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Wednesday
19 October 2022

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Leading from the front

Tammie Jo Shults, the pilot who guided her stricken Southwest Airlines Boeing 737 to a safe landing in 2018, opened the second day of NBAA by stressing the role strong leaders play in helping others achieve their goals.

"Leaders set the tone. They will make the greatest impact," Shults, a former US Navy pilot, told the audience at the keynote event. Shults knows. She described her at-times difficult path to becoming a pilot in an industry long dominated by men. At a careers fair as a

perspective pilot, she was told, "This is career day, not hobby day, you need to go find something girls can do", Shults says.

She persevered, taking flight lessons and eventually joining the US Navy despite initially struggling to find a recruiter willing to give her a chance. Shults went on to fly Boeing F/A-18 fighters, then joined Southwest. In 2018 she demonstrated unmatched piloting skills after one of her 737's engines suffered an uncontained failure. Shults guided the jet to a safe landing in Philadelphia.



BillyPix

up for take-off



BillyPix

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shuttling passengers and cargo on short flights for just a few dollars per mile.

"If we can do this quick hop over a congested city, doesn't that become a very attractive way to go?" Gysin asks.

The executives spoke just a short distance from the Emerging Technologies Zone on NBAA's exhibition floor, where several start-ups are showing off their air taxi concepts.

Despite the substantial developmental, economic, certification and public acceptance challenges to be overcome to hit service entry, the eVTOL sector has been increasingly prominent at NBAA in recent years.

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Charged up for take-off

Jon Hemmerdinger

Air taxi developers took centre stage at NBAA this morning, insisting that the electric vertical take-off and landing (eVTOL) revolution is very much real and ready to change the face of aviation.

And despite the regulatory hurdles, the sector’s leading lights are convinced their aircraft will be in operation in just a few years time.

“We will open the skies over our cities. This will just completely change the way people move around, and also how they move cargo,” Jaiwon Shin (*centre*), chief



executive of Supernal, a Hyundai-affiliated developer of urban air mobility vehicles, said at the keynote panel session.

Gary Gysin (*far right*), chief executive of Boeing-backed Wisk Aero, says eVTOL aircraft are “going to change transportation”,

shuttling passengers and cargo on short flights for just a few dollars per mile.

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Flapper looks app

Kate Sarsfield

Brazilian digital charter marketplace Flapper has returned to NBAA to promote its app to US operators and brokers as it expands its footprint from its original market of Latin America.

Paul Malicki, co-founder and chief executive of the Belo Horizonte-headquartered start-up, says Flapper's focus initially is to launch into markets that benefit its customers in Argentina, Brazil, Chile, Colombia and Mexico. "While our long-term plan is to grow our business across the globe, for now we are interested on those markets that have synergy with our core bases," he says.

In the USA, Florida is a key destination for Flapper customers. "Many have homes and businesses in this state and there is so much poten-



Malicki: Synergy with core markets

tional to grow our base further." Flapper is seeking US operators to list their aircraft on the app and is promoting the service to local brokers and end-users.

To date, Flapper has registered 1,150 business aircraft and helicopters on

its app from around 300 operators. Its inventory of US N-registered jets and turboprops totals 200, most of which are in Florida. This represents around 50% of the state's business aircraft inventory, but Malicki "would like to have them all".

Butterfly set to take wing

Advanced air mobility developer Overair has completed ground tests of its electric propulsion system as it pushes toward a 2023 first flight of its tilt-rotor-based Butterfly vehicle.

"We have just completed full-scale propulsion system testing and now we are well under way building a full-scale flying prototype which will be flying towards the end of next year," says Overair chief executive Ben Tigner.

For the tests, Overair mounted one of the aircraft's four propellers, which includes a battery-powered electric motor driving a 6m (20ft)-diameter rotor, to a 2.7t truck. Ground runs were performed with the rotor in both the vertical and horizontal positions.

"The results showed that the propulsor behaves in the way it was designed to. As expected, it was very quiet," says Tigner.

That has been driven by the size of the rotor blade and disc area relative to the aircraft, allowing a rotor speed of around 400rpm in hover and 200rpm in forward flight.

The Butterfly should be able to carry five passengers and one pilot on flights of up to 87nm (160km) with a cruise speed of 173kt (320km/h).

Tigner sees a "path to certification by 2025", but concedes it could be later as "inevitably there are going to be process delays" as the Federal Aviation Administration (FAA) fully defines the requirements of the new technology.

Overair sees the need for a pilot on board at service entry – and for five to 10 years after that. "We are capable of being fully autonomous but we don't think the flying public or the FAA will accept that until a certain level of safety is demonstrated," says Tigner.

JetWave speeds up

Honeywell has revealed an update to its JetWave Ka-band in-flight connectivity system, saying the improvements will make its inflight wi-fi faster and cheaper.

The company's JetWave system includes onboard hardware that provides connectivity via satellites within Inmarsat's Jet ConneX satellite network.

Honeywell is now updating JetWave to provide "multi-network, multi-constellation capability" and speeds up

to 100Mb. It aims to have the updates certificated this year.

"Our next generation of JetWave will unlock a wider Ka frequency and utilise the next generation of very-high throughput satellites.

"Additionally, new service plans will make this connectivity more affordable than it's ever been," says Honeywell vice-president of services and connectivity Steve Hadden.



Job swapping

CAE is teaming with charter operator Clay Lacy Aviation in what the companies describe as an "industry first" initiative to tackle pilot shortages and boost training standards.

Under the two-year

agreement, announced at the show this morning, employees from both companies will be seconded part-time to the other.

CAE instructors will spend time flying for Clay Lacy while keeping their prima-

ry employment with the Canadian firm. Meanwhile, some Clay Lacy pilots will conduct training and check flights on CAE's behalf. Again they will remain as employees of the Los Angeles-based operator.

"This agreement is an excellent example of how two industry pioneers can share their expertise on a training and job-sharing programme that will benefit the two organisations," says Nick Leontidis, CAE group president, civil aviation.

Pictured signing the deal are Alexandre Prevost (left), vice-president business aviation and helicopter training at CAE, and Dave Lamb (right), chief operating officer of Clay Lacy.



Pearl to power ahead on SAF

Rolls-Royce and Alder Fuels this morning signed a memorandum of understanding covering the flight-testing of new sustainable aviation fuel (SAF) being developed by the US clean-tech firm. Based on Alder's proprietary technology – which turns waste biomass from forestry and agriculture into what it calls "Greencrude" – the SAF is being readied for global roll-out as a drop-in replacement to regular jet fuel; it should be commercially available from 2024.

Flight tests, to take place in the first quarter of 2023, will see the SAF used to power an undisclosed Pearl business jet engine. Bryan Sherbacow (pictured right), chief executive of Alder Fuels, says foresees a "pretty robust campaign of testing and demonstration" culminating in two to three test flights. These will be used to "evaluate the energy efficiency, emissions criteria, and low-carbon credentials" of the fuel, says Rolls-Royce.

Frank Moesta (left), senior vice-president strategy & future programmes – business aviation at Rolls-Royce, says the widespread deployment of SAF is "essential" to decarbonise medium- and long-haul air travel. "It is our responsibility to push it into the industry and make it widely available," he says.

Big in America

Web Manuals has acquired 25 more customers in the USA this year, as post-pandemic trade booms. The Swedish software-as-a-service company offers an application that allows aviation businesses to store operating manuals and other documents in the cloud.

"We've witnessed the return of international travel and with that, global aviation companies have sought to implement reliable safety regulation processes," says Krister Genmark, Web Manuals' vice-president of sales and director of operations, Americas. "To say that we have achieved another significant increase this year following the uncertainty of the pandemic is a huge achievement."

This year's growth comes after Web Manuals reached agreements with 21 new customers in 2021, the company says. Business aviation operators represent more than half of Web Manuals' 480 customers, and more than a quarter of their customers are based in the USA.



Genmark: Return of international travel is driving sales growth

The USA looks good for Vista

Kate Sarsfield

Vista Global, parent of charter operators VistaJet and XO, is back at NBAA in bullish mood thanks to its record performance in the USA during the third quarter.

Leona Qi, president of VistaJet USA, says the country is the group's largest market, representing over 60% of its business. "It's our strongest and fastest growing region and the outlook remains incredibly strong," Qi says.

Charter sales in the USA for the nine months ended 30 September were up 185% year on year, with VistaJet recording the highest number of new client memberships in its history during the period.

In the third quarter alone, the region contributed 64% of the group's total hours sold, and 70% of hours sold in the quarter were attributable to new customers, Qi says: "We are accelerating new client memberships to the highest number in its history."

Many of these high-net-worth clients sampled private aviation for the first time during the Covid-19 pandemic, Qi says, and have



Qi: Many customers have switched to charter from the airlines

not returned to airline travel.

"They moved away from the [commercial] carriers in large numbers for a variety of reasons - poor schedules, unreliable service or because they wanted to travel safely with their families during the pandemic," she says.

Vista Global entered the

US market in 2015 with a clutch of Bombardier business jets. It has since expanded its footprint in the country through the acquisition of a host business aviation companies including Apollo Jets, Jet Edge, Redwing Aviation, Talon Air and XO Jet.

The company has a

worldwide fleet of over 360 business aircraft, of which around half are registered in the USA.

Of these, around 100 are midsize, super-mid-size, large-cabin and long-range-category VistaJet-branded aircraft deployed for the luxury membership-based charter programme. The line-up also consists of refurbished Bombardier Challenger-series jets and Gulfstream 450s from the Jet Edge fleet. Another 40-plus aircraft from the Jet Edge line-up will be upgraded and painted in VistaJet's distinctive silver and red livery over the coming months.

"We hope to have them all completed and installed in the fleet by next June," says Qi.

Meanwhile, VistaJet is preparing to take delivery next month of its 15th of 30 Bombardier Global 7500s. The remaining units - some of which may be converted to the in-development Global 8000 - will be added to the fleet over the next three years, says Qi.

Meanwhile, Vista Global is confident it will achieve carbon neutrality by 2025. Qi says the group offers a carbon-offsetting programme - which has a take-up rate of around 85% - and also gives its customers the option of travelling with different concentrations of sustainable aviation fuel (SAF) in place of regular Jet-A.

