preventative measures that can be taken.

In N250, a session will tackle the important subject of mental wellbeing. Psychological challenges can affect anyone in an organization and attendees will learn how to recognize risks and design policies around managing employees' mental health.

In N259 at 16:00, you can find out the "Top ten things owners should know when registering aircraft with the FAA", including rules and responsibilities and penalties for non-compliance.

Alternatively, in N2635, you can join the audience for the SAF Game Show, where the challenge is to test your knowledge on sustainable fuel with industry experts.

Wednesday's programme includes a session at 13:00 (Learning zone 1) on the evolving regulatory environment for urban air mobility and drone operation.

At the same time there is a chance to get advice on how to hire and better negotiate salary packages with flight crew in the light of the pilot shortage that is driving up pay rates and encouraging some cockpit professionals to follow the money.

At 16:00, a session will look at how AI and other technologies are shaping predictive maintenance.

Thursday's focus turns to the next generation, with the Collegiate Connect programme, designed to give career advice to would-be business aviation professionals in nine sectors: airports, business management, broker/sales, cabin attendant, innovation and technology, maintenance, marketing, piloting, and scheduler/dispatcher.

Members of the NBAA Young Professionals in Business Aviation group, including recent hires, will describe their experiences, and students will have a chance to discuss job and internship opportunities with recruiters at the first NBAA Career Fair. Participants include Bombardier, MedAire, Standard Aero, Universal Weather and Aviation, and West Star Aviation. ▶

Strong aircraft backlogs and resilient demand for private air travel mean the business aviation industry is approaching 2024 in good shape

Safe bet



The 2021 static display at Las Vegas, where the convention will stay for the foreseeable future.

Murdo Morrison

Many attending the National Business Aviation Association (NBAA) convention from 17-19 October will arrive in the US casino capital in a winning mood, thanks to a post-pandemic sector that remains buoyant. Others in Las Vegas may be a touch nervous as inflation continues to stalk the global economy. The outlook largely depends on which direction you look and who you speak to.

On the plus side, deliveries and backlogs remain strong, and continue to rise year-on-year, along with the overall value of aircraft shipments. According to the General Aviation Manufacturers Association (GAMA), deliveries of business jets in the first half of the year rose to 296 units, from 289 in the same period in 2022. Overall turbine aircraft shipments – jets and turboprops – increased by 52 to 586.

Used aircraft values – another benchmark of industry health – are also encouraging. In July, the International Aircraft Dealers Association (IADA) reported higher “resale expectations” for the rest of 2023. It followed a first half in which its members closed 542 deals, 56 fewer than in the same six months of 2022, although IADA described the latter as a “truly exceptional period” for the resale community.

However, momentum in business aviation activity has been slowing, after a surge in late 2021 and into 2022 – helped by pent-up demand and first-time users who were keen to avoid Covid-19 exposure and a dysfunctional commercial air transport system. However, according to data specialist WingX, 2023’s decrease in traffic so far is modest, and usage remains substantially up on 2019.

“Trends in global business aviation activity [held] up pretty well through the summer compared to summer last year,” says WingX. In

terms of market segments, fractional ownership operators have seen the biggest increase in demand since the pandemic, and activity at private flight departments is “still well up in the USA”.

Industry is adjusting after “Covid highs”, suggests analyst Brian Foley of Brifo Associates. “Most segments are doing better than 2019, but things are not going gangbusters like in 2021. Instead of a falling off, it’s a steady decrease, which is not a bad thing after what was becoming an overheated market.”

Market outlook

It is a view seconded by Scott Cutshall, senior vice-president for development and sustainability at management and charter firm Clay Lacy Aviation. “Last year was one of our best from a demand standpoint, but inflation and other headwinds in 2023 are putting downward pressure on people’s flying activity,” he says.

“We are returning to more normal

levels, similar to where they were pre-pandemic,” he adds. “Aircraft ownership is still very high and numbers of aircraft for sale are below average. But there has been a downturn on the charter side, which is an easy turn-on, turn-off in the short term. So far though, we are hopeful there won’t be a recession.”

One red flag for the industry is its exposure to two large and highly geared charter companies that have expanded massively in recent years. In August, Delta Air Lines and a group of financial firms agreed to buy 95% of Wheels Up’s stock in return for \$450 million in fresh funding. The Atlanta-based carrier was already a substantial investor in the troubled firm, one of the USA’s largest charter operators.

