Issue FLIGHT 23-25 MAY 2022 | GENEVA With distribution supported by **EVENINGNEWS** Monday 23 May 2022 CAE the range HALF THE SKY AND COUNTING 1 out of 2 general aviation turbine aircraft flying today is built by Textron Aviation. bal GLOBAL



Bombardier chief executive Eric Martel with the Global 8000 model this morning

stand X33







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STAND X33

into the 7,700nm-range Global 7500, the 8000 remained stuck on the drawing board. In the meantime the market has changed, in particular with Gulfstream's launch earlier this year of its 8,000nm-range G800, which is due to arrive in 2023. Bombardier needed a

Bombardier revives Global 8000 as its longest-distance, fastest aircraft

Dominic Perry

tion campaign.

ombardier has given

a supersonic start

its long-promised 8,000nm (14,800km)-range

to the launch of

Global 8000 - flying a test

aircraft beyond the speed of

sound as part of its certifica-

8000 programme at the

replace its Global 7500.

show this morning, and also

that the type will eventually

In addition to the huge

range, the new jet will have a

maximum speed of Mach 0.94

and be capable of carrying 19

passengers. Service entry is

8000 is not the aircraft the

But while the 7000nm pro-

gressed, eventually morphing

scheduled for 2025. However, this Global

Canadian airframer envisaged when it was launched along with the Global 7000 in 2010. Back when Bombardier first touted the ultra-long-range twinjet, it was planned as a 2.6m (8.5ft) shrink of its 33.8m-long Global 7000 sister which was capable of flying 500nm further, hitting the 7,900nm mark.

The Canadian manufacturer revealed the surprise news that it was reviving its Global

response, but in its view, building a jet that could fly only 200nm more at the expense of cabin volume, or two passenger seats, was not the right approach.

cal - albeit lower-cost - step: rather than developing an allnew jet it has instead souped up the performance of the Global 7500 to create an aircraft that can fly 8,000nm and up to 1.3% faster than the current M0.925 maximum. Continued on page 3

Instead, it has taken a radi-

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cutive Eric Marte

th the Global 8000

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Kate Sarsfield

t was all-systems go for Lilium this morning when the German electric vertical take-off and landing aircraft developer announced an agreement with Honeywell and automotive giant Denso to co-develop and manufacture the electric motor for the Lilium Jet. Honeywell is already developing the Lilium Jet's avionics and flight-control system and invested in Lilium in 2021. The aerospace firm already has an alliance with Denso covering electric

propulsion solutions for aerospace. "We are already mak-

ing great progress with Honeywell on its Anthem integrated flightdeck and flight-control computers, and we are delighted to deepen our relationship,' says Lilium's chief operating officer Yves Yemsi.

"The collaboration with these two powerhouses takes us further along the path to revolutionising regional air mobility," he adds. Development activities



Lilium deals get eVTOL motoring

German developer signs up Honeywell and Denso to power urban air mobility platform at the show



on the motor have been ongoing for around two years already.

"Through this collaboration, the Lilium Jet's e-motor will benefit from Honeywell's aerospace expertise as well as Denso's experience in high-quality volume production," says Lilium.

"It is expected to bring exceptional performance and reliability with zero operating emissions typically associated with commercial jet engines," says Lilium. The first prototypes will be designed to extract over 100kW of power from a system weighing just over 4kg (8.8lb).

Lilium has announced orders for 350 Lilium iets: 200 from Brazilian airline Azul and 150 from fractional ownership company NetJets.

Launched in 2015, Lilium flew the first Lilium Jet technology demonstrator two years later and is now testing the fifth example at its Spanish flight-test base.

Certification and service entry is now scheduled for 2025 following a recently announced 12-month delay.



Revamped XLS tops Textron trio

o of EBACE debutants n the static display - a chcraft King Air 360 -turboprop. Cessna Gen II light iet and > act. EBACE is the

e revamped XLS ouncement at NBA vear and comes hot on heels of its achieving certification earlier

Lannie O'Bannion, senio ce-president of global les and flight operation ys there has been rong interest in all three els, which have all addition, the King Air d auto-pressurisation

'Our focus has been ssible experience for ou

continued from page 1

Chief executive Eric Martel says customers wanted to know if it would still pursue the Global 8000 "given that the Global 7500 was performing so well today we are happy to give you the answer"

The new Global is "two aircraft in one", he says, providing "everything the Global 7500 has to offer" but with "a level of performance that has never been seen before in business aviation"

Bombardier has already begun validating the modifications required using its FTV5 flying testbed operating from a US site. And on 18 May 2021 - accompanied by a NASA-operated Boeing -18 fighter – the aircraft was taken past the sound barrier to M1.015, becoming the fastest civil aircraft since Concorde and taking a crucial step towards validating the new standard.

