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FLIGHT EVENINGNEWS

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Viva fast Vegas

Tickets sell out quickly as Blade helicopter shuttle speeds up static commute, and gives foretaste of urban air mobility

Pilar Wolfsteller

For the first time at the show, attendees have more than one way to get from the Las Vegas Convention Center to Henderson Executive Airport.

In addition to sitting in slow-moving traffic on the ground, they can now soar over the city's iconic Strip in an Airbus Helicopters H135 powered by Blade.

The urban air mobility service provider has partnered with local aerial tour company Maverick Helicopters to set up a pop-up shuttle service, including chic lounges on either end of the journey, giving passengers a taste of what urban air mobility networks of the future could look like.

And, as was to be expected at an aviation show, the response was overwhelming.

"The flights sold out in minutes," says Blade president Melissa Tomkiel. "It's a shame because we would have liked for everyone who wanted to experience it to get that chance.

"We want to show people that you can access air transportation through an app, buy a seat, and not pay an exorbitant amount for an aircraft charter – the way it has historically been in private business aviation."

By the end of Thursday, the company will have offered 24 flights between the two venues for six passengers each. The cost of a leg: $99 per person.

The 11-minute flight is conducted at about 300-500ft above the ground. That's high enough to see the city's sights, but lower than the tops of some of the city's world-famous towering casino-hotels.

Blade, which recently became publicly traded through a merger with investment company Experience Investment, works with aircraft providers across the country to offer an upscale passenger experience, and it recognises that the future is electric. So far, it has signed agreements with Embraer's Eve, Wisk Aero and Beta Technologies.

Steve Spatafore/BillyPix

Data'll do nicely for Wheels Up

Fresh off its initial public offering, fast-growing Wheels Up has arrived at NBAA with a Silicon Valley-inspired plan to use technology that makes it easier for a customer to plan travel, and in turn uses that customer data to improve its services.

New president Vinayak Hegde, a veteran of Amazon, Groupon and Airbnb, says that the key is to make the process easy and fast. Just like booking an Uber online, booking a plane should not be rocket science.

"How do you create the perfect trip? The key is to make it instant-bookable, with as few clicks as possible," Hegde says. "The customer wants the information and they want to make the decision now."

But the company is also very aware of the value of that data.

"Not all customers are created equal," he says.

"With the data, we can predict [a customer's] lifetime value, and we have the ability to personalise their experience like never before.

"We are only starting to do that now."

Vinayak Hegde: "The key is to make the process easy and fast"

Steve Spatafore/BillyPix

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Plenty in the tank

Walk the show floor and you'll see three massive aircraft refuelling trucks – all owned by SkyMark Refuelers.

SkyMark has an interesting business: it purchases diesel trucks and modifies them into refuelling lorries for sale to aircraft fuel providers.

Scattered around the show floor are two of SkyMark's 18,930-litre (5,000USgal) refuellers and one massive 26,500-litre beast, says Jose Molina, executive vice-president of sales.

Steve Spatafore/BillyPix

Molina: bringing the big beasts to the show

Steve Spatafore/BillyPix

Michimasa Fujino: "This is the first transcontinental light jet"

HondaJet concept lights up the show

Japanese manufacturer reveals mock-up aimed at taking on midsize market rivals

Jon Hemmerdinger

The business aviation community is coming to terms today with a new contender in the crowded light jet segment, after yesterday's surprise reveal of Honda Aircraft's HondaJet 2600 concept.

Unlike Honda's existing HA-420, the HondaJet 2600 – unveiled as a mock-up at the show – will have sufficient range and size to compete in the midsize market.

"This aircraft is the first transcontinental light jet. It is capable of flying from New York to Los Angeles," says Honda Aircraft chief executive Michimasa Fujino.

The clean-sheet concept's range, efficiency, comfort and lower cabin-pressure altitude will "redefine" the light jet segment, he says.

The aircraft will carry up to 11 people and be capable of being flown by a single pilot. It will have 2,625nm (4,862km) of range with five people, maximum cruise speed of 450kt (834km/h) and a maximum cruise altitude of 47,000ft.

Honda Aircraft has not officially launched the 2600 development programme nor specified a development timeline. Rather, it has revealed a concept it hopes will generate sufficient customer interest to move the project forward.

"We are still looking for customer feedback and market feedback before we commit to dates," says Honda Aircraft director of sales Peter Kriegler.

The jet will have upper-wing mounted engines, like the HA-420 HondaJet Elite S. That jet, conceived in the early 2000s, can carry up to eight people (including a pilot) and has 1,437nm of range.

The 2600 will have a composite fuselage, and a new wing with a 17.3m (56.7ft) span. The cabin will be several inches wider at shoulder and foot level than the HA-420, and the centre of its cabin will be slightly higher, Kriegler says. The cockpit will also be larger than the HA-420.

Kriegler says the 2600 will be 20% more fuel-efficient than other light jets on the market, thanks to its upper-wing-mounted engine configuration and clean-sheet design that maximises "laminar flow" – a state at which air flows around an aircraft without disturbance.

Steve Spatafore/BillyPix

Looking good... JJ Frigge shows off the five-blade prop

Blade to last

Hartzell Propeller is at the show promoting its five-blade composite propellers – products the company says are lighter and have better performance than traditional props.

Hartzell's composite five-blade props produce more thrust than metal four-blade models. That translates into 2-5kt (4-9km) more speed, shorter take-off rolls and climb rates that are 100-150ft more per minute, says the Ohio company's president, JJ Frigge.

Five-blade props also have "ramp appeal... It looks sexy", Frigge says.

The company makes custom props for aircraft including Daher TBMs, Beechcraft King Air 200s and 350s, Pilatus PC-12s and CASA 212s.

"What we are seeing is a huge demand... in the direction of composite," Frigge says. "We are working on a handful of other programmes right now that we expect to bring to market."

He describes the process of manufacturing composite props as "very manual", noting that Hartzell uses a resin-transfer process. The company's composite props have foam cores, and the design allows for wider chords and thinner aerofoils. "That equals... less drag," Frigge says.

Hartzell's composite five-blade props can cost 20-30% more than traditional props. "You get that back," says Frigge. "These are certified for unlimited life."

View from the inside

Need to see under the skin of an aircraft? Look no farther than booth 1223.

There, you will find USA Borescopes, a Tennessee company that manufactures borescopes used to inspect hard-to-see places inside aircraft and their engines.

"You can go into any kind of cavity and look around," says USA Borescopes sales representative Micah Armato. "They [help] inspect turbines... Look for cracks."

The system uses a fibre-optic probe that ends with a "four-way articulating camera" and an LED light, Armato says.

The probe can be manipulated by a remote control, and video is displayed on a high-definition monitor.

The systems cost between $5,000 and $12,000.

Steve Spatafore/BillyPix

Micah Armato: he sees everything

CAE partners on Phenom 300 sim

Embraer kicked off the second day of the show by announcing it has partnered with Canadian flight training company CAE to offer a full flight simulator for the airframer's Phenom 300E light jet.

Embraer-CAE Training Services, a joint training entity between the two companies, will operate the simulator, though the partners have not said where they intend to locate the machine.

There are now six Phenom-family simulators at three training centres: those in Dallas, Guarulhos in Brazil and Burgess Hill near London.

On the Eve of something big

EmbraerX is making fast progress with the development of its first eVTOL platform

Pilar Wolfsteller

It has been almost a year since EmbraerX, the Brazilian airframer's innovation subsidiary, spun off its first electric vertical take-off and landing (eVTOL) project, called Eve.

And she has been on a tear ever since.

"We have flown some scale models, we have flown engineering simulators, we are about to fly a full-size proof-of-concept as well, very likely before the end of the year," says Andre Stein, Eve's chief executive officer.

The proof-of-concept won't look like the final version of the aircraft, Stein says. However, it does have all the systems in place that the company needs to test before they go into a prototype.

So far, the company holds orders for 735 aircraft from operators all over the world. It has disclosed few details about Eve, though renderings show an aircraft with eight lifting propellers and two ducted fans for forward propulsion.

In addition to the hardware, the company is also on track to develop an entire end-to-end urban air mobility concept.

"Beyond the aircraft, we are developing an operations concept with a consortium of partners all over the globe, along with regulatory authorities, that will help us to create this future together," Stein says.

Eve plans to launch a month-long pilot programme in Rio de Janeiro designed to make a pitch to customers as well as regulators that such a service is feasible, affordable and safe.

"We are going to start flying with a helicopter partner and a ride-sharing company to show how this could work," Stein says. "The whole point is to create a real simulation of the actual operation, including the traffic management aspect of it, define how the routing will be, how the communication will be as well as the whole passenger journey."

EmbraerX spent four years incubating Eve before spinning it off in October 2020, and has said it expects to launch commercial operations with the eVTOL in 2026.

Steve Spatafore/BillyPix

Andre Stein: "We are about to fly a full-size proof-of-concept"

Steve Spatafore/BillyPix

Schmidt bull – in fact, it's the best leather you can get

Hides to seek

Aeristo Leather's president is showcasing a line-up of south German bull hides he says are simply unmatched.

Aeristo's range of leather products are found in cabins of some of the industry's leading business jets, including those made by Embraer and Gulfstream.

The company is no rookie in the world of luxury leather.

"My family has been in the leather business for five generations," says Alexander Schmidt, president of the Grand Prairie, Texas-based company. Decades ago, Schmidt's grandfather had a leather tannery in Europe. In the 1980s, Schmidt's father moved to the USA, and started Aeristo.

Schmidt says his company's leather stands out because it is produced, starting at the tannery, to meet aerospace regulatory requirements. Some competitors merely spray leather with flame retardant, he says.

The company's leather comes from "south German bull hides", adds Schmidt. "The south German region is known to have the nicest hides available."

Trust us on rust

Corrosion is no match for Hollywood, Florida's Quiet Technology Aerospace, a company specialising in remanufacturing engine inlets and related components on business jets.

"Basically, what we do is take complicated issues and determine the root cause of corrosion," says chief executive Barry Fine, who purchased the company in 1990.

Quiet Technology remanufactures inlet cowls and barrels for the engines of eight aircraft types, including for business jet engines such as the Rolls-Royce BR710.

Quiet also supplies thrust reversers for Honeywell HTF7000-series engines, and it makes aft-body assemblies and thrust-reverser components for engines. Its products are made from materials including carbon-graphite and titanium, and are offered for jets made by Bombardier, Cessna, Embraer and Gulfstream.

Steve Spatafore/BillyPix

Barry Fine: tough on the causes of corrosion

Update follows last week's reveal of two new aircraft types from manufacturer

Gulfstream gives avionics boost to its entry-level jet

Jon Hemmerdinger

Following last week's dramatic announcement of its G800 and G400 development programmes, Gulfstream has unveiled a series of avionics upgrades to its smallest jet, the super-midsize G280.

The upgrades include dual electronic charts, (another step toward a "paperless cockpit"), and a "surface management system" that provides aural and visual cues to help pilots avoid runway incursions and other such airport accidents, Savannah-based Gulfstream says on 13 October.