At the same time, Wheels Up said it was divesting its aircraft management arm to fractional operator Airshare. It came after Wheels Up – which floated in 2021 amid a period of fast expansion – disclosed losses of \$262 million in the first half of

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Wheels Up received a capital injection from Delta and others after warning about its ability to continue operating



In the year and admitted there was “substantial doubt” about its ability to continue operations. Founding chief executive Kenny Dichter stepped down in May.

Meanwhile, Thomas Flohr, founder and chief executive of Vista, was forced in May to defend the firm’s financial position after a report in the *Financial Times* warned about the privately-owned operator’s high levels of debt following a growth spurt that saw its fleet grow to 360 jets and the acquisition of two large charter rivals.

Profitable operation

Flohr, who began his VistaJet charter operation almost 20 years ago, stresses that the Swiss-based company remains profitable on an EBITA basis, with a \$500 million five-year bond offer in May two times oversubscribed. Vista said credit ratings agencies including S&P, Fitch, and Moody’s had all “affirmed or upgraded their positions” following the group’s financial audit released in April.

According to Foley, any “hiccup” involving one or more of the industry’s biggest fleet operators “would have a pretty major impact on values and in terms of slowing down new sales. It would have an impact on lenders and vendors across the sector. There are certainly some ticking timebombs out there.”

A number of operators, he says, took on “a ton of debt in a low interest rate environment” to fund fleet expansion, and are now facing higher costs to service those borrowings. At the same time, many investors who rushed into business aviation have started “pulling back”

from the sector as demand for charter slows.

One segment that appears to be weathering the storm is fractional ownership, believes Foley. While the market is dominated by two large privately-owned players, NetJets and Flexjet, he wonders if an environmental backlash against private flying is contributing. “No company wants to be publicly shamed, and one way to be a bit more discreet is through fractional ownership,” he says.

Flexjet earlier this year abandoned plans, announced in late 2022, to list itself on the stock market through a merger with a so-called special purpose acquisition company, or SPAC. Chairman Kenn Ricci declared: “Because we have been dedicated stewards of our capital, there will be no impact on the growth initiatives we have launched during the past several years, which remain full steam ahead.”

One of these initiatives was the shared-ownership specialist’s acquisition in August of Canadian MRO and completions house Flying Colours, of which it had long been a customer. That followed its purchase last year of Cleveland,

Ohio-based MRO Constant Aviation. Both moves will allow Flexjet to offer customers in-house MRO services and better control the availability of its aircraft.

One fractional and charter operator that has gone down the SPAC route to a New York Stock Exchange listing is the market number three, FlyExclusive. The Kinston, North Carolina-based company, which has a roughly 100-strong fleet of mostly Cessna Citation aircraft, last year announced a deal with “blank check company” EG Acquisition.

Supply chain snags and shortages of skilled labour have beset almost all aerospace companies since the recovery began in late 2021, with sharp rises in the prices of some raw materials in the wake of the Ukraine crisis. However, because of lower volumes, business aviation manufacturers have been less affected than their commercial counterparts, and there is evidence the situation is improving.

Product development

Based on their recent business updates and commitment to new product development, all the major

OEMs are bullish, and competition across several segments – including the lucrative large-cabin, long-range – is intense. All three airframers in this category are working on new flagship programmes: the Bombardier Global 8000, the Dassault Aviation Falcon 10X, and the Gulfstream G800.

In the Canadian company’s second-quarter results presentation in August, chief executive Eric Martel said he was “totally comfortable” about hitting a 2023 delivery target of 138 aircraft – 18 up on 2022 – helped by a record aftermarket performance that was largely a result of several years of investment in an enhanced in-house MRO network.

Bombardier has been through a torrid time in recent years, with debts run up from the CSeries airliner development forcing it to sell that programme to Airbus (as the A220) and divest or close every activity except its Challenger and Global lines. Its aerostructures, rail, regional aircraft, and Learjet operations have all been offloaded or shuttered since 2018.

However, it has continued to prosper in its two business aviation niches, with its latest top-end offering, announced in May 2022, the GE Aerospace Passport-powered Global 8000, a reworked version of an earlier planned stablemate to its Global 7500. The Global 8000 has a range of 8,000nm (14,800km) and will eventually replace its sibling.