While Qi concedes "it is a lot more expensive to fly with SAF", leading to modest take-up from VistaJet customers, she expects this will increase as production of the fuel becomes more widespread and the cost falls.

Blackhawk poised for PC-12 repowering

Blackhawk Aerospace has completed baseline flight testing for its new Pilatus PC-12 engine upgrade programme as it targets US approval for the modification in the first half of 2023.

To be covered by a supplemental type certificate (STC), the enhancement sees Blackhawk replace the stock Pratt & Whitney Canada PT6A-67B engine with the higher-powered -67P variant, which the company calls the XP67P.

It has now installed the new engine in its flying testbed and has begun operations with the powerplant. Blackhawk expects to achieve Federal Aviation Administration certification in the second quarter of 2023 with "EASA approval following shortly thereafter".

To date, Blackhawk has received five customer deposits for the upgrade, which it



Blackhawk has received five customer deposits for the upgrade on the Swiss turboprop

says will deliver a significant performance improvement. "Pre-certification orders are an important metric for gauging how successful a new STC programme will be," says Jim Allmon, Blackhawk chief executive.

"Having five contracts in the pipeline prior to obtaining the STC serves as great supporting evidence for the fact that we have a fantastic programme to offer the PC-12 market."



Red all over the show

The *Flight Evening News* team, in their unmistakable flight suits, take a break from handing out the show's only same-day

newspaper in front of the CAE stand. The Canadian training company is supporting the distribution this year.

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The Spirit of Belfast

Aerostructures specialist keen for Northern Irish site to make its mark in business aviation

Jon Hemmerdinger

Aerostructures specialist Spirit AeroSystems is more familiar for its work on commercial airliners than business jets, but the manufacturer is here at NBAA to push its credentials in the sector, not least through the capabilities of its newly acquired site in Belfast, Northern Ireland.

The Wichita-headquartered company sees the show as a chance to stress its expanded global presence, newly acquired



A Bombardier Global 7500 horizontal stabiliser under assembly

business jet capabilities and interest in expanding to new markets, including the electric vertical take-off and landing (eVTOL) segment.

"It's our first substantial presence at NBAA," says Spirit vice-president of

regional and business jet programmes Alex Bellamy.

Spirit has long been known primarily for manufacturing aerostructures for commercial airliners - notably fuselages for Boeing 737s.

But Bellamy says Spirit

significantly boosted its business aviation work with its October 2020 purchase from Bombardier of the Belfast, Northern Ireland manufacturing facility.

As part of that \$275 million deal, Spirit also acquired

Bombardier's Morocco aerospace manufacturing site, and facilities in the USA.

In Belfast, Spirit manufactures fuselages for Bombardier Global and Challenger business jets, and empennages for Globals, alongside wings for the Airbus A220. The company's other business aviation products include nacelles for Rolls-Royce powerplants.

Bellamy specifically cites Spirit's experience in manufacturing composite structures at the site.

He describes the Belfast operation as having a "long history and heritage" of aerospace design, engineering and manufacturing. That site and the Morocco presence allow "us to bring the best of each of our geographic locations... for future customers," he says.

Part of Spirit's strategy includes seeking a slice of the eVTOL market, a segment in which Spirit is already securing a footing.

In March, Airbus revealed it had contracted Spirit to develop wings for the CityAirbus NextGen air taxi, which will be built in Belfast.



Three into one

Three FBOs in Colorado – Denver JetCenter, Colorado JetCenter in Colorado Springs, and Fort Collins-Loveland JetCenter – have simplified to one name: JetCenters of Colorado.

“We wanted our name to say it all,” says Tony Buckley, the company’s president and chief executive. “Our three locations have always been part of a single company.”

Headquartered in Denver, JetCenters of Colorado has been serving airports in Rocky Mountain gateway cities since launching in 1979, expanding to Colorado Springs in 1985 and Fort Collins-Loveland in 1994. The company annually sells some 71 million litres (21 million gallons) of aviation fuel.

Fly Alliance signs for four Citations

Cessna added to its backlog yesterday after Orlando-based charter provider Fly Alliance signed for four Citation jets and took options to purchase a further 16.

The deal involves several variants of the Wichita airframer’s Citation line-up and will see the airframer deliver the first aircraft – a XLS+ Gen 2 – to Fly Alliance in the first quarter of 2023. That aircraft will also be Fly Alliance’s first Cessna.

The total agreement encompasses 12 XLS+ Gen 2s, six Latitudes and two Longitudes. However, the firms do not detail which aircraft are covered by firm orders, save for the initial example.

“This is an excellent path to building our fleet size to 100 aircraft in the years to come,” says Fly Alliance chief executive Kevin Wargo.

“We want to reiterate to our valued customers that no matter what kind of trip you are taking, we have the perfect jet for you.”

The company’s website lists its current fleet as comprising 24 aircraft, among them Bombardier Global Express, Gulfstream GIV-SP, Textron Aviation Hawker 800XP and Learjet 60XR jets.

Parker goes electric

Murdo Morrison

Parker Aerospace maintains its merger with Meggitt – finalised last month – has given it fresh expertise in several areas of business aviation, including the emerging market of electric-powered advanced air mobility (AAM).

The UK entity, which will now be known as Parker Meggitt, is behind a number of electrical and electronic technologies, and is the only manufacturer of “completely electrical brakes”, says Chris Frazer, vice-president of Parker’s business, regional and advanced AAM.

The transatlantic marriage has doubled the size of Parker Aerospace, which has become the largest unit within parent company Parker Hannifin, says Frazer. He has been impressed with the speed at which the two businesses have combined, which he puts down to “our very similar cultures and approaches to innovation”.

Parker used a slowdown in its mainstream commercial market during the pandemic to focus on the AAM sector, which entered a phase of rapid development in 2020 and 2021.

“We saw there were a lot of technologies that were



Frazer: Very similar cultures and approaches to innovation

beginning to develop that would need a lot more electrification,” says Frazer. “So we invested our energies in accelerating our activities there.”

At July’s Farnborough air show, Parker announced a multi-system partnership with Eviation, the developer of the Alice electric commuter aircraft. Parker

will supply six technologies to the programme: cockpit controls, electromechanical flaps, thermal management, hydraulic power packs, vibration and noise mitigation, and a range of seals including a fire-seal wall.

Also this week, Parker Meggitt launched iPress, a long-range wireless tyre

pressure gauge that will be available on a range of Textron Aviation types. Textron had tasked Parker Meggitt to develop a wireless system to check tyre pressures in real time, without the need for manual checks. Parker Meggitt says the innovation will help extend tyre life and reduce human error.

ViaSat takes on the world

Global communications firm ViaSat expects to bring high-speed internet soon to business jets in previously uncovered areas of the world by launching its next-generation satellites.

ViaSat, based in California, is a public-

ly traded company that serves a variety of markets by using its own satellites. The company currently has satellites positioned over Europe, Central America and North America, where most of global business aviation occurs.

The first of three ViaSat-3 satellites – each with a wingspan roughly the same as a Boeing 767 – is expected to launch by the end of the year, says James Person (pictured), director of development and strategy for ViaSat’s business aviation division.

“What we don’t cover with our high-capacity system is Africa or Asia,” he says. “What will change for them is that they’ll be able to use our system globally – and it will get faster.”

The ViaSat-3 satellites are expected to increase the speed of Ka-band internet available to the company’s business aviation customers in addition to greatly expanding the area of coverage.

“Great audio, great video – that’s what people expect on a business jet,” Person says. “Now, people can do everything in the aircraft, connectivity-wise, that they would be doing on the ground.”

As an NBAA promotion, ViaSat is offering “challenge coins” to anyone who stops by their booth for a video presentation.

The coins can be exchanged for two months of free unlimited global service, an offer worth up to \$28,000, says Viasat.



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SkyWay steps up to success

Jon Hemmerdinger

SkyWay MRO Services is stepping out at NBAA, offering a line-up of aftermarket entryway stairs for several types of Cessna aircraft. The 45-year-old Uvalde, Texas company says its

“SideStep” product adds flare and functionality, replacing the basic steps that come standard with the aircraft. For instance, its three-step, lighted “Mustang 510 SkyStep” replaces the Mustang’s standard two-step stairs. The aftermarket product has a solid backing,

rather than open between steps, making them safer and pet friendly – Fido’s paw won’t slip through the gap, the company says. “It’s meant to be an easy replacement on your Mustang,” adds SkyWay senior engineer Diego Lopez. “The idea is to... make your jet better.”



Massage for you

Sore after a day at the show? Head over to Human Touch, a company showcasing its “full-body therapeutic massage chairs” on the NBAA floor. Based in Long Beach, California, the firm sells its leather-wrapped automated relaxation machines to a range of customers, from universities and professional sports teams to aviation companies. The chairs are not yet on aircraft – though Human Touch would love if they were. Rather, the chairs are for relaxing on the ground – perfect accessories for business jet buyers and fixed-base operators, says Human Touch national programme manager Eric Beatty. The company’s chairs have 38 pre-set massage programmes and nine motors – providing a rub down for just about every body part, from neck to back, arms to legs.



Sew business

New Jersey sewing machine seller NC Carpet & Upholstery is keeping those pesky jet carpets from unravelling. The firm makes high-end sewing machines for the business aviation industry, including its “bread and butter” products, known simply as “carpet machines”, says NC Carpet chief executive Mal Maher. The carpet machines attach yarn or tape

bindings along the perimeters of business jet carpets. NC also makes sewing machines used to stitch other interior products, including leathers. “It’s made for heavy duty materials”, Maher says of his company’s product, noting the machines can stitch through seven layers of leather. Buyers include the major business jet manufacturers and aftermarket providers.

Foam home

Zotefoams is showcasing a line-up of what it describes as some of the lightest foam products used in the aviation industry. From foam ducting to filling, the UK-based company offers a range of products found inside business jets. It also sells foam products for other types, including Boeing’s 737 and 777X, and the Airbus A350. “We make the lightest-weight

foam for aviation,” says Zotefoams business director James Bridges, noting the product is used in aircraft windows, siding and floors. The firm is seeking to expand in the business aviation industry, saying it uses a unique manufacturing process involving diffused nitrogen. Its products include polyvinylidene fluoride foam that comes in a range of densities.