Operators also now have access to "vertical weather and predictive wind shear information", and they can equip their aircraft with a SiriusXM-provided "graphical weather system with real-time updates".

Additionally, Gulfstream has achieved an increased interval at which the G280's systems must be validated for compliance with Reduced Vertical Minimum Separation (RVMS). That internal is now 96 months, up from 24 months – a change that reduces aircraft downtime, the company says. RVMS is a standard that allows aircraft flying at cruise altitude to be a minimum of 1,000ft apart vertically, reduced from a previous 2,000ft minimum.

Gulfstream says it remains committed to its smallest jet

Gulfstream

The G280 has Collins Aerospace Pro Line Fusion-based avionics.

Another update includes giving G280 customers the option to equip their jets with a "plasma ionisation clean air system" – technology "proven in lab tests to neutralise pathogens and allergens".

"The enhancements include improvements to the passenger experience, a streamlined pilot workload and overall safety benefits," Gulfstream says.

"We remain confident in the G280's proven track record and are committed to investing in enhancements that further increase the benefits it offers customers," says Gulfstream president Mark Burns.

In 2008, Gulfstream launched development of the G250, which it rebranded the G280 in 2011. The Federal Aviation Administration and Israeli regulators certificated the jet in 2012, and by June 2020 Gulfstream had delivered 200 G280s.

The aircraft has 3,600nm (6,667km) of range and can carry 10 passengers, with sleeping space for five passengers. Powered by twin Honeywell HTF7250G turbofans, each rated to 7,624lb (33.9kN) of thrust, G280s have maximum speed of Mach 0.84.

In March, Gulfstream sought to reassure the industry that it remains committed to the G280 despite rumours that Gulfstream and G280 partner Israel Aerospace Industries might soon stop producing the jet and replace it with a new model. The G280 is a bit of an outlier for Gulfstream, as the only super-midsize aircraft in a portfolio otherwise comprised of long-haul, large-cabin jets.

Gulfstream's G280 changes come several weeks after competitor Bombardier revealed it is developing the Challenger 3500, an update of its super-midsize Challenger 350.

Most of the 3500's updates are in the jet's cabin; they include a new interior and a modern in-flight entertainment system. Bombardier is also giving the 3500 an auto-throttle system and has reduced the altitude equivalent of the 3500's cabin pressure at cruise.

Small-aircraft sector must embrace SMS, says safety chief

The vice-chair of the National Transportation Safety Board (NTSB) has brought several proposals to NBAA that he thinks can significantly improve small-aircraft safety.

Bruce Landsberg is calling on the sector to embrace safety management systems (SMS) and better flight-data monitoring systems, including video, which he says can save money and lives.

Major airlines already use SMS, which are organisation-wide safety structures, and big jets already have advanced data-recording systems. The Federal Aviation Administration has been working to require SMS for operators of small commercial aircraft regulated under US Part 135 rules.

Landsberg thinks SMS are essential to small-aircraft safety, citing the relative high number of Part 135 accidents. But he views the FAA's requirements, being designed for large airlines, as poorly suited for many small companies.

"The problem starts to come in when you get down to very small operators, the extreme case being the single-pilot [aircraft]," he says. "We need to get away from the one-size-fits-all-approach... If it's only financially viable for the big operators, its not going to work very well for the little guys."

Landsberg thinks the small-aircraft and Part 135 community must collaborate to find an SMS solution that works. Perhaps, says Landsberg, groups like NBAA or the Air Charter Safety Foundation could get involved. They could receive and process aircraft and flight data from operators, aggregate the data and provide safety-related feedback to operators. Many small aircraft already log the types of data such analysis requires, Landsberg says.

"You get a report card every time you send something in, showing how you are doing relative to the fleet," he says. Another critical improvement would be for small aircraft to have better data-monitoring systems, including video cockpit recorders. Video would let investigators see inside the aircraft – the pilot's hands, the movement of the controls – and out of the windscreen.

Landsberg: Accidents are expensive

Rex Shutterstock

"If we can see what the control inputs are, and what the aircraft is doing, and the instrument readout, that gives us tremendous insight," Landsberg says.

He recommends that data-storage units be within hardened cases and perhaps located at the rear of aircraft, which tends to suffer less destruction during crashes. Data could also be transmitted off aircraft via satellite.

Flight-data monitoring devices can produce data that insurers could use to reduce rates. And fewer crashes will reduce financial liabilities faced by manufacturers, perhaps allowing them to lower prices, Landsberg says. "Accidents and crashes are tremendously expensive."

Via Atlantic and Alps: Bell's long-distance delivery

Flying your new helicopter across the Atlantic just after taking delivery is not necessarily the most obvious first trip a new owner might take. That, however, is exactly what a new Ukrainian corporate customer for Bell did with a new 407GXi after receiving the aircraft from the production line in Mirabel, Canada.

Following the delivery, the 407GXi – which is fitted with an instrument flight rules (IFR) kit – was flown to Ukraine by Maksym Lunov, the pilot and owner of Heliclub, one of Bell's Ukrainian independent representatives, with the customer on board. The aircraft reached its destination after a rather circuitous route, making stops in 13 countries.

"This Bell aircraft is comfortable, safe and reliable. It enabled us to have a unique travel experience that most people don't get the opportunity to do," remarked the 407GXi customer, who has preferred to remain anonymous.

"I've been a pilot for 13 years, and a transatlantic flight is something I've always wanted to do. It would not have been easily done without the IFR kit," noted Lunov. "The Bell 407GXi is a remarkable helicopter that provided a safe and enjoyable trip. With the IFR kit, we had no weather limitations and it allowed us to proceed with the planned route without any delays."

The 407GXi is the latest variant for a type that, according to the OEM, "has played an essential role in critical missions for more than 25 years", adding the claim that the aircraft "sets a high standard for single-engine aircraft with its unmatched reliability and performance in hot, high or maritime environments".

Supplier commits to offset emissions as it rolls out additions to sustainable aviation fuel network

Avfuel makes carbon pledge

Bernie Baldwin

Avfuel Corporation has announced a formal commitment to sustainability, including a pledge to offset emissions annually. The company says it is committed to "identifying, developing, providing and advocating for sustainable solutions", thus taking on the duty to promote environmentally responsible operations at its properties and throughout the Avfuel Network, as well as helping customers to reach their sustainability goals.

Avfuel will now offset all annual carbon emissions generated from energy used on its campuses and by company vehicles, fuel used in corporate aircraft and diesel used in leased refuelling truck equipment across the Avfuel network.

Avfuel will purchase carbon credits through its own carbon offset programme, which allows operators and companies to reduce their net emissions by investing in green projects. All projects have strict monitoring, verification and certification requirements to ensure full levels of due diligence and compliance.

For that offset initiative, Avfuel has just entered a partnership with CBL Markets, which becomes a new carbon credit provider for the programme. CBL Markets will help with back-end efficiencies, including sourcing green projects, carbon credit accreditation and certificate retiring.

Avfuel

Company is increasing number of locations where SAF is available

Meanwhile, Avfuel continues to increase its number of locations offering sustainable aviation fuel (SAF) and has launched a new solution to help increase access to SAF – a book and claim programme.

With this, customers can buy a full load delivery of SAF and receive credit for the emissions reductions benefit it provides no matter where they are in relation to where the fuel is delivered.

In return, operators will receive credit for SAF usage and be able to apply that credit to their ESG scores.

Blackhawk to offer PC-12 engine upgrade

Blackhawk Aerospace is adding the Pilatus PC-12 to its roster of aircraft for aftermarket engine upgrade supplemental type certificates (STCs). Blackhawk will replace the stock Pratt & Whitney Canada PT6A-67B engines with the higher thermally rated PT6A-67P in its XP67P Engine+ Upgrade. Flight testing for the enhancement is projected to start late in the first quarter of 2022.

The XP67P upgrade utilises improved metallurgy, which allows a higher internal turbine temperature (ITT) limitation of 850°C compared with the stock -67B's 800°C limit for take-off. Additionally, maximum continuous ITT for climb and cruise is 760°C for the -67B and 820°C for the XP67P.

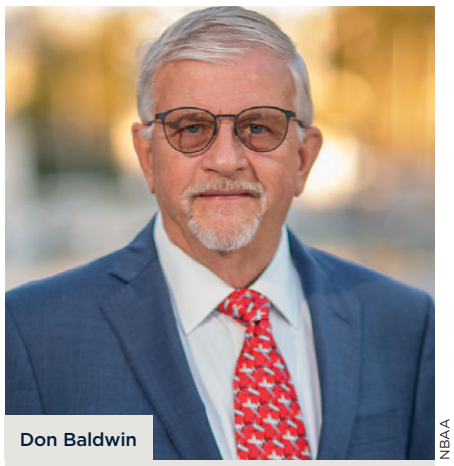
Pilatus

The PT6A-67P is now available to be installed in Pilatus turboprop

Further, the PT6A-67P is a 1,200 SHP engine that produces 142 more thermodynamic horsepower than the stock PT6A-67B. The combination of the higher ITT and thermodynamic power produced by the -67P engine enables operators to use full torque to more efficient cruising altitudes. Where the stock -67B starts losing power at 13,000ft, the XP67P can maintain full power to 23,000ft.

Blackhawk's market research shows that there are 1,700 total PC-12 models in operation, making it the second largest single-engine turboprop market behind the Cessna Caravan. More than 600 of the PC-12s are eligible for the XP67P upgrade.

The XP67P Engine+ Upgrade includes one factory-new P&WC PT6A-67P engine and maintains the existing Hartzell four-blade aluminium propeller. Blackhawk plans to certify additional propeller options in the future to provide operators modularity in the upgrade package.



Don Baldwin

NBAA

NBAA award for safety advocate

NBAA is presenting industry veteran and former association board chair Don Baldwin with the 2021 John P "Jack" Doswell Award.

The award – "granted for lifelong individual achievement on behalf of and in support of the aims, goals and objectives of business aviation" – will be handed over during tomorrow's National Safety Forum.

Don Baldwin is a lifelong safety advocate with more than 30 years' experience in supporting business aviation flight operations, introducing groundbreaking standards and best practices.

He is currently president of Baldwin Safety & Compliance, which he co-founded in 2004 to provide safety management and support programmes to all sizes of flight departments and transportation organisations.

GJC offers buyers a new life of lease

Finance company selling benefits of keeping an aircraft off the books

Murdo Morrison

Global Jet Capital is at the show this week to convince those thinking about acquiring a business jet of the benefits of leasing rather than owning.

It comes as the company reports a strong recovery in the market over the past three quarters, with new CEO Vivek Kaushal believing that having access to a business aircraft has "taken on a new resonance" in the Covid era.

Global Jet Capital is one of the biggest specialist lessors in the market, with around 250 aircraft on its books. It sets itself apart from its competitors by its global customer base, and offering an operating lease model that sees it work with would-be operators to select a new or pre-owned jet before financing the purchase, says Kaushal.

Under an operating lease, as opposed to a straightforward loan, the lessor owns the asset, with the user making payments over a fixed period.