Bombardier’s newest type, which can carry 19 passengers, is due to enter service in 2025. Unlike the original Global 8000 – which was to have sacrificed cabin size in return for a small range advantage over the Global 7500 – the

“No company wants to be publicly shamed [because it operates private aircraft], and one way to be a bit more discreet is through fractional ownership”

Brian Foley Analyst, Brifo Associates



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Bombardier Global 7500 operators will be able to convert their aircraft to the Global 8000 specification

Bombardier

latest version is the same length as its predecessor, at 33.8m (110ft). Global 7500 owners will be able to convert their jets to the Global 8000 specification under a service bulletin.

Bombardier's next move is likely to be a revamp of the 4,000nm-range, large-cabin Challenger 650, which is a design dating from the 1970s and that was last updated in 2015. However, relaunching it as

the Challenger 6500 – following the renaming convention when it replaced the smaller Challenger 350 with the Challenger 3500 – could create confusion with the Global 6500.

Dassault was the first of the so-called big three to announce a range-busting new aircraft with the 7,500nm Rolls-Royce Pearl 10X-powered Falcon 10X in May 2021. While the type will have

around 500nm less range than the Global 8000 or the G800, Dassault is promising the category's roomiest cabin, at 2.77m wide and 2.03m high.

Like the Global 8000, the 10X is due to enter service in 2025, although in May chief executive Eric Trappier hinted that supply chain problems might push that target "a little bit later". The French company has not yet announced

a schedule for its flight test campaign, but R-R has said it expects to fly the Pearl 10X for the first time during 2023, on its Boeing 747 testbed.

Meanwhile, Dassault in August secured certification for the Pratt & Whitney Canada PW812D-powered Falcon 6X, roughly two-and-a-half years after first flight. The company launched the 5,500nm-range jet in 2017 as a stretched rework of the

No leaving Las Vegas for NBAA... but Gulfstream is a no-show

Arguably business aviation's biggest name will be a notable absentee from this year's event. Gulfstream – which traditionally has had one of the largest static displays of aircraft at the convention – says that instead of coming to Las Vegas it is focusing on creating "private events and experiences that have exceeded our customers' expectations while delivering on our business objectives".

Gulfstream's attitude seems to be that it has strong relationships with existing and potential buyers and, with no new aircraft to announce, does not need a domestic show to promote its brand. However, while the manufacturer will no doubt be missed, it will mean a greater share of the spotlight for its main rivals – Bombardier and Dassault – which are exhibiting, along with the other main business aircraft OEMs: Airbus, Boeing, Daher, Embraer, Honda Aircraft, Pilatus, and Textron Aviation.

The NBAA convention has its roots in a 1946 meeting in New York of corporations that flew their own aircraft. They wanted to come up with a way to lobby and educate politicians, as well as hold a business and social gathering once a year. By the 1960s, the event was attracting a group of dealers displaying aircraft for sale, and the exhibition as we know it today began to take shape. Today, it is one of the USA's largest, attracting more than 20,000 attendees and some 800 exhibitors.

For more than a decade it has alternated between Las Vegas and Orlando – Atlanta and New Orleans have also hosted the event this century. However, NBAA has decided to make Las Vegas its regular home for the foreseeable



Gulfstream is a notable absentee from this year's convention

Gulfstream

future, given the city's range of hotels and popularity with business visitors. The proximity of the static display at Henderson Executive airport to the convention centre – in Orlando the two venues are a 40min bus ride apart – is another plus.

This year's event has several new features. In addition to a viewing platform at the static display, NBAA promises the largest-

yet "emerging technology" exhibit, featuring electric and hybrid-electric-powered air taxis and other aircraft.

There will also be a careers fair on 18 and 19 October with more than a dozen companies hosting recruiting stations. The shortage of professionals in an ageing industry is "one of the biggest challenges confronting business aviation", says NBAA.

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Dassault's Falcon 10X is due to enter service in 2025

Falcon 5X, which, despite making its debut flight that year, was cancelled because of performance issues with its Safran Silvercrest engines.