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Leather luxury

Virginia-based leather seller Moore & Giles wants to wrap your business jet in the finest German leather.

The family-owned company, in business since 1933, is at NBAA showing off its line-up of leather products.

They are used for numerous business aircraft applications, from seats to sidewalls. Moore & Giles sells a host of other leather products, including bags and products used in the hospitality industry, says director of aviation sales Chad Evans.



Paint shop

Jon Hemmerdinger

Artist David Uhl is bringing aviation's past to life in his pop-up studio - inside NBAA's convention hall. The Boulder, Colorado artist paints replicas of old photographs, bringing black-and-white shots to

life in paintings rich with colour and flair. He made a name for himself painting vintage automobiles and motorcycles, and became somewhat of a legend through work done for Harley Davidson. Uhl's paintings have appeared on the covers of magazines including *Time* and *Sports Illustrated*, he says. In 2005, Uhl started painting

aircraft, including "war birds" like North American P-51 Mustangs, Vought Corsairs and Lockheed P-38 Lightnings. Three years ago he brought his work for the first time to NBAA's annual show. "We got such a huge response from everyone because it's such an unusual booth compared to all the others," Uhl says.

Plate expectations

Houston's HighTech Finishing is bringing a bit of shine to the show with its line of metallic plating products for aircraft cabins.

The company applies plating on a host of cabin components, including trim, fasteners, seat and lavatory hardware - just about anything metallic inside a luxury jet.

It offers plating in some 130 styles and uses a variety of metals, including 24-carat gold, nickel, copper, brass and bronze, says chief executive Carl Bartuch.

HighTech's products are found on jets made by Embraer and Gulfstream. It also supplies cabin-refit shops.



Euler is linen towards new markets

Interiors company Euler has revealed its Aviation Luxury by Euler line of cabin accessories at this year's show. With the launch, the

California firm is expanding beyond its core aircraft bed business to sell other high-end cabin products. Those include bed linens, china,

crystal, flatware, lavatory complements - "anything to beautify your interiors", says director of sales Lauren Galvez.

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BY TEXTRON AVIATION

Connectivity provider arrives in Orlando marking milestone for business aviation



Gogo completes 5G nationwide network

This has been a big year for the leading provider of inflight connectivity, Gogo Business Aviation. The company has just completed construction of its highly anticipated 5G network, and announced a new global LEO broadband service for business aviation that will provide fast, low-latency connectivity on a global scale.

Gogo continues to work quickly on all elements of Gogo 5G, and the new high-speed, high-capacity experience is nearly ready for prime time. Meanwhile, the company is already making significant strides in developing its global LEO satellite service (see following page), which will be the first complete LEO experience built for business aviation by business aviation experts.

"Our team has been incredibly busy the past few months - there are some big things taking shape here and I'm as excited as I've ever been about Gogo's future," says Sergio Aguirre, Gogo's president and chief operating officer.

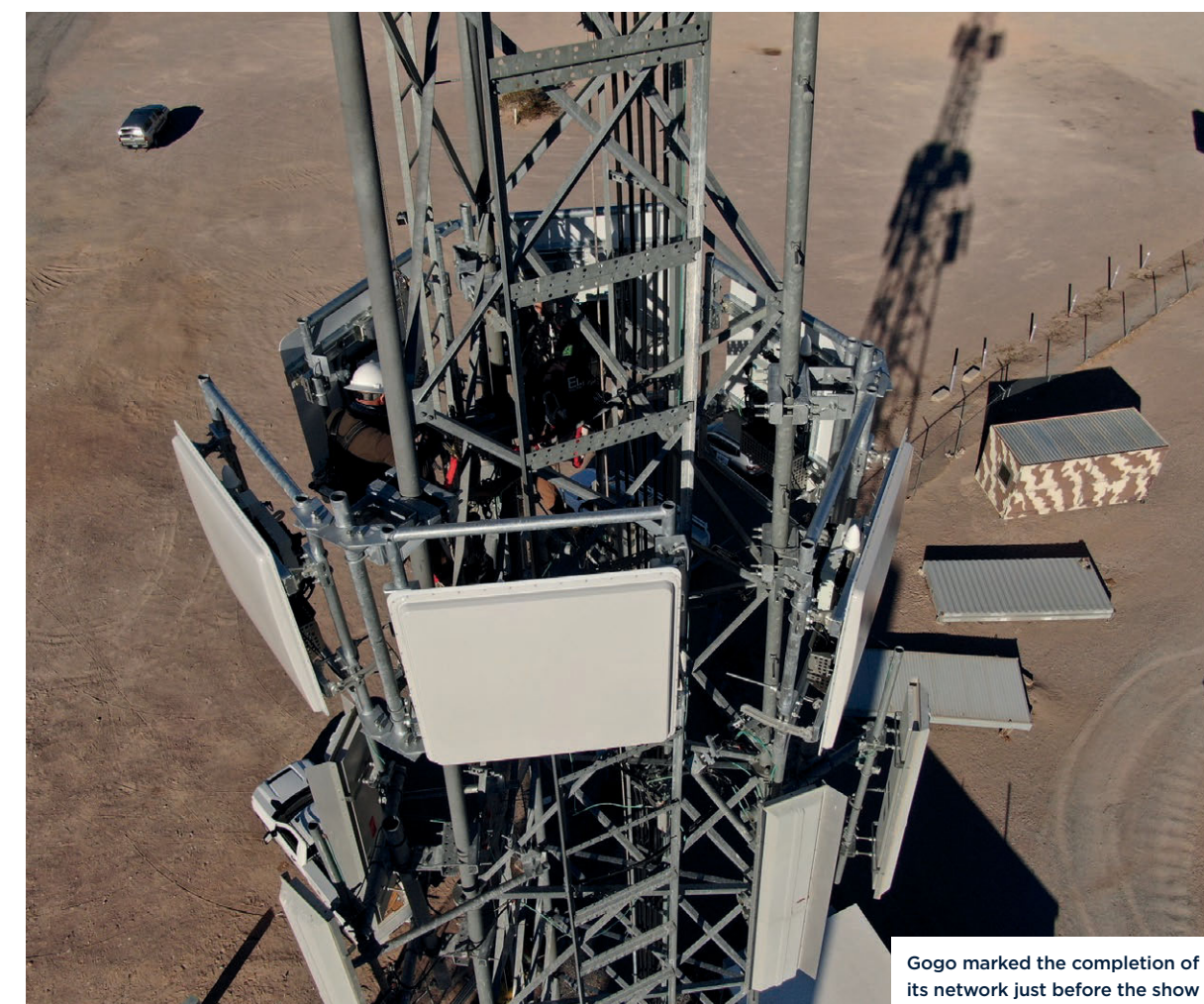
"On Monday just before the start of NBAA, we celebrated the completion of our 5G network," he continues. "We hosted a party with our OEM and dealer partners, and about a hundred of our key customers as we watched our network team - via a livestream - bolt the final 5G antenna on a tower in Oregon to complete the nationwide network."

Gogo's team was able to build an entirely new network for Gogo 5G and did so in less than a year. The 5G network covers the contiguous United States today, and Gogo says it will expand next into Canada beginning in 2023.

"It's remarkable what our network deployment and field operations teams have accomplished," says Aguirre. "Our teams overcame a host of issues including Covid-19, weather, the supply chain, and geopolitical concerns, to build a standalone network of 150 towers nationwide. To get that done in less than 12 months, with all those challenges, is truly remarkable."

While Gogo's network operations and field deployment teams were able to overcome those challenges, the manufacturer of the 5G chip needed for the service notified Gogo that it had encountered an issue in late-stage testing which will have an impact on full production volume until 2023. Gogo says customers can still provision for 5G, despite the delay.

"The good news though for customers who want 5G is that they can install the AVANCE L5 with full 5G provisions today, including the MB13 antennas, and operate on our 4G network while they wait



Gogo marked the completion of its network just before the show

for the 5G (X3 LRU) next year," says Dave Glenn, Gogo's SVP of customer operations. "That means once the X3 is ready they can get it installed and they'll begin getting 5G service immediately."

Gogo 5G is expected to deliver 25 Mbps on average with peak speeds in the 75-80 Mbps range and has been designed to deliver high throughput with very low latency to address the increasing demand for data-heavy interactive services like video conferencing, live TV and gaming.

"AVANCE L5 is the key element and provides a fast upgrade path to 5G," Glenn adds. "If a customer

has an L5 installed in their aircraft, to upgrade to 5G they literally add one small LRU and replace the antennas on the belly of the aircraft."

Gogo has completed the first-article supplemental type certification (STC) for the belly-mounted MB13 antennas and the X3 (5G) LRU. That STC will be amended once the 5G chip is available.

Gogo says it is working closely with business aviation manufacturers and several authorized Gogo dealers to develop STCs that will cover more than 30 aircraft models in the aftermarket and from the factory. ▶

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Known for its market leading North American air-to-ground network, connectivity specialist is taking it a step further – its industry-first satellite service is tailored for business aviation



Several users will be able to perform data-heavy online activities simultaneously

Gogo goes global with new LEO experience

Gogo Business Aviation will launch the first global broadband service in business aviation to use an electronically steered antenna (ESA) to deliver a high-speed, low latency low Earth orbit (LEO) satellite experience.

ESA and LEO are terms that may not mean much if you are not familiar with those two technologies, but they are critical components for Gogo's new inflight connectivity service that will transform satellite connectivity's performance, accessibility and affordability.

The reason: they enable Gogo to build an antenna that is small enough to fit on virtually any business aviation aircraft including turboprops like a Pilatus PC-12, or a Beechcraft King Air 350, and light jets such as a HondaJet or an Embraer Phenom 100. That same system can also be used on the heavy-iron, ultra-long range large-cabin jets and every aircraft in between.

"Unlike other providers, we're focused on serving all of business aviation with our global broadband product, just like we did with our ATG network in North America several years ago," says Sergio Aguirre, Gogo's president and chief operating officer. "We want to give everyone in business aviation the ability to have an exceptional broadband experience regardless of where or what size aircraft they fly and our service will be fast and affordable."