Vivek Kaushal

GJC

Kaushal, who assumed the role from Shawn Vick in July, says it is increasingly popular with corporations and ultra-high-net-worth individuals who do not want to lock up their capital on a depreciating asset, and "never have to look at the value of the plane again".

Kaushal says the company's mission is to "simplify access to business aviation". Unlike commercial aircraft lessors, Global Jet Capital does not buy aircraft on spec, and does not have an orderbook. "Instead, we partner with a customer through the whole acquisition process," he says. "It's a relationship business."

Although about 20% of Global Jet Capital's fleet is on financial leases – similar to a loan – Kaushal says the operating lease model has been the most popular.

"Most of our customers are well-heeled. They have lots of finance options," he says. "They want the use of the asset, but to them it's not a core asset like property."

Kaushal is convinced business aviation's upward trajectory will continue. "I have all the confidence that what has unfolded in the US in the past few months will unfold elsewhere," he says.

"We are still to see further momentum from the corporate market in the US – until now the recovery has been led by high net worths. There is also a huge pent-up demand in the rest of the world."

Traxxall launches MRO module

Traxxall, which provides aviation intelligence ranging from maintenance tracking to data analytics, has launched its new 'MRO' module at the show.

Operating in conjunction with Traxxall's maintenance tracking and inventory management modules, 'MRO' is designed to help operators build better businesses by generating and using rich data to its optimum.

The 'MRO' module features and benefits include: enhanced workforce management with the tracking of time, tasks and labour costs; flexible integration, with 'MRO' able to be configured to interoperate with existing automated systems including accounting and flight scheduling; daily updating and distribution of airworthiness directives, service bulletins and other alerts to clients by Traxxall's team of aviation experts; plus synergies from integration with the company's maintenance tracking module.

On the practical side, the new module offers user-friendliness, including dashboards that provide intuitive access to real-time data. Implementation is easy, according to Traxxall, with training and setup delivered and supported by the company's expert team.

Mark Steinbeck

Traxxall

Traxxall also claims a lower entry cost for 'MRO', stating that unlike traditional automated aviation systems, the new module is subscription-based and web-based, so there are no large upfront implementation costs.

"We developed the 'MRO' module as an extension of our expertise and because we identified a clientele that is underserved," explains Mark Steinbeck, president of Traxxall. "Traditional 'MRO' software systems are complex and overpriced, due to large upfront implementation costs. Based on a subscription model, our new web-based module is simple, efficient and right-sized.

"By providing comprehensive visibility – including the status of ongoing projects, resource allocation, labour costs and invoice generation – we are enabling our clients to build and run better businesses. 'MRO' is the latest chapter in our evolution from a maintenance tracking company to a provider of sophisticated aviation intelligence," Steinbeck adds.

"By extending our engagement with clients and earning an increasingly deep understanding of individual aircraft, aircraft types and OEMs, we are the custodians of an ever-growing wealth of data and expertise. We share this knowledge with our clients and contribute directly to their operational and financial success."

In brief...

Advent-age Cutter

Cutter Aviation has become an authorised dealer for Advent eABS anti-skid braking systems for Pilatus PC-12 and Beechcraft King Air B200/B300 aircraft. "Anti-skid braking offers another safety feature and reduced costs, adding value to these already great airplanes," says Cutter chief executive and president Will Cutter.

Chicago's STC deal

Chicago Jet Group has received Federal Aviation Administration supplemental type certificate approval to fit Universal Avionics InSight flightdeck upgrade on the Dassault Falcon 900B.

Dallas refresh

Bombardier is to enhance the interior repair and refurbishment activities at its Dallas, Texas service centre. The OEM will collaborate with aircraft furnishings provider Global Engineering & Technology (GETI) to enable customers to avail themselves of even more maintenance and support capabilities. The two companies have a long-standing relationship, with GETI being based in Wichita, home to another of Bombardier's service centres.

FlyExclusive joins the club

Company is displaying Citation X at the static display

FlyExclusive

Murdo Morrison

FlyExclusive could be the biggest Part 135 charter operator you have never heard of. The reason is that the company, which has a fleet of 85 mostly Cessna Citation jets, has for most of its six years focused on the wholesale market, supplying infill services to the sector's biggest names – NetJets, VistaJet and Wheels Up.

But that is changing fast as the Kinston, North Carolina-based outfit ramps up its retail activities, centred on a jet card model. After starting to market directly to the end-user last year, the segment now represents around 30% of FlyExclusive's revenues, and founder and chairman Jim Segrave expects that to grow to as much as 60% in the next few years.

However, Segrave says wholesale will remain a significant part of its business, and he sees no conflict in competing with charter brands that he is also a supplier to. There are strict "firewalls" between the two operations and pilots flying for a third party provider are not allowed to carry business cards.

"We take that responsibility very seriously," says Segrave, who is at the show this week, along with several new members of his management team and a Citation X at the static display. "We are not out there to take their clients from them. It is very much in our interest for them to be successful. As they grow, we grow."

FlyExclusive is a relatively new player in the charter market, but Segrave is a veteran of the industry. After founding his previous company, Segrave Aviation, in 1994, he sold it to Delta Air Lines' private jet venture Delta AirElite in 2010. That business was subsequently absorbed into Wheels Up in 2019, with Delta retaining a stake in the merged entity.

Segrave then decided to move back into the sector "I had the relationship and I was able to hire back some of the people we previously employed." However, although his new team had the "operational expertise" to acquire and manage a large charger fleet, "building a retail brand from scratch is the most complicated part, and that's why we launched as a wholesale provider", he says.

FlyExclusive operates a fleet of 78 Citations, ranging in size from the Mustang to the Citation X and Sovereign. The Wichita-built brand formed a significant part of the former Segrave Aviation fleet. The remainder are Gulfstream GIV-SPs, the result of the acquisition in 2020 of Tennessee-based charter operator Sky Night.

Segrave is keen to build the Gulfstream fleet. "We'll most likely move to [more modern] G400s and G450s, and then the G500 and G550," he says. The company both owns and manages third-party assets, but "everything is under our control", insists Segrave. "That's what makes us efficient and competitive on pricing. It's a critical part of our structure."

The company is also highlighting at the show the recent addition of a paint hangar at its Kinston facility, part of what Segrave describes as a $12 million investment.

FlyExclusive operates two jet card schemes under the Fly Club brand, one offering guaranteed availability for those flying between 15 and 30 hours a year, and another for those requiring more than 30h of travel. The jet card segment lost a major player last year when JetSuite – a business backed by JetBlue and Qatar Airways – filed for Chapter 11 bankruptcy protection.

GARMIN

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Network covering Southeast USA will be game-changer for connectivity, says company

SmartSky brings ATG broadband to business aviation

SmartSky president Ryan Stone (left) and CEO David Helfgott: US business aviation market is playing to the company's strength

Steve Spatafore/BillyPix

Bernie Baldwin

SmartSky has officially launched its air-to-ground (ATG) wi-fi network, with its initial availability covering the Southeast corridor of the United States. The company has been developing its product over the nine years since its inception and is confident that its system will be a game-changer in the field of connectivity.

SmartSky's CEO, David Helfgott, says that belief in what the company was bringing to the market helped in the battle to achieve official launch. He outlines both the process and the product. "SmartSky is a next generation, air-to-ground, broadband network service, focusing on business aviation adjacent to connected aviation markets like commercial regional jets and, later, general aviation. The bullseye for our launch though, is business aviation," he says.

"Over the company's nine years, the first five were classic, early stage, research and development – patents and intellectual property [IP] developments, regulatory work with the FCC and FAA to make sure that everything that we were developing was, in fact, licensable. The next four years have been the fundraising and build out of the network," he says.

Helfgott claims much greater effectiveness for SmartSky than the direct ATG competition in the business aviation sector, where airframe types start with VVIP and large cabin aircraft and go all the way down market to turboprops. "There are 23,000-plus of those in the US," he notes.

"The top 3,000 aircraft by size are addressed by satcom, but there has always been a problem getting a cost-effective, reliable and empowering kind of connectivity to aircraft below that size. The only alternatives you had were Gogo or very expensive narrowband satcom from companies like Iridium or Inmarsat," Helfgott says.

"To get true broadband onto business aircraft that had physics limitations, getting enough antenna on the aircraft to receive a broadband signal has always been the trick. That's what the first five years of SmartSky was about; it was figuring out how to do that – and we did," he continues. "We now have 220 granted patents and another 135 pending. We have physically built out about 90% of our network in the US – the towers, the fibres, the data centres, the network operation centre – and we are now going across those sites, having completed all of the software work by June 2021," he adds.

"We're deploying one region at a time and we've arrived at the NBAA show with about 50% of the US business aviation air traffic routes covered. By the end of 2021, about 80%-90% – depending on weather – will be lit up and the rest will be done by 2Q22.

"This service will be at least 10 times better than the incumbent air-to-ground service," Helfgott says. "The current offering has 4MHz of bandwidth in a licensed spectrum. That's very, very narrowband. But we bring 60-70MHz of capacity to bear by using the unlicensed spectrum. An enormous amount of our IP is the way in which we deploy 4G and 5G technologies in the unlicensed spectrum for ATG. That provides high quality of service wherever you are.

"We see the market as either unserved or badly served in business aviation, so we'll have lots of greenfield opportunities. Right now we're doing almost no marketing – by design – but even with no marketing, we're getting a dozen or more unsolicited leads a week via our website. They range from VVIP aircraft all the way down to King Airs.

"We lost a year with Covid and on top of that we had a well-publicised issue with one of our chief vendors. That has been resolved and Covid, in terms of business aviation, has resolved itself. In fact, the business aviation market in the US is very robust right now," Helfgott says.

"That plays to our strength. Our network is becoming ready just as people are making decisions to connect their aircraft. Also, it's not just about having the best possible wi-fi in the back of the aircraft. That's just one of three value drivers and we believe we are unique in being able to provide all three for business aviation.

"The first one is office-like connectivity, so I can do Zoom calls without any latency delays or any freezing or any drops. I can do cloud-based computing which requires very low latency, high-bandwidth connection off the aircraft. It really suits the business aviation traveller.

"The second bucket, which I find even more exciting, is getting operational data off the aircraft. What you had to do once the aircraft landed, you can now do en route. It's very hard to get low latency, high bandwidth off an aircraft, especially a small business jet, but because of our ATG network design, we can do that.

"The third bucket of value is augmenting or supplementing information and safety applications for the cockpit. Through the electronic flight bag (EFB), the pilot of a small jet will get updates through the same data connection. For example, to avoid turbulence, we are rolling out a product called SmoothSky, which is a crowd-sourced turbulence avoidance application. We're doing this in co-operation with IATA. That information has never really been available to the business aviation cockpit.

"As noted, it has taken quite a long time, but we've kept pounding away when others may have given up. This is a very committed, tough-minded team. And the reason why are excited is that we're flying our network right now in our own aircraft. We've been taking up investors, partners and customers for months now and are very confident in the robustness of the technology and the network. On one flight we had five different Zoom calls going on simultaneously. That was incredible."