Exclusive club

The third member of the ultra-large-cabin/ultra-long-range club, Gulfstream - which took the somewhat unusual decision to not attend this year's NBAA convention - has taken longer than it hoped to achieve certification for its next type to go into service, the 7,750nm-range, Pearl 700-engined G700.

In July, the Savannah-based manufacturer said it hoped to get the green light from the US regulator by the end of the year. The G700 is a 3m stretch of the G650, which has older generation R-R engines, and shares fly-by-wire cockpit technology with the smaller G500/G600 pairing, including BAE Systems-developed active control sidesticks.

The G700 is one of a trio of aircraft Gulfstream has in development, with its 8,000nm-range G800 - which has a slightly shorter cabin than the G700 but is also powered by a version of the Pearl 700 - making its first flight in June 2022. A second test example joined the campaign in July this year, and the airframer is targeting a 2024 certification for its longest-range variant.

Along with the G800, Gulfstream - maintaining its tradition of developing programmes under a veil of secrecy - also in October 2021 launched the 4,200nm-range, P&WC PW812GA-powered G400. The type fills a gap in its portfolio where there is less competition than in ultra-long range. Gulfstream has not flown the aircraft but aims to deliver the first example in 2025.

According to Foley, delays in the certification of the G700 - a consequence of a more scrupulous approach by the US Federal Aviation Administration in the wake of the Boeing 737 Max failures - has left the manufacturer a "bit behind" Bombardier, delaying the inevitable "end of the Global 7500's reign" in the ultra-long-range segment.

He expects Dassault to close the gap with its two larger rivals now that the 6X is certificated and the 10X is on the way. "As a family company, Dassault move at their own speed, they don't take huge risks and don't overbuild. They had a bump in the road with the 5X, and lost market share with that delay, but they will start recovering," he says.

Elsewhere in the market, Textron Aviation's launch at the EBACE convention in May of the Cessna Citation Ascend, and Honda Aircraft's 2600 light jet have been the two other big product announcements of 2023. The Ascend is an updated version of the P&WC PW545D-powered, 12-seat Excel midsize jet and is scheduled to enter service in 2025.

Textron's other new offering, the single-turboprop Denali, is still awaiting certification with delays put down to technical issues with its Catalyst engine, with which GE Aerospace aims to take on the ubiquitous and evergreen P&WC PT6. The 1,600nm-range Denali - a competitor to the Pilatus PC-12 - flew for the first time in

November 2021, but deliveries are not expected until next year.

Embraer, the final member of the big five in business aviation, has no new products in the works, but remains in a comfortable position in its key segments. Its Phenom 300 has been the top-selling light jet for more than a decade, while its smaller sibling, the Phenom 100EV, and the midsize and super-midsize Praetor 500 and Praetor 600 continue to sell well.

Succession planning

Honda Aircraft, which broke into the market with the HA-420 HondaJet light jet in the 2010s, is targeting a 2028 certification date for its 10-seat 2600 successor, now called the Echelon. One of the most interesting features of the new aircraft is that it will be powered by Williams International turboprops, rather than engines from its GE Honda venture, which supplies the HF120s for the HondaJet.

In the airliner-derived business jet segment, the A220-derived ACJ TwoTwenty, which launched in October 2020, is the only significant new type -bringing Airbus into genuine competition with the big three large-cabin manufacturers for the first time. In April 2023, Dubai luxury hotel group Five took delivery of the first example from Comlux, which completed its interior.

Rival Boeing celebrates 25 years of the Boeing Business Jet this year - the first BBJ, based on the 737-700, flew in September 1998. Boeing has traditionally been the leader in this market, with its 747-400 in particular flying heads of state (including US presidents) over the years. However, neither it nor Airbus delivered any examples in the first half, according to GAMA data.

Most manufacturers are sitting on healthy backlogs



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Prestige events from rock shows to global sporting bonanzas are luring more wealthy visitors to Las Vegas. In response, Henderson Executive airport, which hosts the NBAA static display, has been upping its game

Pilar Wolfstetter

Henderson Executive airport, about six miles (10km) south of Las Vegas's famous casino "Strip", is the preferred gateway airport for private travellers coming to Sin City to gamble, as an alternative to the main Harry Reid International, which is closer to the city.

Henderson has hosted the NBAA-BACE static display every year the convention has been in Las Vegas, but repeat attendees will notice the airport has significantly upped its infrastructure game in time for this year's show.