The exclusive antenna assembly will be roughly 24 inches (61cm) long by 11.2 inches wide and two inches tall and is installed on the top of the fuselage of business aircraft. It will operate on the high-speed, low-latency LEO global network from OneWeb. Service launch is expected in the second half of 2024.

The Gogo AVANCE platform is at the heart of Gogo's new service. Gogo's LEO service will require just one AVANCE LRU [line replaceable unit] inside the aircraft, which means existing Gogo AVANCE customers will only have to install the ESA antenna, with a single cable for power in, and a single cable for data out. Today's GEO solutions are much larger and require multiple LRUs so they require larger airframes to accommodate the size and weight.

"We specifically designed AVANCE so customers could easily and effectively add additional features, functionality, and capacity to the system," says Aguirre. "We saw this wave of increased demand for connectivity coming several years ago and that's when we started building AVANCE. It was a strategic decision to give us the ability to add new networks and for upgrades to be done with minimal cost and little to no downtime."

The network will deliver improved performance with faster speeds and low latency that is significantly less than what geostationary satellite

(GEOs) networks deliver today. The reason is the close proximity to Earth. LEO satellites are roughly 750 miles (1,200km) from the surface while GEO satellites orbit between 22,000 and 25,000 miles away.

"The LEO experience will be much better than a GEO network can provide and it's not only because LEO will be faster, which it will be, but the latency—or the time it takes for a signal to travel from satellite to ground to aircraft—will be greatly reduced," says Aguirre. "It's a matter of physics and LEOs are much closer to Earth so the signal gets there much faster."

A multitude of users will be able to perform simultaneously data-heavy interactive online activities such as conducting simultaneous live video conferences, accessing cloud solutions such as Office365, watching live TV, streaming video applications like TikTok, and much more.

Gogo's LEO service will include one fuselage-mounted unit with an integrated antenna, modem, power supply and RF converter; will only require 28 volts of DC power; will not rely on aircraft-positioning data; and will include an AVANCE router.

Aguirre concludes: "We have long delivered affordable, high-quality connectivity, and award-winning customer service to aircraft owners in North America, and now we will be bringing those same benefits to all aircraft owners on a global scale." ▶

AVANCE is business aviation's only true connectivity platform

In 2018 Gogo introduced the AVANCE connectivity platform and the new technology represented a paradigm shift for inflight connectivity in business aviation. Since that time, AVANCE has been so well received that others in business aviation have caught the "platform" bug.

You see it in ads, marketing content, and sales pitches. Many technology players in business aviation are talking about the "latest and greatest platform" or "our new and improved (insert buzzword) platform".

But what, specifically, is a technology platform? What does it do and what benefits must it provide to warrant that term?

To answer that question, we asked Gogo to see how it defines "platform", and to explain how AVANCE meets the criteria.

"A technology platform is a group of individual components brought together to make a cohesive unity," says Jeremy Tyler, vice president of software applications engineering. "You bring in software, hardware and tools to create a consistent experience for the user. Apple is a great example.

"The Apple iOS operating system is the 'brains' across its hardware, but Apple created an entire digital ecosystem where everything can be integrated, automatically synchronized through the cloud, and even updated between any Apple device," he continues. "The result is a seamless, consistent Apple experience independent of what device you are using it on. AVANCE is very similar."

According to Gogo, AVANCE software is the "brains" on all of its systems – L3, L5 and SCS – and future products as well, such as global LEO broadband. Gogo uses one operating system that detects what systems and services it is connected to so every feature Gogo offers is available to every system.

"It doesn't matter if our system is on a Gulfstream



AVANCE software is the brains behind Gogo's product offering

which requires putting the aircraft down for a period of time for the change which takes time and is expensive, we can do over the air."

In terms of hardware engineering, AVANCE is built modularly, and is designed to be what the company calls "plug and play", which makes it easy for customers to expand and upgrade their inflight Wi-Fi experience.

"When we create a new solution, we don't have to start from scratch, we can simply use our base set of features," says Chris Rippe, Gogo distinguished member of technical staff product development. "When we need to do an upgrade, we can design it once for the whole platform. 5G is a great example of this modular design. When a customer is ready to upgrade, they won't have to remove any hardware to add 5G speed to their AVANCE L5 system – instead, they'll simply plug a small Gogo X3 LRU into the AVANCE L5, much like how you'd connect a peripheral like a printer to your laptop."

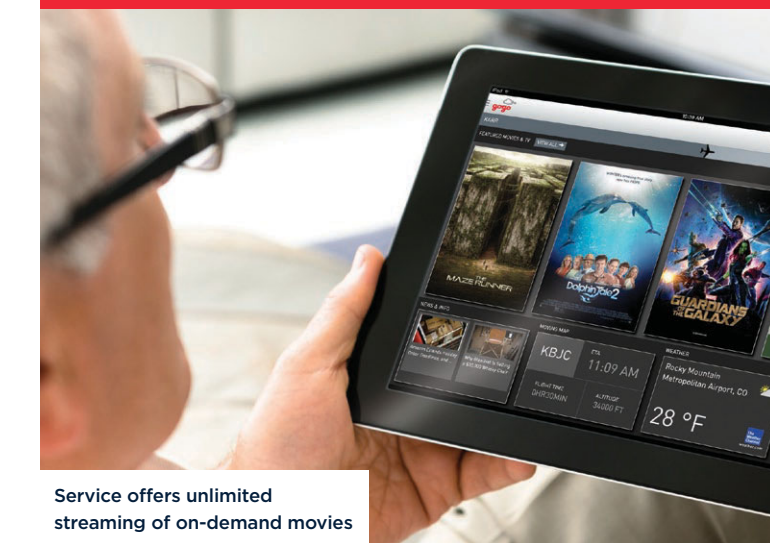
AVANCE also gives operators comprehensive inflight connectivity and entertainment in a single LRU that has been designed to be future-ready right out of the box which allows Gogo to:

- Easily add new networks such as Gogo 5G and the new global LEO broadband system
- Instantly deploy new services over the air
- Remotely deploy support and software updates over the air
- Quickly connect to and enable new third-party applications

"When we lowered our service altitude from 10,000 feet AGL to 3,000 feet, every AVANCE customer received that update over the air," says Rippe. "Our customers never had to touch the aircraft or bring it down for that upgrade to be implemented, and Gogo is the only connectivity provider in business aviation with that capability." ▶

heavy-iron aircraft or a turboprop like a Pilatus PC-12, the experience is the same," says Tyler. "And the benefit for aircraft owners, operators and passengers is that Gogo can get innovations and updates into their hands almost instantly: things that other providers have to do with hardware,

Gogo Vision 360 captivates passengers



Service offers unlimited streaming of on-demand movies

Gogo set a new standard for inflight entertainment (IFE) in business aviation when it unveiled Gogo Vision 360 in 2020 – a premium IFE service that features a compelling and comprehensive suite of services, including an upgraded 3D moving map.

The service offers unlimited streaming of on-demand movies, TV programming and news, along with digital magazines and a state-of-the-art 3D moving map, all at a fixed monthly price eliminating the unpredictability and often high costs associated with inflight streaming video and audio.

All Gogo Vision content is updated automatically each month through a seamless delivery via Gogo Cloudport, either in a customer's own hangar or at

Gogo Cloud locations throughout the USA and in Europe. Gogo Vision is the only IFE service that delivers content updates over-the-air.

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

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

BOLDLY CONNECTING now & next

What do Gogo 5G and Gogo LEO global broadband have in common? They're powered by the only complete, software-driven inflight connectivity and entertainment (IFEC) technology platform in business aviation: Gogo AVANCE. Discover how to connect your aircraft with a single, boldly designed solution that gives you the best IFEC experiences available now, and ensures you're ready for the best of what's next.

Visit Booth #4040 to learn about the Gogo AVANCE platform, see the equipment, and get expert guidance on the only connectivity designed to be sustainable, not replaced.



Inspiring creativity: Melanie Prince (left) with Tanja Grill, marketing and customer relations

F/List shapes the future

Kate Sarsfield

Austrian VIP interiors specialist F/List – known for bespoke interiors for yachts and luxury residences as well as business jets – has unveiled at NBAA a range of new cabin concepts along with a portfolio of innovative, sustainable materials which it says, have “never been available for the cabin environment”.

The company describes the cabin concepts as Shapeshifters and “stunning, seemingly impossible interior prototypes that will redefine the cabins of the future”. Examples include credenzas that transform into a working space and smart storage units with integrated technology such as a sunken phone charger.

The Shapeshifter programme “brings cabins to life”, says Melanie Prince,

F/List’s head of design, and “challenges traditional notions and the dimensional limits of the cabin environment”.

Complementing the Shapeshifter pieces are a selection of sustainable yet luxurious interior materials, including alternatives for leathers, countertops, surface fabrics, and reconstituted veneers.

“We are developing and producing striking new cabin options by reusing remnants of some of the

most exclusive raw materials in the world [including precious metals and stones],” says Prince.

F/List is also promoting bespoke sidewalls where the customer’s chosen artwork or design can be applied with sustainable materials to give the cabin a personal feel.

“We want to inspire creativity, initiate a paradigm shift and liberate the imagination while providing practical, real solutions simultaneously,” says Prince.

FLIGHT EVENING NEWS

Produced by FlightGlobal, 1st Floor, Chancery House, St Nicholas Way, Sutton, Surrey SM1 1JB, UK

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Collins' cool military spin-off

It's not every day you can say that your glass of beautifully chilled Champagne has achieved the perfect temperature thanks to the US Department of Defense (DoD), but Collins Aerospace is enabling VIPs to do just that.

Collins has adapted ultra-compact refrigeration technology originally developed to cool electronics in military aircraft to instead form the core of a product it calls SpaceChiller.

The technology – whose development was funded by the DoD – has allowed Collins to create a cooling system that is lightweight and which uses minimal power. Crucially, SpaceChiller is also small, per-

mitting installation in business jet cabins, says Phil Kim, business development manager, interiors (above).

“This could be for a mini-bar or even a galley,” says Kim. “It will bring a lot of value to a lot of people.”

He sees potential for the SpaceChiller to be integrated into a divan or even a smaller version into a seat.