Helfgott explains that, technically, operators require high bandwidth, low latency and symmetry (bandwidth to the aircraft being the same as bandwidth off the aircraft). "Those are the three things that SmartSky's air-to-ground network does better than anyone," he says.

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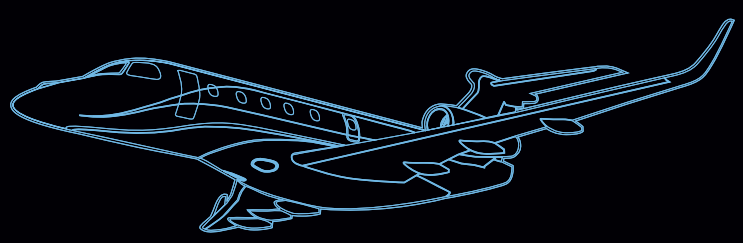

EMBRAER

In the depths of a global pandemic, the business aviation sector has prospered. Analyst **Brian Foley** believes next year will be even better

Good times coming

If patience is a virtue, then business jet makers are the most virtuous of all, having waited some 13 years until now to proclaim that business is booming once again.

Back in 2008, the industry delivered over 1,300 new aircraft worldwide. Following the 2008-09 recession, that figure atrophied to just half that amount annually, around where it still remains today. But that is all about to change.

Call them one of the late beneficiaries of Covid-19. Although total deliveries fell by 20% in 2020 – that period incorporates the depths of the pandemic and featured factory shutdowns, supplier hiccups and would-be buyers waiting for economic confidence to return.

However, while manufacturers were taking action to right-size their operations, other sectors of the industry suddenly began to flourish. Well-heeled travelers sought alternatives to crowded airports and cramped airliners, looking instead to private jet charter or fractional ownership. Data showed business jet travel quickly climbing back toward pre-pandemic levels, while airlines continued to languish.

This crush of first-time private aircraft users, which caused upwards of a 20% increase in business, coupled with increased jet utilisation by existing customers, led fractional jet provider NetJets to temporarily suspend further sales of its jet card charter service.

Concurrently, the number of pre-owned business jet transactions took off in the last half of 2020, setting all-time records and reducing used inventory to nil.

The 2020 increase in charter activity and used aircraft sales were a harbinger of what was to come for business jet manufacturers. While early 2021 was still a little sleepy, by the end of the first half, most OEMs were reporting new jet orders outpacing shipments by a two-to-one margin, fattening depleted backlogs and giving hope that the long lost go-go days of the early 2000s may finally be returning.

Since aircraft production cannot be increased with the flip of a switch, overall 2021 deliveries will not be all that different from previous years. However, as OEMs gain confidence that the increased demand is real, and that they can crank out more planes without the risk of amassing unsold inventory, the ramp-up will become steeper.

Our latest delivery forecast anticipates around 700 shipments in 2021 — in line with previous years. A meaningful ramp-up will begin in 2022 and continue unabated for several years, surpassing the 900-unit level for the first time since 2007. Demand will be driven by first-time owners and corporations that hunkered down during the pandemic but who are now ready to buy, and charter/fractional providers who need larger fleets, by the hundreds, to meet forecast growth.

All the big jet manufacturers stand to benefit from this trend, but the improving market has been particularly beneficial to Bombardier, which as a recent convert to a pure-play business jet manufacturer, has its future tied to the segment.

For now, business jet makers will continue to happily take orders while replenishing their backlogs, and will finally have the luxury to contemplate future production increases. "It's a good time to be in the business," a phrase not uttered since 2007, will soon return to the industry's vocabulary. As Aristotle once said, "Patience is bitter, but its fruit is sweet."

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Jet Aviation has businesses in aircraft management and charter, completions, FBOs and MRO. Its chief executive talks about surviving the crisis and preparing for recovery across its multiple activities

Strength in diversity

Jet Aviation

Murdo Morrison

Few companies in private air travel can take the temperature of the market as quickly and effectively as Jet Aviation. The Swiss-based service provider, part of Gulfstream parent General Dynamics since 2008, has operations on four continents, and across four distinct activities: maintenance, aircraft management and charter, fixed-base operations, and large-jet completions. Its 2018 acquisition of Hawker Pacific added a fifth: air force sustainment.

The company makes money when business aircraft are in the air and in the hangar for servicing, when they are at the airport taking on passengers, and having interiors created before delivery. This diversity has been a strength over the past 20 months, states president David Paddock: "We are the only true, full-service global business aviation company. That, and the backing of our owner, has given us the ability to navigate Covid better than others."

The range of services and worldwide operation across more than 50 sites means that "regardless of where a customer travels, they are recognised as a Jet Aviation customer," says Paddock, an almost 15-year company veteran, who has been in the top job since 2019. He cites the example of a customer in Saudi Arabia. "We do maintenance for them there, but they also go everywhere, so they need AOG [aircraft on ground] support, they need handling, they sometimes need charter," he says.

While maintenance is Jet Aviation's largest business by revenue, the area Paddock sees as having major growth potential, and which it is emphasising at BACE, is aircraft management. "There is a tremendous opportunity there, and you will see more from us on that front," he says. Jet Aviation has more than 300 aircraft under contract, a total boosted by its July acquisition of Luxaviation's Swiss management and charter division. That added 17 aircraft to its European fleet.

While he admits it is a competitive field, charter remains "a significant and core business" for Jet Aviation, with its aircraft flying more than 10,000 charter hours a year, says Paddock. What differentiates Jet Aviation in this market, he says, is that almost the company's entire fleet is managed on behalf of third-party owners, so Jet Aviation is directly responsible for the care of the aircraft it is chartering.

Jet Aviation is also a significant global player in another highly contested market – FBOs – where it is ranked number three with 32 sites, across the USA, Europe, the Middle East and Asia-Pacific. It recently opened FBOs in Bozeman, Montana, and Scottsdale, Arizona, while Hawker Pacific brought it a network in Australia. Meanwhile, the Luxaviation Swiss deal came with ExecuJet's Zurich FBO, which added two hangars to Jet Aviation's existing operation in the Swiss commercial capital.

Jet Aviation's recently opened FBO in Bozeman, Montana

Jet Aviation

Paddock admits there are holes in the FBO portfolio. The company pulled out of Brazil when the economy there hit difficulties a decade ago, and since then has had no presence in Latin America. Around the same time, it also exited the UK, where it had a site at London's Biggin Hill. Another gap is Paris Le Bourget, Europe's busiest business aviation hub. Paddock says all these territories are under consideration for new FBOs, along with growing US markets, such as Austin, Texas and Miami, Florida.

One of Jet Aviation's best known activities is large aircraft completions, where it is one of a handful of players in the world in this highly specialised market. Paddock says this part of its business has been "competitive but fairly active". Its complex at Basel, Switzerland is full with four aircraft currently in the hangar. Two others are on the way, and "we are actively pursuing another couple of opportunities", he says.

In May, Jet Aviation delivered its first VVIP-configured 737 Max, believed to be the first corporate version of the re-engined narrowbody to go into service. Although the customer was not disclosed, an illustration provided by the company showed a Cayman Islands registration. In August, the company also announced it had finished the extension and renovation of a production centre at Basel, bringing its cabinet, interiors, sheet metal and finishing shops together for the first time.

Like most companies in business aviation, the first few months after Covid emerged in early 2020 were challenging for Jet Aviation. The grounding of many aircraft stalled maintenance visits, and other difficulties ranged from Singapore's virtual shutdown that made it difficult for pilots to fly into the maintenance hangars at Seletar airport, to border controls that made it hard for French workers to cross to their job at Basel, just over the border in Switzerland.

Paddock says that when the pandemic hit, the company had a full maintenance backlog, and that helped keep facilities running at close to capacity during the period. Since then, recovery has been healthy, but "uneven in different parts of the world", he says. While the US market has been trending ahead of 2019 levels since May this year, and Europe and the Middle East are beginning to bounce back, Asia still "lags", with business aviation activity significantly down on two years ago.

Although Paddock says Jet Aviation's ownership by one of the world's biggest aerospace and defence companies is a plus, Jet Aviation will remain platform agnostic. "Our policy is that we put the focus on customers first, not the type," he says. "We have numerous clients who operate mixed fleets, and we want to provide the best service to all of them. We have a very good relationship with our sister company, Gulfstream, but that will never be to the detriment of operators of any other type."

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Learjet epitomised style, speed and sexiness for celebrities and corporate high-fliers from the 1960s on. After Bombardier's decision to end production earlier this year, we look at the brand's six-decade legacy

King Lear's long reign

Learjet 23 first flew in October 1963

Bombardier

Murdo Morrison

The early to mid-1960s were arguably aerospace's most creative age, outside wartime. From the first manned space missions to the genesis of vertical take-off fighters, supersonic transports, and jumbo jets, engineers were dreaming big. The period also saw the birth of the business jet, an invention that fused glamour, security, and time machine for those Tom Wolfe would term the Masters of the Universe in booming corporate America.

Bill Lear's Learjet 23 was the only US contender among a trio of types – with France's Dassault Falcon 20 and the UK's Hawker Siddeley HS125 – that over a few months between 1962 and 1963 took to the skies to usher an era of fast, comfortable and private transport for those companies and individuals who could afford them. Of all the brands that emerged at the time, Learjet, along with Gulfstream, has perhaps endured longest in the public consciousness and become synonymous with the sector.

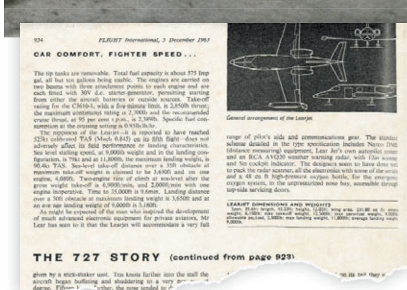
Competitive segment

But in February, Bombardier – owner of the Wichita, Kansas-based airframer since 1990 – announced that Learjet production will cease by the end of the year, blaming slow sales in a highly competitive segment.

Although the Canadian company delivered the 3,000th Learjet in 2017, and more than 2,000 examples remain in service according to Cirium fleets data, annual deliveries of the current 70/75 models have been well below 20 annually for some time.

Bombardier's wider problems have not helped. Weighed down with debts from the ill-fated CSeries development, the company has been offloading assets and slashing costs to stay afloat. It could little afford to keep a subsidiary that was struggling to make a profit. There have been missteps too, specifically with the Learjet brand. Since the scrapping in 2015 of the Learjet 85 – an attempt to bridge the midsize to super-midsize segments – there has been little money available for product development.

Today, the Learjet name may command recognition among those who have a casual knowledge about aviation, but it is no longer pre-eminent, being just one of five brands competing in the broad light jet segment – including several new players that have emerged this century.


CAR COMFORT, FIGHTER SPEED...

THE 727 STORY (continued from page 929)

How *Flight International* reported on the Learjet 23 in December 1963

However, in the 1960s and early 1970s it would have been difficult to overstate the sheer star appeal of the fast and stylish Learjet 23. Frank Sinatra was one of its first customers, and for years it was the favoured mode of transport for Hollywood celebrities.