In the past two years, Henderson invested more than \$9 million in airport improvements to better accommodate the event as well as increased aviation traffic to the city.

The centrepiece is a new 7.3ha (18 acre) apron on the west side of the terminal building - previously a dirt lot used for overflow parking - where the static display hosting more than 75 aircraft is located.

"We're so excited about this expansion," says airport manager Bruce Daugherty, manager of general aviation airports at the Clark County department of aviation, which manages five airports in the region. "It's something that we have needed for a really long time."

Construction on the apron area began in April 2022 and was completed last January. Much of the cost was absorbed by the Federal Aviation Administration's airports improvement grant programme.

In addition to the new ramp, the airport has installed five high-mast LED light poles, airfield edge lighting, drainage infrastructure and perimeter fencing.

The new paved area has three reinforced-concrete Ts for parking heavy jets. "It's a rare aircraft to see here so it was funny when we opened up the ramp our first customer was a BBJ," Daugherty adds.

"Most of the aircraft on static display will be back on the new part, opening up a bit of the ramp for us, and making it a better experience for the NBAA attendees as well," Daugherty says.

The FBO at Henderson is part of the World Fuel-backed Air Elite-branded network, which has 80 locations worldwide. Maintenance provider Apex Aviation and flight school All In Aviation are among the airport's other tenants.

This year's NBAA BACE is set to be bigger and attract more visitors than the last time Las Vegas hosted the event, in October 2021. At that time, Covid-19 border restrictions were still in place, making it impossible for representatives from numerous countries to attend.

The event's economic benefit to the wider Las Vegas Valley is usually about \$40 million.



Henderson hosts the NBAA static display every time the show is in Las Vegas

Red carpet welcome

"As our community hosts more high-profile, large-scale events, our general aviation operations will be a key component to serving the customers these events attract," Rosemary Vassiliadis, Clark County's director of aviation said earlier this year. "Investments such as this expansion project at Henderson Executive airport ensure we can accommodate increased general aviation activities into the valley, which in turn, helps preserve and maximise the capacity for commercial aviation operations at Harry Reid International airport."

Aside from regular casino traffic travelling to Vegas, the city is set to host a Formula 1 motorsports race in November, and the National Football League's Super Bowl game in February 2024. In addition, Las Vegas regularly hosts major cultural events and concerts, attracting internationally renowned music

greats like Adele, Rod Stewart, Sting and Katy Perry.

In late September, legendary Irish rock band U2 was the first to play at the new Sphere - a spherical music and entertainment arena whose exterior is covered with programmable lighting and set to become a new landmark for the city. Having already attracted a professional American football team and professional ice hockey team in the past decade, the city is now poised to bring a Major League Baseball team to the Strip as well.

"The diversity of the events that we've had come to Las Vegas, even just on a regular weekend, has changed our needs," Daugherty adds. "Every weekend is a big event weekend now. It's just becoming a regular thing."

The airport, which had 78,000 aircraft operations in 2022, is therefore planning even more

improvements. Headlining these is a project to lengthen its primary runway, 17R/35L, in the coming years.

"Especially during the summer months when it's very hot, some of the jets that come in here can't take off with the amount of fuel that they need for long-haul, so the plan is to add 1,000ft to the north end of the runway" on land the county already owns, Daugherty says. That would bring the runway's length to 2,286m (7,500ft).

To accommodate aircraft during construction, expected to last about a year, Henderson's secondary parallel runway 17L/35R will be temporarily lengthened by 305m, he adds.

In March, the FAA also granted Henderson airport \$871,000 to improve and update the field's air traffic control tower.

Daugherty and his team of 35 employees began planning for NBAA-BACE months ago, and they have been busy spiffing up the field for its international guests.