But the version on display is uniquely sized, reveals Kim, as it was designed around the dimensions of Champagne flute.

Collins is also promoting its Hyper Gamut advanced LED lighting system, which is so close to natural light that it “brings the outside into the cabin”.

FlightSafety wins 10X training deal

Dassault Aviation has picked FlightSafety International as the exclusive training provider for the entry into service of the ultra-long-range Falcon 10X.

FlightSafety will initially design and manufacture two full-flight simulators for the Falcon 10X – one located in the USA and a second in Europe. Additional sites will be determined at a later date.

“FlightSafety will work closely with Dassault to provide simulator testing for aircraft development and certification, and upon aircraft launch will provide the highest quality training for 10X pilots, maintenance technicians and flight attendants around the world,” says Nate Speiser, executive vice-president of sales & marketing at FlightSafety.

Service entry for the Falcon 10X is foreseen in late 2025; Dassault confirmed at the NBAA show that it had begun building parts for the first flight-test aircraft.

Meanwhile, the French airframer is to bolster its support network with the construction of a new MRO facility in Melbourne, Florida. The 16,300sq m (175,000sq ft) complex will accommodate all current Falcon models, including the 10X, and will be capable of working on up to 18 Falcon jets simultaneously.

VSE details deals on distribution

Honeywell has appointed VSE Aviation as exclusive global distributor of the LASEREF IV product line. The LASEREF IV inertial reference system replaces the existing LASEREF I, II and III systems, which are no longer supported through Honeywell. Honeywell’s LASEREF IV is an all-digital ring laser gyro-based inertial reference system.

The system uses gyroscopes, accelerometers and electronics to provide an aircraft with precise altitude, velocity and navigation information so it can determine how it is moving through the airspace.

VSE has also extended its distribution agreement with Bombardier for three years. It covers around 30,000 parts for around 1,000 Learjet 20, 30 and 50 aircraft.

New era at Honda Aircraft

Hideto Yamasaki outlines the manufacturer's plans for its next phase of expansion

Jon Hemmerdinger

Honda Aircraft's new chief executive Hideto Yamasaki is at NBAA in charge of a company he describes as poised to begin a second phase of expansion, one likely to be spearheaded by the development of a new and larger business jet.

Yamasaki joins a company which has spent 20 years carving itself a respectable niche in the ultra-competitive business aviation market.

During those first two decades, Greensboro, North Carolina-based Honda Aircraft developed, certificated and brought to market its HA-420 HondaJet - all under the leadership of its visionary former CEO Michimasa Fujino, an engineer by training.

Things changed this year when Fujino retired, replaced in April by longtime Honda executive Yamasaki.

Now, backed by decades of business and sales experience, Yamasaki aims to revive the company's finances and drive development of the conceptual 2600 HondaJet, which is to replace the HA-420.

"I'm concentrating on the 2600," Yamasaki tells FlightGlobal. "We are currently moving into the next phase of this company."

Fujino was the father of Honda Aircraft and its six-passenger HA-420. He envisioned the aircraft's design - with its distinctive overwing engines - in 1997, then guided Japanese-owned Honda Aircraft through the jet's development.

The aircraft first flew in 2003, but the programme struggled to reach the finish line: development dragged on for 12 years, with Federal Aviation Administration certification obtained in 2015. It is powered by twin 2,050lb (9.1kN)-thrust HF-120 engines made by GE Honda Aero Engines, joint venture.

Making it alone

Fujino "created this HondaJet and the Honda brand in the aviation industry", Yamasaki says. "This company made it through alone, not with partners".

Some 225 HA-420s are now flying, and although Honda Aircraft declines to specify the number of aircraft in its backlog, the figure equates to about two years of production, it says.

In recent years, output stood at two to three jets monthly, though this has



Yamasaki: I'm not a superman

recently slowed amid the same supply-chain struggles that have hamstrung other airframers. Honda Aircraft has repeatedly rolled out updates to the HA-420, including its Elite S variant in 2021 and, now, the Elite II, revealed at NBAA. The latest iteration has range of 1,547nm (2,865km) with four people aboard - 110nm more than the Elite S. Honda Aircraft plans to further modernise the jet with a series of avionics updates in 2023.

Despite technical success-

es, the airframer's financial results have lagged; Honda's aircraft and aircraft engine business lost ¥3.8 billion (\$25.5 million) in the company's most recent fiscal quarter, which ended in June.

But Yamasaki aims to change that. The Japan-born executive joined Honda in 1985, spending most of his career working in various countries for its automotive division. He has led Honda's operations in Ukraine and Turkey and was general manager, and then senior

vice-president of sales, for its Americas division.

"I was raised... [on] the business side," Yamasaki says. "I'm a sales-oriented guy."

While Fujino brought HondaJet to its present position, Yamasaki says the company now needs a leader with strong business experience - someone to fix its finances and guide it into a future that lies not with the HA-420, but with its next jet, the HondaJet 2600.

"We have to have another story. This 2600 will be our

next story," Yamasaki says. Honda Aircraft's latest HA-420 updates might be "the ending story" for that type.

Honda Aircraft unveiled the 2600 concept in Las Vegas at last year's NBAA event. The aircraft will be capable of carrying 11 people - including up to two pilots - cruise at 450kt (834km/h) and sufficient range to fly across the continental USA.

Transcontinental

The company describes the aircraft as the "first-ever transcontinental light jet" and the "longest-range single-pilot business aircraft".

Those capabilities would place the 2600 at the upper end of the light-jet segment, with capabilities knocking on the door of the midsize category, says Yamasaki.

It would seemingly compete with types like Embraer's Phenom 300E (carrying 10 passengers over 2,010nm), Cessna's Citation CJ4 (10 passengers/2,165nm) and Cessna's Citation Latitude (nine passengers/2,700nm). Like the HA-420, the 2600 will have twin overwing engines and be produced at the company's Greensboro site.

Honda Aircraft has not yet launched a formal 2600 development programme, nor specified a timeline for the jet's arrival. But it is talking with suppliers about the project, and Yamasaki says its ambitions in the space are genuine.

"We are quite serious. We just cannot announce it today," he says. "This concept - the 2600 - is to be [an] extended version of the 420."

Yamasaki says Honda Aircraft has a sufficiently large customer base to support development of the successor and that they have been asking for a longer-range jet.

He also says his team's experience developing the HA-420 leaves it well positioned to think bigger: "We have learned through the [HA-420] process of development and certification. We want to fully utilise that experience."

Crucially, Honda Aircraft has sufficient financial backing from its parent for the programme. Yamasaki describes himself as a skilled manager, saying he has surrounded himself with a strong team of sales, finance and strategic leaders.

"I'm delegating many of the things for them, which hasn't been the kind of a culture" previously, he says. "I'm not a superman."



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Charter companies and FBOs are expecting a big win from the FIFA World Cup in Qatar next month as thousands of fans opt for business aviation

Ready for kick-off

Murdo Morrison

At EBACE in Geneva in May, flight support and FBO brand Jetex had a ball – several dozen of them in fact. The Dubai-based company's soccer-themed stand, complete with footballs and an in-house "team" in Jetex-orange kits, was arguably the most eye-catching of the event.

Jetex – which is also exhibiting at NBAA – was promoting its services for the FIFA World Cup, which kicks off in Qatar on 20 November. The company will be keen to continue that message here at the show. The month-long tournament will generate hundreds of business aviation flights, as high-end fans and delegations jet in to watch their national teams.

Although it does not have a facility in Doha, Jetex believes many of the 1.5 million supporters expected to attend the World Cup will choose to stay in Dubai or Abu Dhabi because of the availability of hotels, and those who can afford it will charter private jets to get to the games.

In addition, a lack of parking slots at Qatar's Hamad International means operators will also base their aircraft in Dubai and neighbouring states, and fly passengers in and out of Qatar for matches, suggests Jetex founder and chief executive Adel Mardini.

Other Gulf-based operators are anticipating a surge in activity from the year's biggest sporting extravaganza. They include Jetex's Dubai neighbour, DC Aviation Al-Futtaim, which operates a maintenance hangar and FBO at the city's Al Maktoum International airport.

DCAF is marketing round-trip charter flights from Dubai to Doha, targeting families and groups of friends, as well as corporates keen to entertain clients.

"It's for those who want to travel at their convenience, and not when the scheduled airline tells you," says managing director Holger Ostheimer. Despite several daily commercial flights between the two Gulf cities, many will want to avoid crowded airports and make their own "bespoke travel arrangements", he believes.

The World Cup, he maintains, is "a huge opportunity for the entire industry", especially in the wider region. This is largely because Qatar does not have the hotel accommodation, or perhaps the social attractions, to cater for so many fans, and because the likes



Qatar is the smallest country to host the World Cup

of Dubai, Bahrain and Abu Dhabi are only an hour's flight time away. In addition, Doha airport will have strict limits on business aircraft parking overnight.

In Sharjah, Dubai's next-door emirate, Gama Aviation is offering seven days' free parking at its FBO to operators and owners during the World Cup – although on a first-come basis.

"Operators are actively looking for solutions and locations to base their aircraft during the tournament," says Tom Murphy, the company's head of FBOs. Sharjah has the advantage of being quieter than its neighbour's two airports, but passengers can be

in downtown Dubai in less than 30 minutes by taxi.

The World Cup – the clue is in the name – will attract fans from every corner of the globe. According to governing body FIFA, the countries with the most ticket requests are Argentina, Brazil, England, France, Mexico, Saudi Arabia and the USA.

Qatar is the smallest country to have hosted the tournament, which takes place every four years. That comes with challenges – lack of accommodation and pressure on the sole international airport being the prime ones, as already noted. However, one advantage is that the eight stadia hosting the games are all close to one another – the furthest from the centre of Doha is just 46km.

This is in marked contrast to previous tournaments where uncertainties over where a team would be playing meant fans could often not book flights and accommodation until the last minute, says brokerage Chapman Freeborn. In 2002, for instance, when Japan and South Korea jointly hosted, one country's match could end up being in Sapporo or Seoul, a six-hour flight away. There was a similar situation in 2014 in Brazil.