Born in Hannibal, Missouri in 1902, Bill Lear failed at high school but became a serial entrepreneur and inventor, making money during the Second World War. In 1960, he started working with Swiss-based engineer Dr Hans-Luzius Studer on a business jet version of Studer's FFA P-16, a supersonic fighter that never entered service. Abandoning plans for a Swiss factory, in 1963 he set up in Wichita, home of Cessna and Beechcraft. The Learjet 23 flew in October that year.

Two months later, *Flight International* approved of the "sleek compactness" of the six- to eight-seat twinjet in a piece headlined "Car comfort, fighter speed", noting that what it lacked in cabin space compared with other fledgling business aircraft it made up for in pace. The General Electric CJ610-1-powered type featured swept wings and integral wing and tip tanks that gave it a 1,600nm (2,960km) range. It reported that Lear planned to build 10 Learjet 23s a month by 1964.

In 1967, the Gates Rubber Company acquired a majority stake in the company, although Lear, by now approaching 70, remained on its board until 1969. By the time of the first flight in 1971 of the Garrett FTE731-2-powered Model 25 – later the Learjet 35 – the firm had become Gates Learjet.

In 1975, the Learjet Corporation delivered its 500th aircraft, going on later that decade to launch the Learjet 28 (a re-winged version of the Learjet 25), and the midsize Model 54/55/56 prototype.

Space Shuttle

The 1980s witnessed a move into producing parts for the Space Shuttle programme, a short-lived relocation to Tucson, Arizona, and a further acquisition that saw the company revert to the name Learjet Corporation, although its new parent soon filed for bankruptcy. In 1990, Learjet was scooped up by the fast-expanding Canadian combine Bombardier, which had recently bought Canadair and Northern Ireland's Shorts, and would later add De Havilland Canada.

Flight International reported in July that year that Learjet would be an autonomous subsidiary of Bombardier, with its management team in place, although the Canadian outfit planned to establish a new flight-test centre for its products at the Wichita site. Bombardier chairman Laurent Beaudoin said production of Learjet's then current models – the

Learjet 75 is the final variant in production

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The Learjet 31A was one of several successful types launched by the Wichita-based airframer

Bombardier

Bombardier has announced an upgrade programme for variants such as the 40XR

Bombardier

31, 35A and 36A light jets, together with the larger 55C – would continue as "niche" products within the wider Bombardier range.

Huge ambition

During the 1990s, the Learjet 60 (an evolution of the Learjet 55) and all-new Learjet 45 flew for the first time. Around the time it was preparing to launch the CSeries, a bullish Bombardier also announced in 2007 the all-composite Learjet 85, a hugely ambitious project that involved outsourcing specialist fuselage production to Grob in Germany.

But the complexity of developing the Learjet 85, together with Bombardier's growing cash crisis, saw the programme cancelled in 2015.

Despite attempts to reinvigorate what had become a one-aircraft range with the launch of a Learjet 75 Liberty variant in 2019, the move to end production has surprised few industry watchers. "There have been tell-tale signs leading to this decision for years," says Brian Foley of consultancy Brian Foley Associates. "There have been no real enhancements to the Learjet line since 2013, when the Learjet 40XR and 45XR were tweaked to make the Learjet 70 and 75."

All-composite Learjet 85 was an ambitious attempt to broaden the range in the 2000s, but was a costly failure

Bombardier

Daniel Hall, a senior valuations consultant with Ascend by Cirium, notes that values for the Learjet 70 and 75 have "continued to rapidly depreciate" during the pandemic, although he says that values for the older Learjet 45 and 60 families have "performed quite well". When it announced it was ending production, Bombardier also said it was launching an upgrade programme for Learjet 40/45s, including new avionics, cabin improvements and updated in-flight connectivity.

Even loyal Learjet customers have accepted the inevitability of the decision. Siegfried Axtmann, chairman of German air ambulance specialist FAI, one of the biggest Learjet operators in Europe with a fleet of 12 Learjet 60s, describes the move as "regrettable but understandable", and on the cards since the cancellation of the Learjet 85 programme. However, he adds: "The Learjet remains one of the most iconic business aircraft ever. We have enjoyed many successful years with it."

The lost brands of business aviation remembered

These are some of the families or types that pioneered new segments or were highly successful in their own right, but are no longer being produced:

Lockheed JetStar

While Lockheed Martin remains one of the biggest names in aerospace and defence, Lockheed's days as a business aviation badge are long over. The Lockheed JetStar was in production from the early 1960s until the late 1970s and some maintain the four-engined, 10-passenger type was the first true business jet. Elvis Presley and Frank Sinatra were among celebrity JetStar owners.

Hawker

Hawker Siddeley was behind another 1960s-era business jet – the HS125 – which evolved into the Hawker 1000 under Raytheon ownership in the 1990s. The Hawker family – the 400XP and the super-midsize Hawker 4000 – continued to be produced until shortly before Hawker Beechcraft went into Chapter 11 bankruptcy protection in 2012. Textron Aviation then acquired the Hawker and Beechcraft brands in 2014, but Hawker production was never restarted.

Lockheed's JetStar was produced from the 1960s

James Mellon

Grob SPn

Grob continues as a manufacturer of trainer aircraft, but the Bavarian company briefly dipped its toes into business aviation under then-owner South African entrepreneur Niall Olver. The all-composite Grob SPn, unveiled and flown in 2005, was one of a flurry of light and very-light jets to hit the market in the mid-2000s. As with many of its contemporaries, the programme was cancelled in 2008 when Grob fell into insolvency. Four prototypes were built, but none entered service.

Adam

Another start-up from the noughties that failed to survive the financial crisis, Colorado-based Adam Aircraft's range comprised the A500 piston twin and the A700 very-light jet. Seven A500s – based on an original design by Burt Rutan – entered service, but the A700 never made it to production.

Eclipse

If founder Vern Raburn's vision had come true, the skies would be full of Eclipse 500s and their successors by now. The former Silicon Valley executive planned to mass produce the original very-light jet in the early 2000s, offering them to early adopters for just $2 million a time. But it was not to be. Eclipse Aviation failed in 2008, and, although the Eclipse name has survived under successive companies, Raburn's dream of a brand that would disrupt the world of general aviation came to nothing.

Sabreliner

The North American and later Rockwell Sabreliner was a midsize jet developed for both military and business use in the late 1950s. After a number of civilian models were made, from the Series 40 to the Series 80A, production was halted in 1981.

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Covid-19 may be making long-haul travel difficult, but demand for the biggest business jets is rising. And with multiple new entrants to the market, competition is heating up in this profitable segment

Distant prospects

Dassault unveiled its 7500nm-range flagship Falcon 10X in May

Dassault Aviation

Jon Hemmerdinger

Think back to the last NBAA-BACE – October 2019, also in Las Vegas. Before the world changed so dramatically.

That was a time of optimism for the companies that produce the largest business jets – the ultra-long-range types that can fly nearly anywhere without needing to refuel.

Those companies were riding a wave of demand, with business jet deliveries in 2019 jumping 15% year on year, according to the General Aviation Manufacturers Association (GAMA).

At 2019's BACE, Gulfstream launched its G700, a competitor to Bombardier's standard-setting large-cabin Global 7500.

Then came Covid-19, which changed everything. The industry sank into a dark place from which escape seemed uncertain. Manufacturers cut staff, wound down production, and restructured operations.

But a curious thing happened in 2021: the large-cabin business jet market snapped back. For various reasons – many pandemic-related – buyers are again eagerly placing deposits on the world's longest-range, largest, priciest and most-capable business jets.

Much has changed with the pandemic. But to a large degree, trends that defined the upper echelon of the business jet market prior to Covid-19 also define its 2021 recovery. Some of those trends have actually accelerated – competition, for instance. In May, Dassault Aviation unveiled development of its Falcon 10X, a jet aimed squarely at countering the Global 7500 and in-development G700. Then, in early October, Gulfstream revealed a class-topping riposte to its rivals with the 8,000nm (14,800km)-range G800.

Inelastic demand

"It just goes to show that the top market is, as economists say, completely inelastic," says Richard Aboulafia, vice-president of analysis at Teal Group, meaning manufacturers seem able to charge "whatever price [they] like" – and buyers will still line up. The four jets above all have price tickets north of $70 million.

Commercial aircraft producers also compete in the ultra-large-cabin segment, though they tend to deliver far fewer executive jets than airframers producing dedicated business jets.

Airbus has been vocal in promoting its ACJ TwoTwenty, a 5,650nm-range corporate variant of its A220-100 jetliner. Earlier this year, Airbus said it had started assembling the first TwoTwenty at its Montreal site. It aims to fly the aircraft for the first time before year-end and to deliver the lead example to launch customer Comlux in early 2022.

Other competitors include Embraer, with its E190-based, 4,600nm-range Lineage 1000E, and Boeing Business Jets, which sells executive variants of its 737 Max, including the 7,000nm-range BBJ 737 Max 7.

The business jet market has not fully recovered. With Covid-19 continuing its global sweep, the sector is far from its usual self. Layoffs and production cuts will have lingering effects.

But things are looking up.

"The second quarter was exceptional on all fronts. Better revenue, better profitability, better cash generation, better service revenue and perhaps most importantly, better aircraft sales," Bombardier chief executive Eric Martel said on 5 August.

Who would have thought?

The market for business jets never suffered as mightily from the pandemic as its commercial aviation sibling. Indeed, in early 2020, as Covid-19 arrived and airline operations fell into disarray, business jets were suddenly in high demand.

Plenty of people wanted to travel – either domestically, or to escape whatever country in which they found themselves marooned. If you wanted or needed to travel, and if you had the money, you might have chartered a jet.

"They [business jet operators] were flying the pants off them up to the March [2020] timeframe," says Brian Foley, founder of aerospace consultancy Brian Foley Associates.

The boom was short lived, ending as the world hunkered down to wait out the pandemic. Airframers cut staff and production. Deliveries slowed to 130 business jets in the second quarter of 2020, fewer than half as many as were delivered in the same period of 2019, according to GAMA.

But all was not lost. Amid the pandemic, demand "percolated" for small and mid-size jets, say Foley – aircraft perfect for the only travel that was still permitted: domestic. But still, at the end of last year, large-cabin jets "weren't moving at all – the big-cabin stuff practically ground to a halt".

The large-cabin market was not sour for long, however. Recovery took hold in early 2021 and demand returned. Airframers delivered more jets and new orders filled their backlogs. By mid-year 2021, some companies were delivering jets at a faster pace than in pre-Covid 2019, and upping revenue expectations.

"At first, it looked like the small- and medium-cabin segments were doing best, but now a rising tide [is] lifting all boats," says Aboulafia. "No-one thought everything would come back on a dime, but it did. Now they have to bring production up again."

He estimates Bombardier, Dassault and Gulfstream will, in 2021, deliver a combined 196 large-cabin jets (defined as those costing at least $35 million) for a total delivery value of $11.7 billion. He expects deliveries will increase steadily – hitting 250 jets, worth $14.7 billion, in 2025.

Bombardier delivered 17 large-cabin business jets (including 11 of its flagship Global 7500) in the second quarter – one more even than the 16 large-cabin jets it delivered in the same period of 2019.