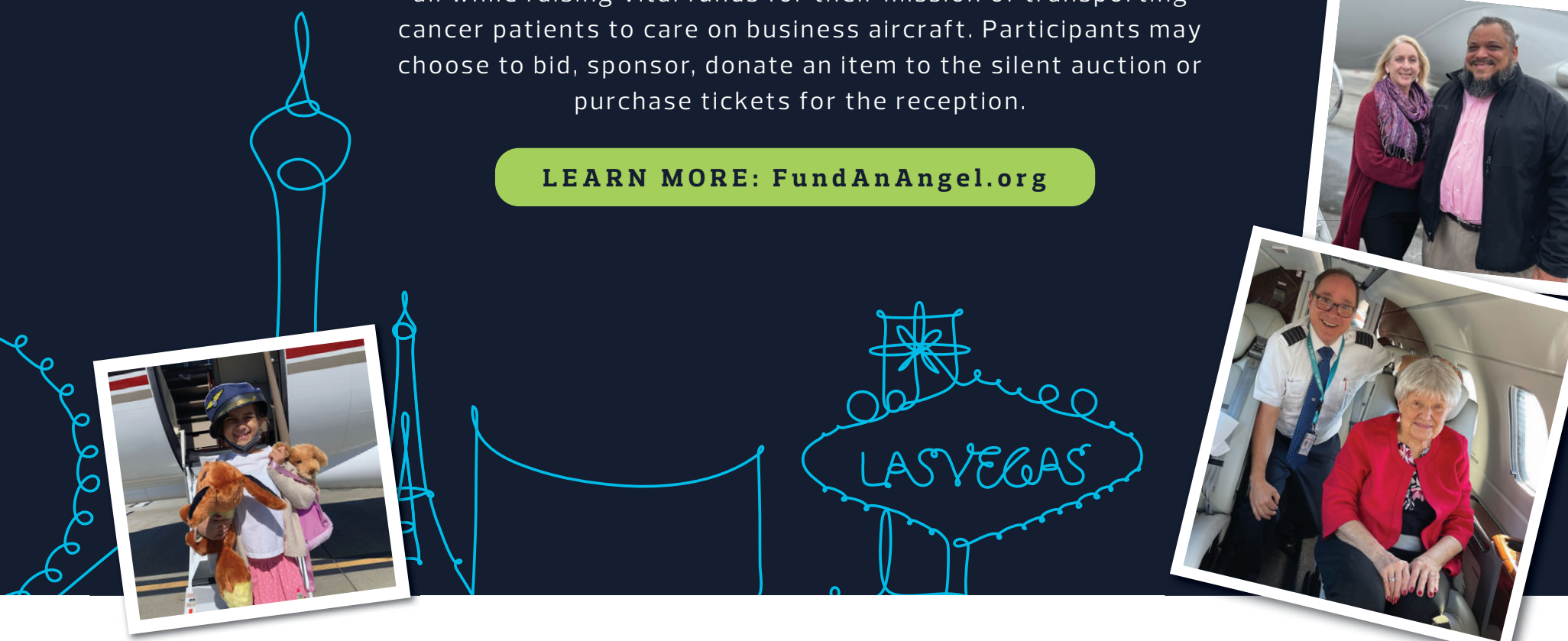
"One amazing thing about NBAA is that every time it's here, with the chalets, the carpets that get rolled out... when you're walking on the ramp, I understand that I'm still walking on our own ramp," he says. "But yet you look around, and it's transformed. They do such a good job of that. And it's very impressive for the people that attend the show."