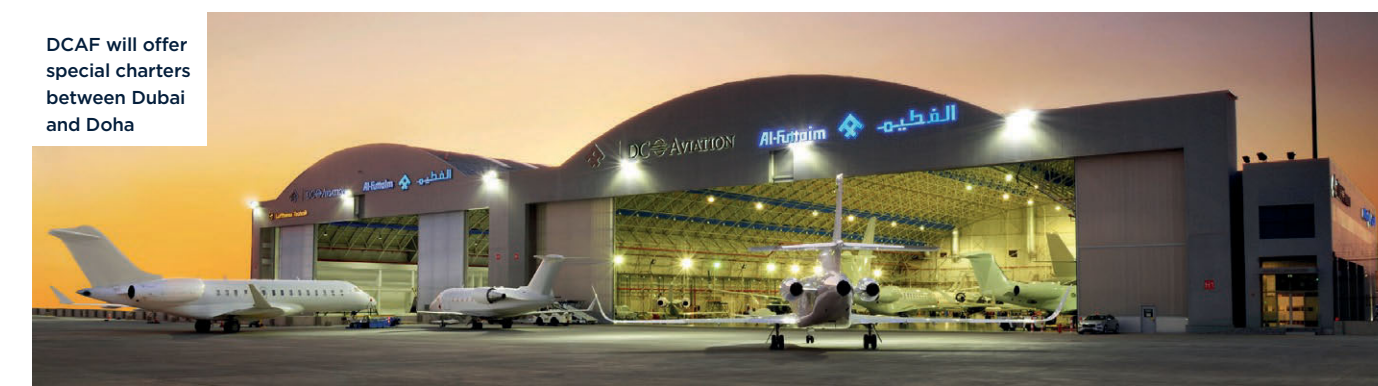
However, even with all the matches in Qatar taking place within an hour's drive of each other, there are still factors to bear in mind when chartering a business jet to this year's World Cup, suggests Rita Domkute, chief executive of Lithuanian private jet operator KlasJet. She says the longer supporters take to book flights the further away from Qatar their aircraft is likely to have to park, raising the cost of the charter.

She also points to instances at the World Cup in South Africa in 2010 where confusion about availability of parking at King Shaka International airport in Durban led to aircraft having to divert hours before one of the semi-finals, meaning passengers missed the game. Supporters looking to charter should confirm travel arrangements as early as possible to secure airport slots, she advises.



Jetex and its founder Adel Mardini hope to keep-up with demand

DCAF will offer special charters between Dubai and Doha



Eyeing a lucrative gap in the market for a 4,200nm-range jet with large-cabin comfort, Gulfstream has embarked on its G400 development with lofty expectations

Sweet spot



Deliveries of the up to 12-passenger G400 are due to start in 2025

Jon Hemmerdinger
Cutaway Tim Hall

Gulfstream's in-development G400 will round out the airframer's family of large-cabin business jets, filling a market niche seen by many observers as ripe with opportunity.

The Savannah company revealed development of the up to 12-passenger G400 at an event in October 2021. That same night, it also disclosed the development of a larger, 19-passenger jet called the G800, which perhaps received the most attention because, during the event, it rolled out the first G800 test aircraft.

Today, there is no G400 to lay eyes on; Gulfstream has yet to unveil the first flight-test example, though assembly is ongoing.

High spec
Still, the smaller type stands to make considerable waves in the wedge of

"This is a new generation of airplane – much more efficient engines, much more efficient operations, lower ownership costs"

Mark Burns President, Gulfstream

market space it occupies – the lower end of the large-cabin segment. Jets in this category are not ultra-long-range globe-crossing machines, but rather incredibly high-end aircraft with spacious cabins designed more for continental than transoceanic flying.

Analysts say the space has grown stale in recent decades. They note that, initially at least, only two other jets will compete directly with the G400, and both are updates of decades-old platforms.

That gives Gulfstream an advantage, says the airframer's president, Mark Burns. "Most of [the] airplanes that are in that space now have been there for a while," he tells FlightGlobal. "This is a new generation of airplane – much more efficient engines, much more efficient operations, lower ownership costs."

Gulfstream, a division of General Dynamics, aims to deliver the first G400, priced at \$34.5 million, in 2025.

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Boasting a 4,200nm (7,770km) range, the G400 fills a gap in Gulfstream's line-up, occupying space between its super-midsize, 10-passenger G280 and the 19-passenger, large-cabin G500.

The G500 and G600, launched by Gulfstream in 2014, are the G400's sister ships. Burns says the company's long-term plan always called for development of the third family member.

The three jets - known internally by Gulfstream as its "Advanced Aircraft Programs" - share fuselage cross-sections and other technologies, such as the airframer's Symmetry Flight Deck, which includes touchscreens, active-control sidesticks and a "Predictive Landing Performance System" that warns pilots of possible runway overruns.

Gulfstream's other large-cabin jets include the G700 and G800 - ultra-long-range, Rolls-Royce Pearl 700-powered sister ships that compose a separate aircraft family. It is developing and testing these in tandem and aims for the first G700 to enter service by mid-2023, with the G800 following in early 2024.

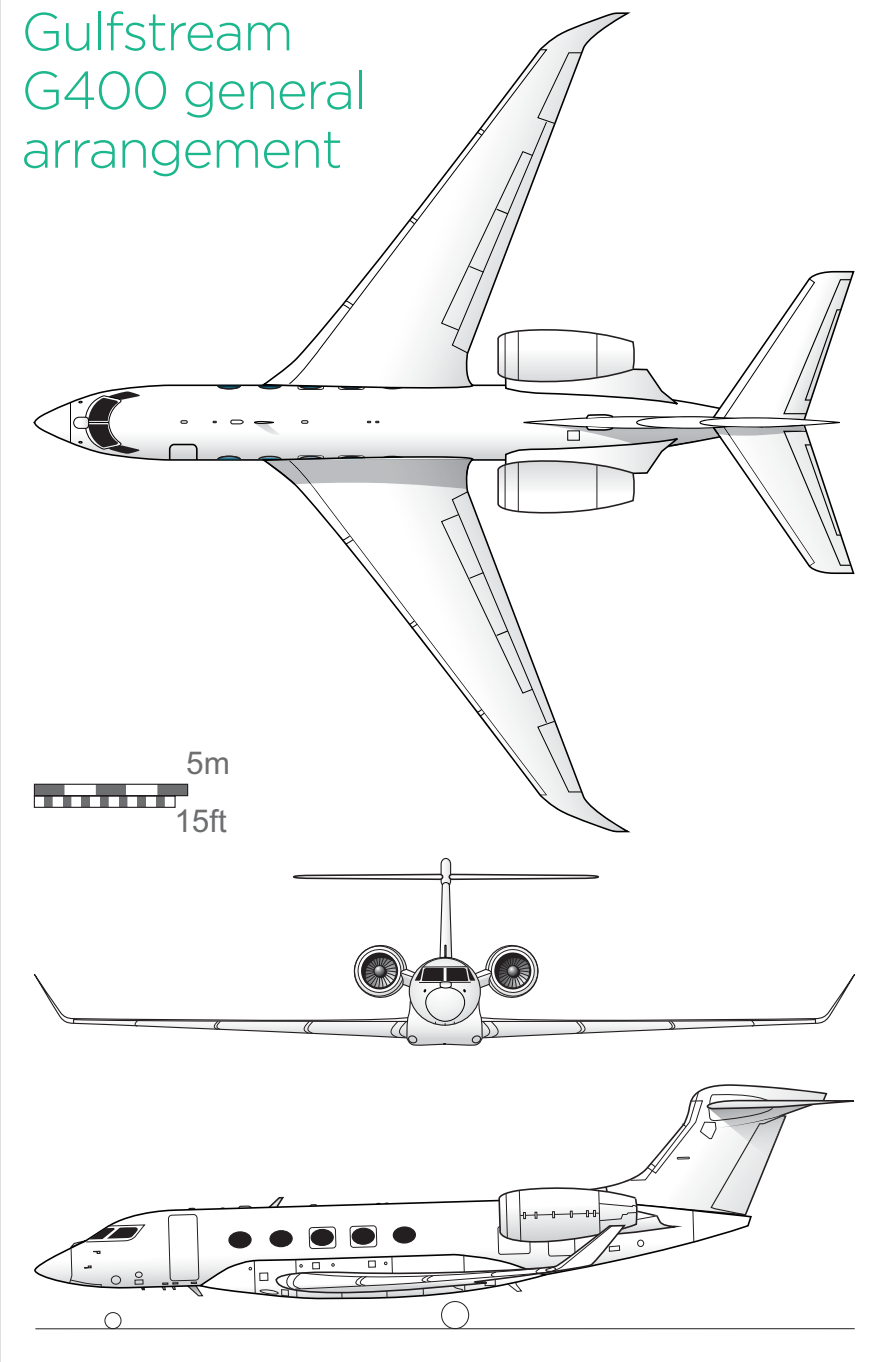
The G400 will have twin Pratt & Whitney Canada PW812GA engines - certificated by Transport Canada in mid-September - each developing almost 13,500lb (60kN) of thrust. The new model will hit its maximum 4,200nm range when cruising at Mach 0.85. Maximum cruise speed will be M0.88.

By comparison, the G500 has a range of 5,300nm, and the G600 6,600nm. Those jets have different variants of the PW800: 15,140lb-thrust PW814GAs for the G500 and 15,680lb-thrust PW815GAs for the G600.

The G400 will be the smallest Gulfstream large-cabin model, although not by much. The type will measure almost 26.3m (86ft 3in) from nose to tail. Its cabin will stretch 11.07m from front to back, excluding the baggage compartment. Those figures are each about 1.5m shorter than the G500's specifications. The G400's cabin will be 1.88m high and 2.31m wide - the same as on the G500 and G600.

Capable of cruising at 51,000ft and M0.9, it will need 1,520m

Gulfstream G400 general arrangement



of runway to get airborne at its maximum take-off weight of almost 31,700kg (69,850lb).

Lab testing

The jet's characteristics are "very similar" to those of the G450 - a 4,350nm-range model that the company stopped producing in 2018 - says Gulfstream senior vice-

president of innovation, engineering and flight Vicki Britt.