The company, fresh from a restructuring that involved divesting non-business aviation units, recently upped its 2021 revenue expectations by $200 million, to more than $5.8 billion. It also tweaked its 2021 delivery expectation to 120 aircraft, revised from a previous estimate of 110-120 shipments.

Bombardier has a bit of a head start over competing ultra-long-range products, having beat competitors to market with the late-2018 service entry of its Global 7500. Powered by twin 18,900lb (84.2kN)-thrust GE Aviation Passport turbofans, that $75 million jet can carry 19 passengers and has 7,700nm range.

The next move for the Montreal airframer is somewhat unclear, although executives say their focus lies on maturing the Global 7500 programme. They also continue to evaluate the feasibility of launching the long-stalled Global 8000, which Bombardier launched in 2010

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Gulfstream has staked much on the 19-passenger, 7,500nm-range G700

Gulfstream

Bombardier delivered 11 examples of its Global 7500 in the second quarter

Bombardier

alongside the Global 7000, which became the 7500.

Competitors Gulfstream and Dassault – which have each countered the Global 7500 with clean-sheet designs – have likewise reported encouraging market conditions.

"Sales activity truly accelerated in the middle of February" – a trend that continued in the second quarter, Phebe Novakovic, chief executive of Gulfstream parent General Dynamics, said in July.

Savannah-based Gulfstream delivered only 21 aircraft in the second quarter, 11 fewer than the same period last year. But it aims to hike deliveries to 32 aircraft in the third quarter and 37 in the fourth.

"If all goes well, we may be able to bring a few more forward from the first quarter [of] 2022 to meet current demand," adds Novakovic. "You will see more deliveries, revenue and operating earnings in the second half as a result."

Gulfstream's hands are full with the work of certificating the jet it has staked much of its future on: the 19-passenger, 7,500nm-range G700. The airframer revealed the Rolls-Royce Pearl 700-powered G700 at 2019's NBAA. It targets a late 2022 service entry.

Within range

Priced at $78 million, the G700's range is the same as Gulfstream's previous standard-bearing G650ER – and 200nm less than the Global 7500. However, that range discrepancy has now been addressed with the launch of the $71.5 million G800. Effectively a shrink of the G700, it shares a wing, winglets, tail and fuselage cross section, as well as Rolls-Royce Pearl 700 engines, with its larger sibling; service entry is due in 2023.

How the newest large-cabin business jets stack up

Specifications	Bombardier Global 7500	Dassault Falcon 10X	Gulfstream G700
In-service date	December 2018	Scheduled: end of 2025	Scheduled: late 2022
Price	$75m	$75m	$78m
Passengers	up to 19	Not disclosed	up to 19
Range	7,700nm	7,500nm	7,500nm
Top speed	M0.925	M0.925	M0.925
Operating ceiling	51,000ft	51,000ft	51,000ft
Cabin height	1.88m	2.03m	1.91m
Cabin length	16.6m	16.4m	17.3m
Cabin width	2.44m	2.77m	2.49m
Wingspan	31.7m	33.6m	31.4m
Engines	2 x GE Aviation Passport	2 x Rolls-Royce Pearl 10X	2 x Rolls-Royce Pearl 700
Thrust (per engine)	18,900lb	>18,000lb	18,250lb

Source: Manufacturers

Dassault is banking on the taller and wider cabin of its Falcon 10X – it trumps both the G700 and Global 7500 – persuading customers to wait until 2025 for delivery.

Gulfstream also highlights the G700's technology. Fly-by-wire controls. Active-control side sticks. A Honeywell Primus Epic-based Symmetry flightdeck with touch-screen avionics, moving maps, head-up displays, synthetic and enhanced vision systems and a predictive landing system.

The G700's 18,250lb-thrust Pearl 700s will also burn 2-3% less fuel than the G650ER's R-R BR725s, the airframer claims.

As of late July, Gulfstream had completed some 1,600h of testing across five G700 test jets. However, "there is much that remains to be accomplished" with the certification effort, Novakovic said at the time, observing that "new engine development programmes... are always difficult to get through certification."

Airbus ACJ TwoTwenty is based on the A220-100

Airbus

For a while, it seemed Bombardier would only have to contend with Gulfstream in the ultra-long-range space. But with large-cabin business jets being as profitable as they are, Dassault could not have been expected to sit on the sidelines forever.

In May, the French company jumped into the ring, revealing it is developing its largest-ever business jet, the $75 million Falcon 10X. Powered by R-R Pearl 10X turbofans – likely higher rated than those on the G700 - the 10X will have 7,500nm range with eight passengers and four crew.

Dassault is working to bring the aircraft through certification in time for service entry at the end of 2025, three years behind Gulfstream's G700 timeline.

In July, the company revealed it had landed its first 10X orders, although it did not disclose how many. In the first half of 2021, it took orders for 25 Falcon jets of all models – up from five for the same period of 2020.

"For the past 25 years, they have been absent from the very top," Aboulafia says of Dassault. "Will they be able to gouge out a presence? That is the single biggest question."

"Its getting a little crowded in the market, with the three contenders," adds Foley. "That's a lot of airplanes in a pretty niche market, but it's also one of the more-profitable segments."

With the Lineage 1000E and executive variants of the 737 Max also battling for ultra-large-cabin business jet buyers, it is worth asking if demand can support all that production.

In the long term, analysts are unsure – but at the moment the answer is yes. Underlying economic conditions indicate no shortage of willing buyers, they say.

Strong corporate profits and roaring equities markets have left buyers flush with cash, says Aboulafia. And oil prices are up – good for business jet makers because a large number of buyers are either oil companies or from oil-rich countries, he adds.

Another encouraging factor is that the used aircraft market is booming, with very few aircraft for sale. "When there is nothing left in the pre-owned market and people are itching to buy... there is only one other place to look, and that's new aircraft sales," Foley says.

In July, Bombardier's Martel cited the health of the used-aircraft market, noting only 4-5% of the global used aircraft fleet is up for sale – a two-decade low.

"Typically, the percent of the fleet for sale, in a normal time, is 10-12%," says Foley, noting that about 18% of the used fleet was available following the 2007-2009 recession.

As a result, orders are coming in and airframers are reporting higher book-to-bill ratios – the balance of a company's orders to deliveries – a higher number is better, meaning a company is landing orders faster than it is delivering jets, thereby building its backlog.

Bombardier reported a second-quarter book-to-bill ratio of 1.8:1 (in aircraft units), adding $300 million worth of orders to its backlog in the period. Gulfstream's ratio for the period was 2.1:1 (in dollar value).

"From an order perspective, the quarter bordered on spectacular," Novakovic said of Gulfstream in July. "This is the strongest-order quarter in number of units in quite some time."

The way things look, Foley wonders if demand for large-cabin jets might actually outstrip supply for several years. He notes that manufacturing and supply-chain limitations will probably preclude significant production rate hikes. That is likely to be fine for manufacturers; they will not soon forget being stuck with unsold inventory following the last recession, he says.

"I could make the argument that there could be a scarcity coming up, at least initially," Foley says of new jet availability. "If I have to make a prediction – all three of those manufacturers will be facing a nice problem to have."

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Having already impressed with earlier versions of its SF50 Vision Jet, Cirrus has again raised the bar with the newly available G2+ model, offering enhanced performance and new safety features

Vision of success

Increase in available thrust from Williams FJ33 engine enables greater range and/or payload

Cirrus Aircraft

Michael Gerzanics San Jose

Cirrus Aircraft launched its ground-breaking, single-engined SF50 Vision Jet in 2006. It received US Federal Aviation Administration certification in October 2016, with European Union Aviation Safety Agency approval secured the following May.

The world's most affordable light jet enjoyed immediate market success, and more than 260 have been delivered to date.

I was fortunate to fly the original Vision Jet in July 2017 for *Flight International*. Since then, Cirrus has not stood still, offering a major upgrade with its Generation 2 (G2). Launched in early 2019, this standard increased the jet's operating ceiling from 28,000ft to 31,000ft, made possible by upping the Williams International FJ33 engine's thrust output at altitudes above 24,000ft.

The Vision Jet's composite fuselage was also reinforced, so that the original G1 version's 8,000ft cabin altitude pressure could be maintained. This higher altitude and thrust capability pushed maximum range out to 920nm (1,700km) with four occupants. Stated in other terms, the G2 could carry 68kg (145lb) more payload than the G1 over 800nm.

Aside from its increased performance, the G2 also gained an auto-throttle (AT), a welcome addition that reduces pilot workload.

In July 2021, Cirrus announced the latest upgrade to the SF50, the Vision Jet G2+, offering what might be best characterised as increased bandwidth.

The major update is in enhanced hot and high operating performance. Changes to the FJ33's FADEC increase available thrust for take-off, allowing more range and/or payload compared with the G2. The next bandwidth increase is actual in-flight connectivity, using Gogo's Avance L3 3G broadband system. This keeps pilots and passengers connected in real time, improving productivity.

Enhancements to passive sound deadening from the G1 to the G2 reduced ambient cabin noise levels by up to 3dB. Matthew Bergwall, Cirrus's director of Vision Jet product line, says this reduction allows him to characterise the type's cabin as a headset-free zone.

Recently, *Flight International* was invited to fly the Vision Jet G2+ out of San Jose's Norman Y Mineta International airport. Cirrus's piston product line features large and airy cabins, and the Vision Jet continued this feature. As I had noted before my flight four years ago, the Vision Jet has a certain ramp presence driven by its sizeable cabin with large windows, and the single jet engine mounted prominently on its fuselage's dorsal spine. Finally, the large V-tail, employed so that engine exhaust would not impinge on the empennage, shouts: "Look at me!"

I accompanied Bergwall as he performed the pre-flight walk-around inspection of our preview aircraft, N275CM; a production-representative G2+. There was little to visually differentiate this from the original variant, but keen eyes might notice the two broadband antennas mounted on the underside of the fuselage. As we circled the jet, Bergwall pointed out where minor aerodynamic refinements had been made to reduce drag.

The original Vision Jet had Boundary Layer Energisers (BLEs) installed before the ailerons to improve handling at high angles of attack. Follow-on testing for the G2 showed they could be removed with no adverse effect. As I would find out later while in flight, the BLE-free wing provides for lighter lateral control stick forces and crisper roll performance. Fewer parts and better performance equals a win-win.

Integral steps on the lower half of the clamshell door aided entry to the large, airy cabin. Before settling into the left-hand pilot seat, I took note of the passenger accommodation. The cabin is fitted with three seating rows, with removable seats. The densest configuration offers seating for seven: five adults and two children. Ours featured two middle-row seats, separated by a console, and two children's seats in the third row. A 51cm (20in) LCD display viewable from the aft two rows was a feature sure to put the in-flight broadband to good use.