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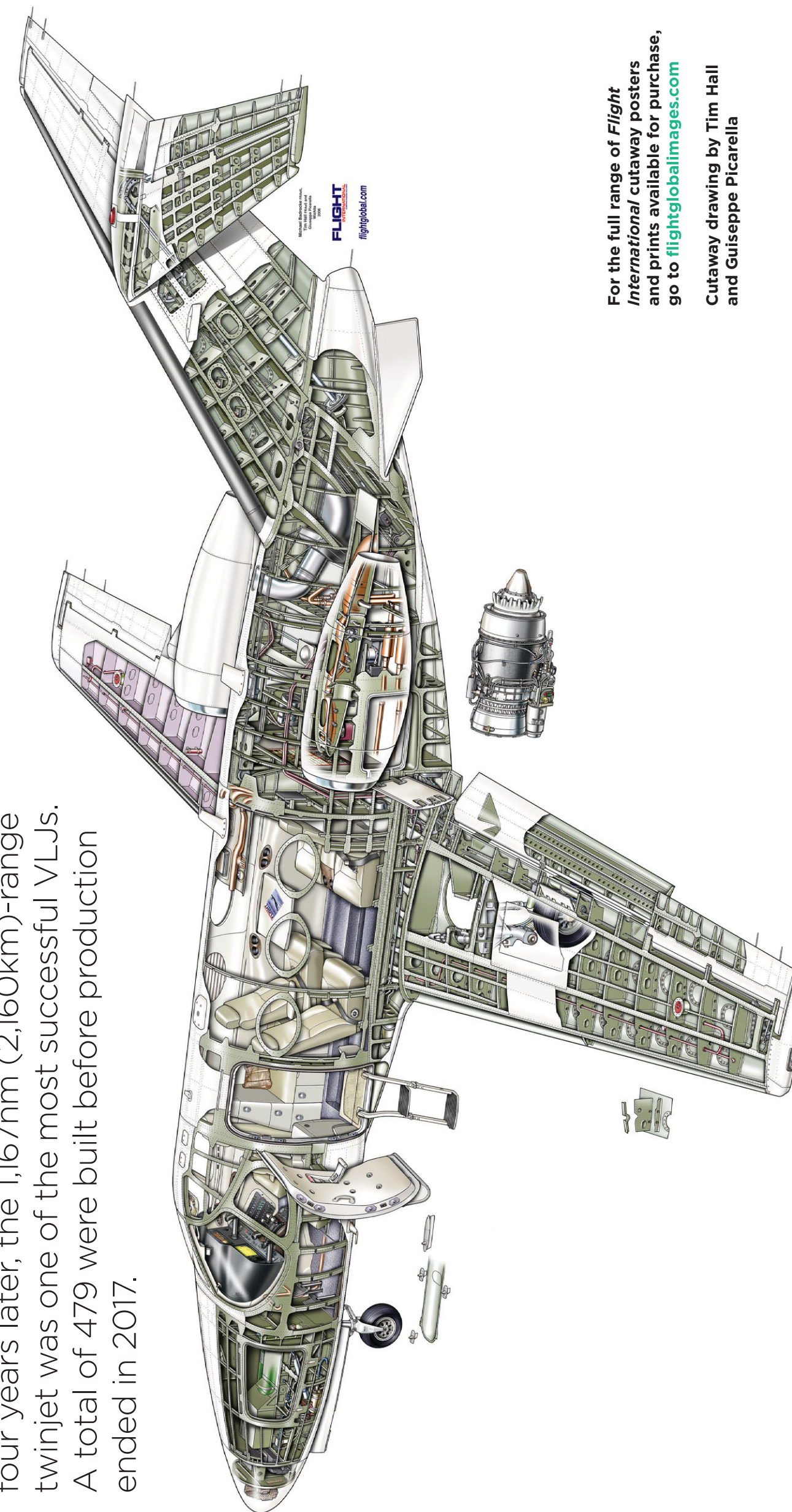
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Cessna Citation Mustang

The Mustang – shown in this classic cutaway from 2006 – was Cessna’s contender in the much-hyped but short-lived very light jet segment. Launched in 2002 and certified four years later, the 1,167nm (2,160km)-range twinjet was one of the most successful VLJs. A total of 479 were built before production ended in 2017.



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Cutaway drawing by Tim Hall and Giuseppe Picarella

Dozens of aircraft – old and new – are on display this week. In each issue we look at two types that are likely to catch the eye of visitors

Perfect 10 and eVTOL debut



Dassault Falcon 10X

Once again Dassault Aviation is displaying a mock-up of what will be, when it enters service in 2025 or 2026, its flagship Falcon. For the French manufacturer, the interior has a particular appeal. What the 10X lacks in range over its direct competitors – although it still delivers an impressive 7,500nm (13,900km) – it makes up for with the segment's biggest cabin, not to mention other features such as 38 extra-large windows. Dassault announced the type in May 2021. Now that the smaller 6X has been approved by the regulators, bringing the Rolls-Royce Pearl 10X-powered 10X to certification will become the manufacturer's number one focus.