As with Gulfstream's other jets, the G400's complex systems undergo rigorous testing in a Savannah research and development facility called RDC III. The site houses several labs at which technicians test the integration of various systems, including avionics, flight controls

and a data concentration network (DCN) - a hub through which major systems connect.

The labs vary from bench test facilities - to evaluate systems integration with the DCN, for example, or whole-aircraft integration - and iron bird rigs where Gulfstream combines digital and mechanical systems.

Along with developing new aircraft, Gulfstream has been expanding its service offerings in recent years, adding aftermarket capability in Appleton (Wisconsin), Fort Worth (Texas), Mesa (Arizona), Palm Beach (Florida), and Van Nuys (California) in the USA and Farnborough, UK.

Five G400s will participate in the flight-test and certification programme, including one employed for cabin testing, Britt says. By comparison, Gulfstream is using only three test aircraft, including one for the cabin, for its G800 programme. That is partly because some certification work completed for the G700 will carry over to the G800 - a benefit made possible by the many similarities between the two jets, Britt says.

The G400's certification will be more involved owing to several factors. Those include the amount of time elapsed since the US Federal Aviation Administration certificated the G500 (in 2018) and the G600 (2019), and the G400's use of a different engine variant, says Britt.

In recent years, "the rigour with which we have had to do some of our testing, especially in the labs, significantly increased the workload," she says.

"The 400 will have to go through more than the 500 and the 600... from a software testing standpoint," Britt adds. "There [are] some things that haven't been addressed from a certification standpoint."

The G400's cabin accommodates two-and-a-half distinct living areas, and Gulfstream offers nine-, 11- or 12-passenger cabin configurations. Depending on the selected arrangement, it has sleeping accommodations for four or five people. The cabin has five windows per side and electric-controlled shades.

"It's probably just the right product at the right time," says

Tim Bicheno-Brown/FlightGlobal



Fuselage barrels will be built at the G500/G600 plant in Savannah



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- Jeff McClean,
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Potential customers can explore options for 11.07m-long cabin using dedicated mock-up

Gulfstream director of interior design Tray Crow. "I think the market is looking for something like this, with a really wide cabin."

Crow oversees Gulfstream's cabin mock-up centre, which houses G400 and G700 demonstration cabins. During a visit to Savannah by FlightGlobal earlier this year, Crow offered a tour of the G400 mock-up. "As you can see, a very spacious cabin, especially for where this aircraft sits in the marketplace," he says.

The mock-up was in the 11-passenger configuration. Standing in the galley, Crow pointed aft, calling out features. The cabin has four club seats forward: two on each side. Amidships, it has a right-side divan and two left-side club seats, while aft are another pair of club seats, both forward-facing.

Seating options

Crow explains that the 12-passenger configuration lacks the divan, but that six of its seats can form a conference area in the aft cabin. Its nine-passenger configuration, meanwhile, features six club seats and a divan, plus a second lavatory.

With its 4,200nm range potential, overnight trips, including transatlantic crossings, are absolutely part of the G400's mission profile, Crow says. However, the jet's capabilities make it ideally suited for transcontinental US hops or routes within Europe and Asia.

Gulfstream will build G400s in the same Savannah facility that houses G500 and G600 assembly, and using similar techniques. The company developed the site, and the processes, from the start to incorporate G400 requirements, says director of operations technology and support Steve Ritchie.

The G400 "predominantly is based off the 500", he notes.

Ritchie stands in a quiet room overlooking the busy assembly floor.

"The rigour with which we have had to do some of our testing, especially in the labs, significantly increased the workload"

Vicki Britt Senior vice-president of innovation, engineering and flight, Gulfstream

"Other than some very specific tools that we have had to make for the shorter fuselage section, [G400 production] is relatively similar," he says. "It's just more volume required for the site."

He explains that G400 production – as for the G500 and G600 – will incorporate improvements Gulfstream developed for the G650. For instance, the company altered the design of some fuselage components to allow for increased

use of automated riveting. Also, some parts arrive at the assembly site with more pre-drilled holes and other pre-fabricated features that make actual assembly easier.

Structural similarity

"By embedding those holes or features into the part when it is manufactured, you no longer need a separate tool," Ritchie says. "It improves quality. That's really where our focus is."

"The [G400's] producibility, and the structural approach to building the aircraft, is very, very similar to the 650," he adds.

During our visit, several G500s and G600s were taking shape at the assembly site. Fuselage sections form as they move from station to station along the assembly floor. Workers, assisted by machines, form main barrel sections that compose fuselages. The work involves attaching fuselage frames to fuselage panels and adding structural brackets.

The G400's fuselage is made from aluminium, while components such as pressure bulkheads, horizontal stabiliser skins, wing-to-body fairings and engine pylons and cowlings are made from composites, says Ritchie. Aerostructures specialist GKN Aerospace produces the jet's rudders and wing skins.

Gulfstream had considered investing in an automated "levelling system" for joining fuselage sections, but decided to take another path.

"We looked at it and we said, 'We don't need to go to that level of expense or complexity,'" Ritchie says.

Instead, Gulfstream developed "precision-build carts". These hold fuselage barrel sections (forward-mid, centre-mid, and aft-mid), and allow workers to bring sections together using "joining fixtures", Ritchie says.

"We build up the fuselage sections, we join them together. We bring them to systems integration", where workers wire the jets and install other internal equipment, he says.

Next, teams add the wings, and the whole structure takes the unmistakable shape of a Gulfstream large-cabin jet. The company manufactures G400, G500 and G600 wings and empennages in an adjacent facility in Savannah.

"We bring the wing across from

Gulfstream G400 specifications

Dimensions	
Length	26.29m
Height	7.72m
Wingspan	26.31m
Cabin (L x W x H)*	11.07 x 2.31 x 1.88m
Accommodation	
Passengers	12
Powerplant	
Engine (x2)	Pratt & Whitney Canada PW812GA
Engine thrust (x2)	13,496lb
Performance	
Maximum take-off weight	31,683kg
Maximum zero fuel weight	21,387kg
Range (at Mach 0.85)	4,200nm
Maximum operating Mach speed	M0.9
Operating ceiling	51,000ft

Source: Gulfstream,*Excluding baggage compartment

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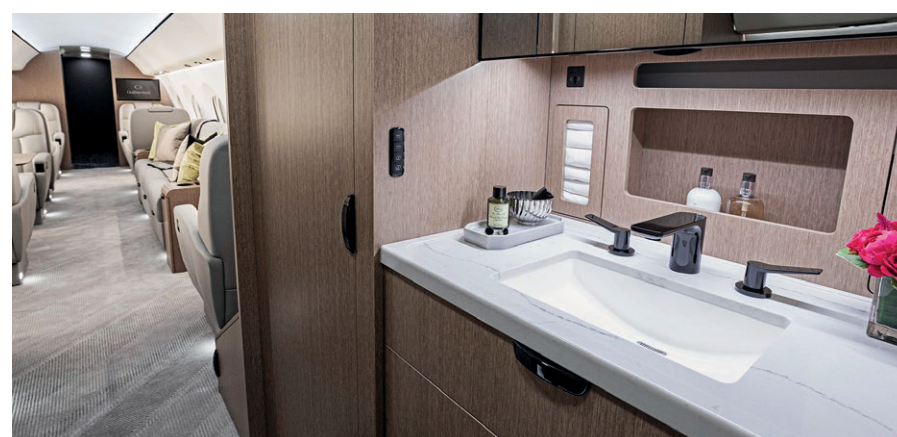
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G400 offers nine-, 11- or 12-passenger cabin configurations and can sleep four or five people



Photos: Gulfstream

the next building," Ritchie says. "We take the fuselage... join it to the wings and put all the other major components on, like the landing gear, the engines. The empennage comes over and gets installed."

Jets then move to Gulfstream's flight-test facility for fuelling and engine runs. First flights follow. After receiving airworthiness certificates, it begins completion work, which it performs in Savannah and at facilities in Appleton and Dallas, Texas, Ritchie says.

Gulfstream has started constructing the first G400 test article but has not said when that jet will be complete. It will build fuselage barrels for G400 test aircraft in the G500/G600 facility, then move the barrels to another part of the Savannah site, where workers will complete remaining assembly work.

Parallel lines

As Gulfstream transitions to G400 production, it plans to transfer all production work to the G500/G600 site, assembling all three models there. To accomplish that, the airframer plans to expand the facility to include another parallel production line, Ritchie says.

In terms of market segment, the G400 sits wedged between the upper echelon of large-cabin jets including the G500, G600 and Bombardier's

"It's sitting in really a unique place... a sweet spot, kind of, between those two worlds"

Tray Crow Director of interior design, Gulfstream

Global-series, and super-midsize aircraft such as the G280.

"It's sitting in really a unique place... a sweet spot, kind of, between those two worlds," Crow says.

That market position has seen little innovation or development in recent decades, say aerospace analysts. They note that essentially only two other in-production jets compete in the G400's space: Bombardier's Challenger 650 and Dassault Aviation's Falcon 2000LXS.

Gulfstream had, previously, had a stake in the segment with its G450. Cessna also had its eye on the sector with the Citation Hemisphere, but ceded the space when it shelved development of the aircraft in 2019 amid engine troubles.

"The [Challenger 650] is the oldest business jet in production, and the [Falcon] 2000 is around the second oldest," says aerospace analyst Richard Aboulafia with AeroDynamic Advisory. "Gulfstream

found a golden opportunity."

The Challenger 650's lineage stretches to the 1970s. The type is based on the Challenger 600, a jet developed by long-defunct Canadair that made its maiden flight in 1978. Bombardier acquired the programme when it purchased Canadair in 1986. It has since rolled out new variants, including the Challenger 605, which completed its debut flight in 2006.

Bombardier updated the type in 2014 by introducing the Challenger 650. Powered by twin 9,220lb-thrust GE Aviation CF34-3B powerplants, the type can carry 12 passengers and has range of 4,000nm. Including all derivatives, Bombardier has delivered more than 1,000 of the jets.