Cirrus SF50 Vision Jet G2+ specifications

Dimensions	
Length	9.3m
Height	3.3m
Wingspan	11.7m
Wing area	18.18sq m

Weights**	
Maximum take-off weight	2,722kg
Maximum landing weight	2,517kg
Basic empty weight	1,610kg
Useful load	1,112kg
Usable fuel capacity	907kg
Full fuel payload	205kg

Passenger cabin	
Length	3.5m
Width	1.56m
Height	1.24m
Cabin volume	4.81cb m
Baggage stowage*	0.63cb m/136kg

Performance	
Take-off distance**	973m
Operating ceiling	31,000ft
Range***	920nm
Maximum operating Mach speed	M0.53
Landing distance****	918m

Notes: *Plus optional 0.11cb m/18kg **MTOW, SL, ISA ***MTOW, IFR reserves, four occupants ****MLW, SL, ISA

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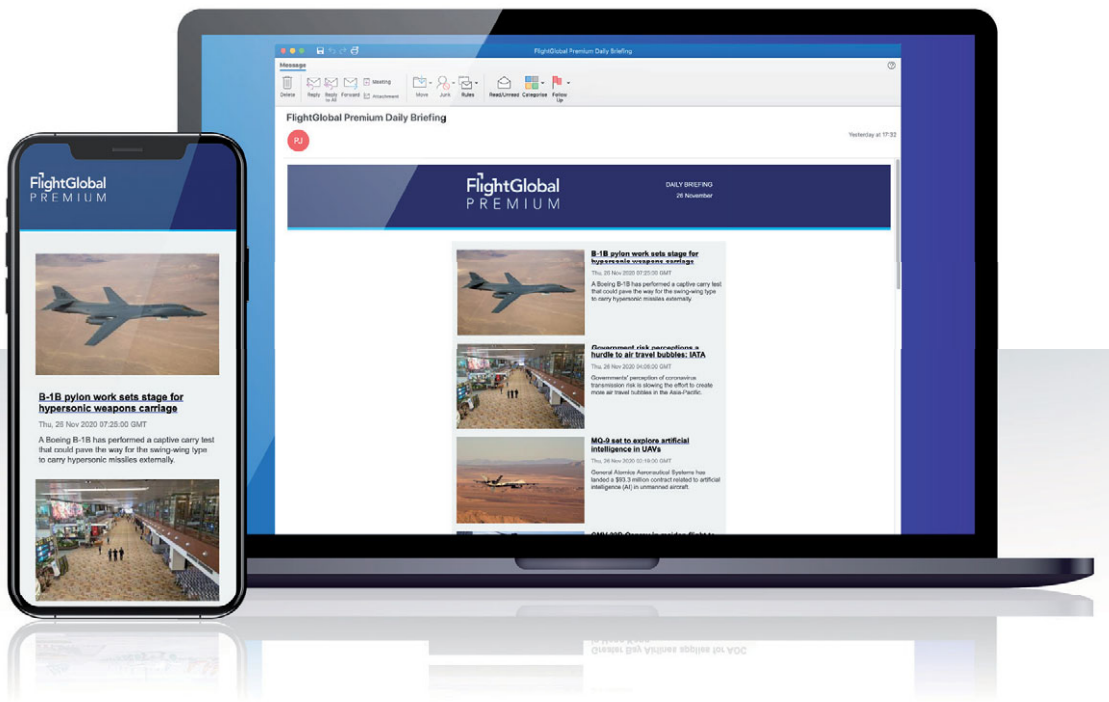

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One unique aspect of the Vision Jet's layout is where the emergency switches are located. Engine fire control switches, emergency locator transmitter, quick-don crew oxygen masks, as well as several other emergency controls, are conveniently placed on the overhead above the flightdeck. The Cirrus Airframe Parachute System (CAPS) actuation handle is nestled between the oxygen masks.

Standard across the whole Cirrus offering, CAPS is a hallmark of the airframer's dedication to providing industry-leading safety features. Just aft of the CAPS handle is the autoland activation panel, with its large recessed red activation button accessible to the first-row passengers.

Safe Return is Cirrus's implementation of Garmin's Autoland system, which was awarded the 2020 Collier Trophy, recognising it as the greatest accomplishment in aeronautics or astronautics in the USA that year. According to Garmin, Autoland is "the world's first certified autonomous system designed to activate during an emergency to safely fly and land an aircraft without human intervention". One of three aircraft types so far to be certificated with Autoland – along with the Daher TBM 940 and Piper M600 SLS – the SF50 is the only jet.

Safe Return is armed by pushing the ceiling-mounted button. At altitudes of more than 600ft above ground level (AGL) this will engage the system after a 10s delay. A green "landing airplane" icon illuminates on the panel to show activation. At any time, pushing the yoke-mounted autopilot (AP) disconnect switch will disengage Safe Return.

First-row passengers can reach Autoland activation button

Cirrus Aircraft

Ken Hall

Cirrus Aircraft

Safety first

Designed primarily for cases when the pilot is incapacitated or unable to land the aircraft, Safe Return turns the Vision Jet into an autonomous air vehicle. The system uses all available resources to find the nearest suitable airport to land safely. The transponder is automatically set to 7700, with advisory radio broadcasts made on air traffic control and Emergency Guard frequencies. During the emergency recovery, passengers are informed of the time remaining to landing. Once on the ground, the Vision Jet brakes itself to a stop on the runway.

It should be noted that operation of Safe Return is predicated on good GPS data, and degraded operations can result if there are aircraft system failures.

This revolutionary enhancement provides an additional layer of safety to operations of the Vision Jet, which was itself a Collier Trophy winner in 2017.

As Bergwall strapped into the right-hand pilot seat, I reacquainted myself with the Vision Jet's flightdeck. When I had first sat in the type four years earlier, I noted that the flightdeck was "arranged in a somewhat unique manner". The forward panel was unlike any aircraft I had flown before, looking like it came from a car of the future.

Over the intervening years the design has grown on me. It is anchored by two 35cm GDU 1400 display units, for the primary and multi-function flight displays. A bolster forward of the screens gives the flightdeck its unique look, with three GTC 580 touchscreen controllers placed below it. The number one (leftmost) screen also serves as a standby flight display. The AP control panel is placed below the controllers, with the single thrust lever (TL) on the small centre console.

Engine start controls are located just forward of the sidestick. Placing the engine knob to RUN and depressing the engine button initiated the start sequence. The FADEC-controlled start was essentially automatic, with the pilots monitoring for an abnormal start. Time to IDLE was 25s, with interstage turbine temperature peaking at 655°C (1,210°F); well below the 1,000°C start limit.

The flaps were set to the take-off setting (50%) before the taxi to San Jose's runway 30L. Taxiing the Vision Jet would turn out to be the hardest task I would perform on the preview flight, owing to its fully castoring nose wheel. Cirrus ecosystem pilots are used to this, but for me it was a bit of a learning curve, especially as the Vision Jet tried to weather vane into the 13kt (24km/h) crosswind. However, by the time we reached the runway I had gained confidence in my ability to keep the G2+ on taxiway centrelines.

Before lining up on the runway, Bergwall reviewed take-off contingencies. Response to an engine failure would be guided by altitude. Below 600ft AGL: land straight ahead; between 600ft and 2,000ft AGL: deploy the CAPS; and above 2,000ft: initiate an air start while turning towards an emergency landing field.

Cleared for take-off, I advanced the TL to the full forward take-off (TO) detent. On the 24°C day TO power stabilised at 98% of rated (SL STD Day). Differential braking was used to maintain the centreline until the rudder become effective at around 40kt indicated airspeed. At 85kt, a moderate aft pull was needed to establish the 5° nose-up TO attitude.

Pitch trim easily removed yoke force changes caused by flap retraction during acceleration through 115kt. At 5,000ft, I retarded the TL to the MCT detent, (62% thrust for that day) and established a 150kt en route climb. I referenced the flight director's (FD's) 'Highway in the Sky' boxes to keep the Vision Jet on the published ground track and at desired climb speed.

During the climb I engaged the AP and familiarised myself with the Perspective Touch+ flightdeck. Time to level off at 31,000ft was slightly over 25min. During the climb, temperature was about 10°C hotter than standard. With three occupants, book data for the G2 showed the time needed as 32min, so our G2+ had reached its operating ceiling 6min sooner than its predecessor.

The first leg of my preview flight was to Bishop, California. Increased TO thrust is the main performance improvement offered by the Gen 2+, unless you are glued to a screen. Bishop sits at 4,124ft mean sea level (MSL), at the northern end of the Owens Valley, and forecast high temperatures would make it an ideal place to demonstrate the G2+'s increased performance.

Cruising at 31,000ft en route to Bishop I left the TL in the MCT detent (34% thrust), to see how fast the G2+ would go. After 5min of slow acceleration, it settled at

Cabin can accommodate up to five adults and two children

Cirrus Aircraft

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188kt indicated airspeed. Cirrus lists 305kt for high-speed cruise, but this is predicated on standard day temperatures. On our test day it was 10°C hotter, yet our true airspeed was 313kt (Mach 0.52). Fuel flow was just 65gal/h. As with the climb performance, Cirrus had under-promised and over-delivered.

Conversation point

While in cruise I also noted the 6.7psi/462hPa delta p pressurisation system was maintaining a cabin altitude of 8,000ft, comparable to that of many airliners at cruise altitude. I also took off the noise-cancelling headset to assess ambient flightdeck noise level. It would be a bit of a stretch to compare it to my flight four years ago, but I did note that we could converse easily over the background noise.

With my headset back on, we prepared for the RNAV (GPS) runway 12 approach, to be followed by a low approach and visual circuit to runway 17 to a full stop. Bergwall guided me through, loading the approach and setting our minimum descent altitude at 6,600ft MSL. With the AP and AT engaged, we descended in Vertical Speed mode to the Final Approach Fix (JAAKE) altitude of 7,900ft sea level just outside of JAAKE.

Established on final, the AP and AT did an excellent job of tracking the approach path. Fully configured, with gear down and flaps at 100%, the Vision Jet had a reference speed of only 85kt indicated airspeed. When MINIMUMS was announced by the flight management system, I pushed the TO/GA button on the TL. I sat back and watched as the aircraft pitched to 7° nose up. I immediately retracted the flaps to 50%, followed by the gear when a positive rate of climb was established. Passing 115kt I retracted the flaps and clicked off the AP and AT to hand-fly the circuit to runway 17, as the winds were 180°, 17kt, gusting 23kt.

Despite the bumpy conditions, the Vision Jet was a pleasure to fly in the circuit. On short final I retarded the TL to IDLE at 30ft, and the flare manoeuvre, started a few feet above the runway, resulted in a soft touchdown. Light toe-braking slowed the Vision Jet for runway turn-off and taxi back to runway 12 for our flight back to San Jose.

Lining up for take-off on runway 12, I advanced the TL to the TO stop and noted available thrust was about 93% – a sizeable increase over the G2's. FADEC changes – akin to the automatic thrust reserve feature available on some twin-engined jets, which boosts thrust on the good engine in the event of a failure to the other – deliver the additional thrust. On the 38°C day, book take-off roll for a G2 is 3,600ft, while our G2+ lifted off in only 3,000ft.