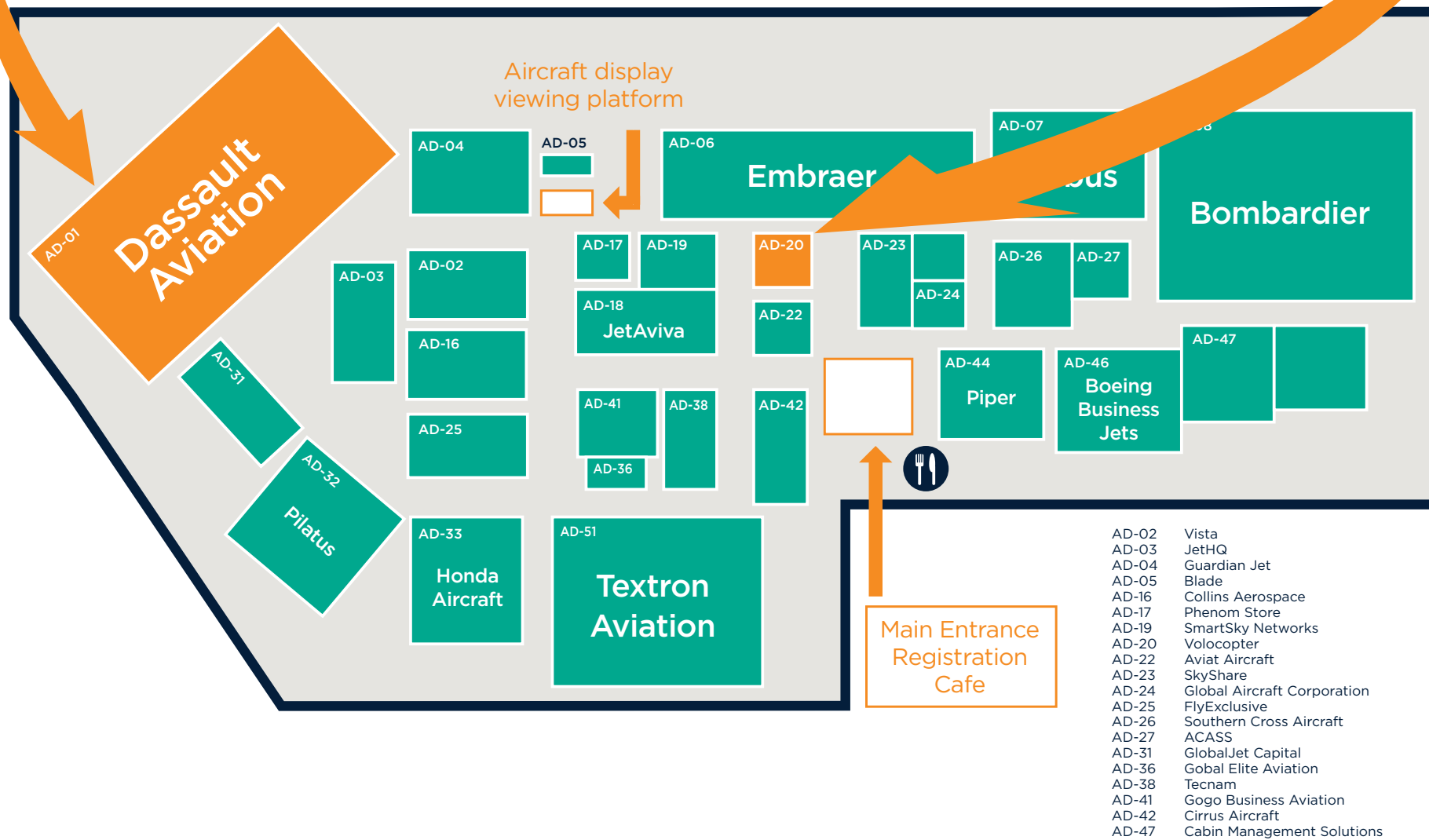


Volocopter 2X

Volocopter is not only displaying a prototype of its two-passenger electric vertical take-off and landing (eVTOL) aircraft. In a departure for the static display (the clue is in the name), the German developer will be conducting brief flight demonstrations over Henderson Executive Airport during the show, after gaining dispensation from the Federal Aviation Administration. The 2X is the precursor to the VoloCity air taxi that the Bruschal-based company plans to fly passengers in at the Summer Olympics in Paris next year. One of more than a dozen companies developing eVTOL types, Volocopter has been working on its design for over a decade.

STATIC DISPLAY OF AIRCRAFT AT HENDERSON EXECUTIVE AIRPORT

Note: Details correct at the time of going to press



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