Dassault's Falcon 2000LXS, launched in 2012, is the French airframer's update to its baseline Falcon 2000, a jet that entered service in 1995. The 2000LXS has twin 7,000lb-thrust PW308Cs and range of 4,000nm. Globally, nearly

650 Falcon 2000s remain in service or storage, according to Cirium fleets data.

Deliveries of jets in the G400's category have been limited in recent years. In 2021, airframers handed over just 20 jets in the segment, down from 57 in 2015, according to Aboulafia. He defines the segment as encompassing business aircraft with list prices between \$35 million and \$45 million.

But Aboulafia predicts a slight renaissance. He expects deliveries of G400-class jets will accelerate in the coming years, hitting 50 in 2028.

Burns declines to say how many G400s Gulfstream might ultimately sell, but predicts the market will be substantial, noting the sales success of the predecessor G450. "This is going to be a large space... a lot of customers," he says. "At 4,200nm, there is a strong case for this airplane for a lot of people - private individuals and corporations."

Crow expects G400 buyers will include customers upgrading from midsize jets and existing operators of large-cabin types.

"We also anticipate large fleet owners using this for their regional or domestic missions," Crow adds. "This will be a game changer. There has not [been] anything new in this market sector in 20 years." See Cutaway P33

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We profile two aircraft sure to catch the eye on the static display – Textron Aviation’s Beechcraft Denali plus Tecnam’s P2012

Small wonders



Beechcraft Denali

Textron Aviation’s latest turboprop is behind schedule, so it is a mock-up on show. The launch platform for GE Aerospace’s all-new Catalyst, the single-engine prototype first flew in November 2021 – two years later than promised when Textron launched the type in 2015. The manufacturer is now scheduling certification for 2023, with GE subsidiary Avio Aero – in charge of the European engine programme – insisting the FADEC-equipped, 1,300shp (970kW) powerplant is back on track. Launched as a Cessna aircraft, the Denali now sits under the Beechcraft brand, alongside the larger King Air family, and is able to carry between four and nine passengers, depending on configuration.

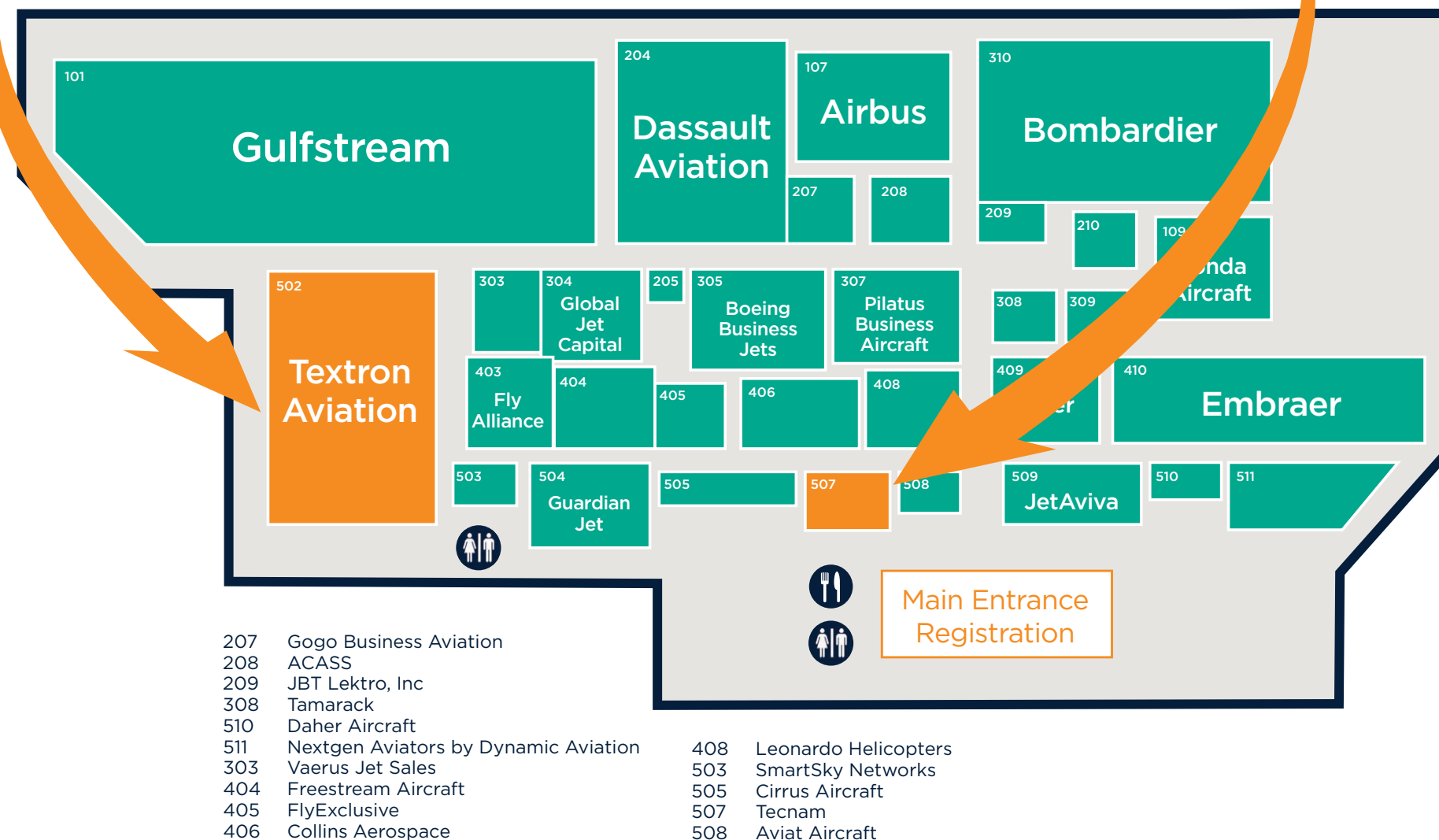


Tecnam P2012

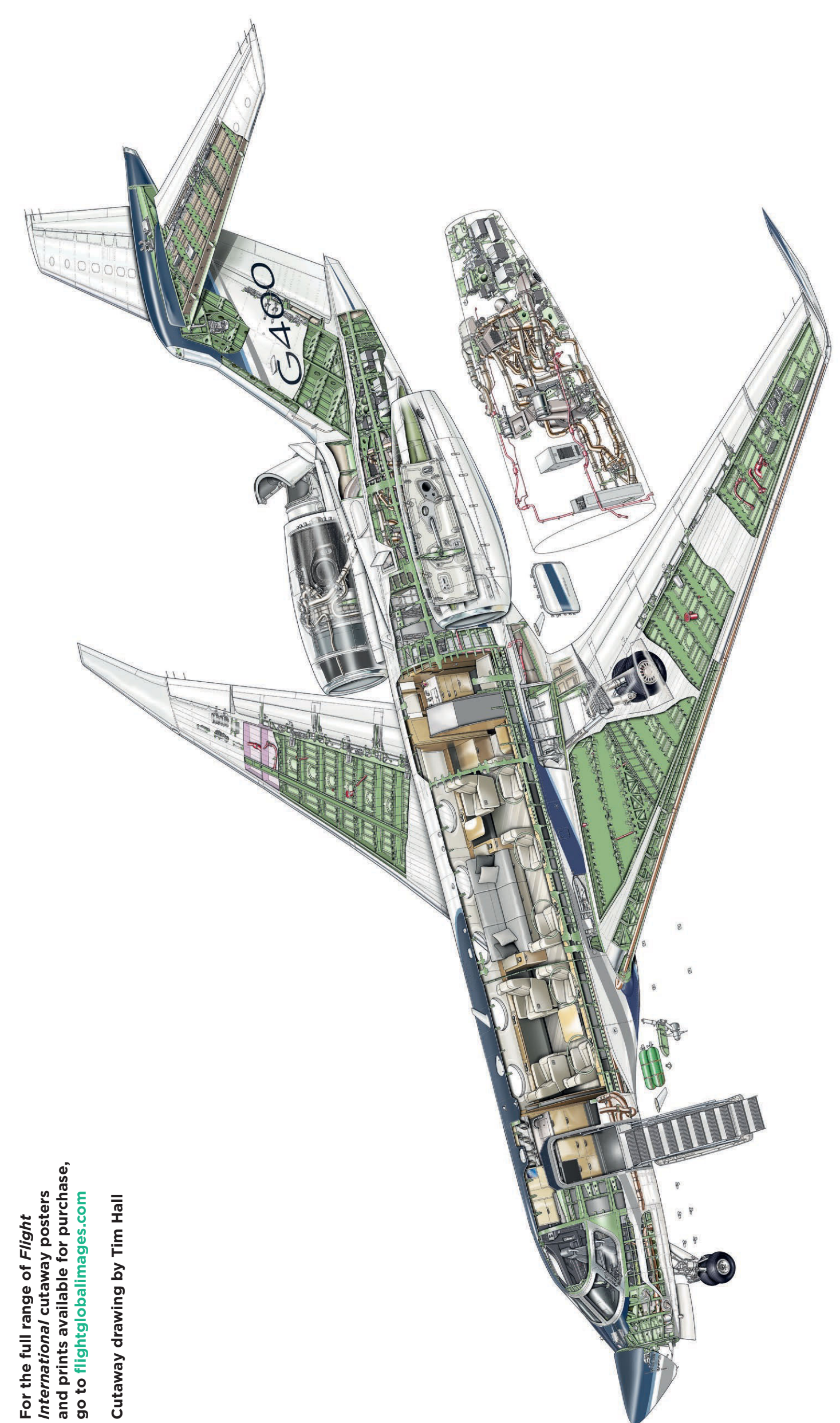
The Italian manufacturer’s nine-seat piston twin is in service with US airline Cape Air and a handful of other operators, but Tecnam is also keen to promote its flagship in the business and general aviation sector, so is back at the show. It believes the P2012 is an ideal replacement for ageing Cessna 402s and other out-of-production types. The latest development of the \$2.6 million P2012, due for certification next year, is a short take-off and landing variant. Tecnam has also been working with Rolls-Royce to develop an electric version of the Lycoming TEO-540-C1A-powered aircraft called the P-Volt.

STATIC DISPLAY OF AIRCRAFT AT ORLANDO EXECUTIVE AIRPORT

Note: Details correct at the time of going to press



Gulfstream G400



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