The FADEC remapping provides a 4% thrust increase at SL STD Day, and up to 20% more at higher temperatures and elevations. According to Bergwall, this now opens up 4,000ft-long East Coast airfields to maximum gross weight take-offs in typical hot summer temperatures. Out of Henderson, Nevada – Las Vegas's general aviation/executive airport – at 41°C the G2+ can carry 227kg more payload than the G2. This additional capability will no doubt be appreciated by Vision Jet pilots, with the only downside being a slight increase in Cirrus's Jet Stream hourly cost.

I hand-flew the climb out of Bishop as we circled to gain altitude to cross the Sierras at 16,500ft MSL. At this lower-altitude transit, a fuel flow of 81gal/h was needed to maintain 215kt indicated, with a resultant true airspeed of 285kt. During the medium-altitude cruise, Bergwall discussed the Vision Jet's emergency descent mode (EDM), an automated descent to a safe altitude in the event of cabin pressure loss.

The Vision Jet's AT and Safe Return features greatly enhance the effectiveness of EDM. The AT allows the thrust to be reduced, expediting the EDM's descent to 14,000ft. Safe Return adds a new safety net. After levelling at 14,000ft, if there is no indication of pilot activity within 30s, Safe Return activates on the assumption that the pilot is incapacitated.

Before descending into San Jose I was able to explore the Vision Jet's slow-speed handling characteristics. I accomplished two approach to stall manoeuvres; one clean and the other in a landing configuration, with gear down and flaps at 100%. In both manoeuvres I held aft sidestick until the stick shaker activated. Before shaker activation there were plenty of visual and aural cautions/warnings provided to alert the pilot of the slow speed condition.

At shaker activation, the Vision Jet was stable, with little if any wing rock. Additionally, the jet was responsive to small control inputs at this low-speed condition. The AT will prevent slowing to an unsafe speed, waking up if not engaged to keep the Vision Jet out of the shaker situation.

With the slow-speed manoeuvring complete, I started a descent for the ILS approach to runway 30L. During the descent I executed a number of 45° to 60° angle of bank (AoB) turns. The Vision Jet's Electronic Stability and Protection (ESP) system kicked in as the AoB exceeded 45°. ESP is a great safety feature, helping to prevent an unusual attitude from upsetting the pilot's day.

Soft landing

The final event of the preview flight was a hand-flown ILS approach to a full stop landing. During the approach to runway 30L, I found the FD provided intuitive guidance to help me keep the Vision Jet on course and on glide slope. Approximately 30% thrust held our target speed, again just 85kt. As was the case at Bishop, the touchdown was a smooth one, no doubt aided by the trailing link main landing gear. Moderate braking slowed the Vision Jet to taxi speed.

My flight in the upgraded Vision Jet G2+ revealed a single-engined jet with docile handling qualities and a remarkable number of safety features. Increased take-off thrust markedly increases the type's capabilities in hot and high conditions.

The Perspective Touch+ avionics package is an extremely capable one, with safety features such as the blue LVL button and ESP, which in addition to its roll protections also offers low- and high-speed protections. CAPS is a proven safety system that has saved numerous lives. Finally, Safe Return adds an entire other layer of safety, virtually eliminating the risks posed by pilot incapacitation.

The Vision Jet G2+ offers marked performance improvements over the G2, along with in-flight broadband which is sure to please pilots and passengers alike. More capability in a safer package is a sure recipe for success, and Cirrus has cooked up another winner with its Vision Jet G2+.

Gerzanics (*left*) with Cirrus Vision Jet product director Matthew Bergwall

Ken Hall

Distinctive V-tail contributes to light jet's ramp presence

Ken Hall

Nose houses recovery parachute

Ken Hall

Cirrus SF50 Vision Jet G2+ versus competitors

	SF50 Vision Jet	Eclipse 500	Piper M600
Cabin (L x W x H)	3.5 x 1.56 x 1.24m	3.75 x 1.43 x 1.28m	3.76 x 1.25 x 1.18m
Range (four occupants, NBAA IFR)	920nm	1,125nm	1,484nm
Operating ceiling	31,000ft	41,000ft	30,000ft
Engine/s	1 x Williams International FJ33	2 x P&W Canada PW610F	1 x P&W Canada PT6A
Maximum take-off weight	2,722kg	2,722kg	2,722kg
Useful load	1,112kg	1,089kg	1,089kg
Take-off distance	973m	742m	803m
Landing distance	918m	850m	810m
Maximum cruise speed	311kt	375kt	274kt
Stall speed	67kt	69kt	62kt
Thrust-to-weight ratio	31%	30%	n/a
Wing loading (kg/sq m)	150	203	140
Price (typical)	$2.98m	n/a	$2.85m

Source: Manufacturers Note: *Used example

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We profile two aircraft sure to catch the eye on the static display – mock-ups of Dassault's Falcon 10X and the Textron Beechcraft Denali

Walk up to mock-ups

Textron Beechcraft Denali

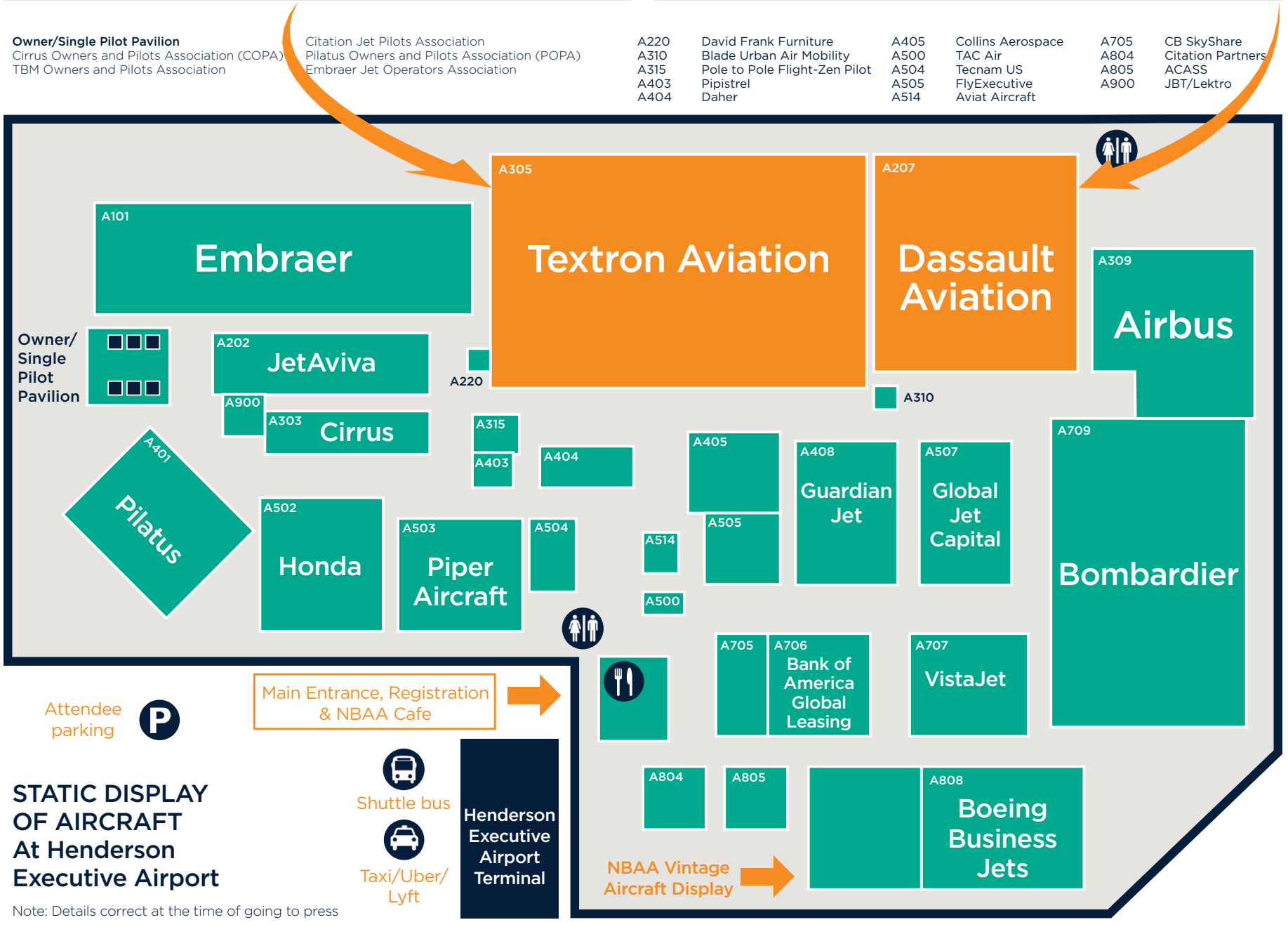
Steve Spatafore/BillyPix

The single-turboprop Denali was launched as a Cessna, but parent Textron Aviation decided to realign it with the Beechcraft brand, alongside its top-selling twin-engined King Air. Textron is displaying a mock-up on the static, as the 1,600nm- (2,960km) range aircraft is still in development; it recently completed ground engine runs, ahead of a planned first flight later this year. The Denali is the launch platform for GE Aviation's FADEC-equipped Catalyst engine. Textron has two other Denalis in development, in addition to the prototype, and three additional ground test examples will be used for static and fatigue tests, as well as cabin development. When the Denali was unveiled in 2015 it was expected to fly in 2019, with certification following about 18 months later. However, delays to the Catalyst development had a knock-on effect on the schedule. The Denali promises a cruise speed of 285kt (528km/h) and certification is expected in 2023.

Dassault 10X

Steve Spatafore/BillyPix

The newest addition to Dassault's Falcon family will not be flying into Las Vegas – the French manufacturer's largest jet was only announced in May and will not arrive until 2025. However, Dassault does have a mock-up on display on the static, and its team will be keen to add to the sales already racked up for the 7,500nm- (13,900km-) range jet. Dassault launched the Falcon 10X to compete with the latest ultra-long-range aircraft from rivals Bombardier and Gulfstream. The Global 7500 entered service in 2018, and the G700 will follow in 2022, although Gulfstream last week announced another contender in the segment, the G800. Chief executive Eric Trappier says the decision followed pressure from customers who "asked us to have an ultra-long-range Falcon". Powered by twin Rolls-Royce Pearl 10X engines, the $75 million Falcon 10 will cruise at Mach 0.85, with a top speed of M0.925.



STATIC DISPLAY OF AIRCRAFT At Henderson Executive Airport

Note: Details correct at the time of going to press

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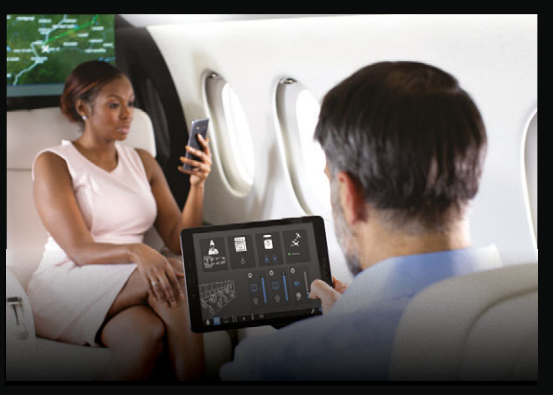

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