Service entry for the Global 8000 is anticipated n 2025, says Bombardier. At that point two things happen - thanks to a service bulletin all G7500 owners will be able

able to change guickly to drive more demand for our products.

ew seats - including up ry in the CJ4 Gen II. pl additional features such a extra luggage storage

These were driven

In addition. Textron viation's turbine fleet is certificated to operate or fuel. which the ai ghts to Geneva.

European Union Aviatic afety Agency approval or the CJ4 Gen II and XL Gen II is "imminent". savs the company. The King A was validated by EASA in September last year.

to convert their jets into the Global 8000, and production of the earlier model is phased out in favour of the longer-range aircraft; list price also rises from \$75 million to \$78 million.

"The speed and cabin size will be will be more than those of the G800 - we have taken a no compromise mentality to how we want to position this aircraft at the top of the pyramid," says Bombardier

The Global 8000 will be 33.8m long, with a useable cabin space of 16.59m, compared with respective figures of 14.27m and 30.4m for the G800.

"We are doing everything that we wanted to do with the original Global 8000 but with the longer fuselage,' adds Bombardier.

To turn one Global into the other, changes are needed to the control software for the GE Aviation Passport engines and tweaks enabling more fuel to be carried. "We are going to be utilising space and weight savings to be able to carry more fuel to unlock the range potential of the aircraft," says Bombardier

Tennis royalty, and aviator, Martina Navratilova, opened EBACE this morning. She wooed a packed house with her life stories and how the multiple grand slam champion learnt to fly in the late 1990s after travelling to Kenya and realising it was an easier way to get around. She lobbed a few signed tennis balls to grateful delegates telling the ds: "For me it was always about being the best I can be," before heading off to our the show and visit the static park.

No trip-ups with UAS

BACE to launch a new p management system hich it describes as the nost powerful of its kind h the market"

e system, called Glob-Trip Manager, gives n greater control of planning activities to ver what UAS calls st. efficient, and simpl cess to all trip detai anywhere, and at

The web and mobile ased trip planning plication provides al-time updates and ormation on all service quests globally, so anage all their trip ning needs as wel manage their own mpany profile, says The Dubai



also announced that the show that it has recorded a 200% increase in demand for specialist VIF ground supervisors over he past two years.

It attributes this drama ness aircraft travel since the pandemic outbreak i early 2020.

business aviation gatewa operators are engaging supervisors to navigate th complexities and handle any unforeseen issues of the operation on the ground," says Al Husary. an extension of your tea last-minute changes or issues, and advocating fo our interests at all times results in more ef

> SAF lands at EBACE Jet Aviation supplying 30% blend from FBO

Mark Pilling

ards of red tape had to be cut but the NBAA and EBAA are delighted that sustainable aviation fuel (SAF) is on tap at EBACE. For the first time in history there is SAE actually here savs Ed Bolen, NBAA president

"One of the key issues we are advocating for in Europe is the geographical spread of SAF," says Athar Husain Khan, EBAA secretary general. "This is why it is so significant and crucial for us to have it available at our own show, in Geneva, so that we practise what we preach."



Business aviation services provider Jet Aviation will supply the SAF at its FBO here at Geneva airport for outbound flights. It has imported a stock of 30% blended SAF from manufacturer TotalEnergies.

Flight Evening News's intrepid distribution team are bringing "today's news today" to EBACE visitors this week. They are pictured in front of sponsor CAE's stand. FlightGlobal

has been publishing the show newspaper at the EBACE and NBAA conventions since 200

"It is our great pleasure to offer delegates the choice to fly here on SAF through Book & Claim, or to uplift SAF directly in Geneva." savs Joao Martins. Jet Aviation's vice-president of

FBO operations in Europe.





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Mark Pilling

buoyant industry.

the industry.

membership programmes.

biggest challenge.



Industry's future bright, say leaders

However, business aviation chiefs stress need to tackle diversity, sustainability and supply chain challenges

he mood was ebullient as big names from the business aviation world waxed lyrical at the media press lunch yesterday about the return of EBACE and the prospects for a

The sector is "celebrating" its commitment to sustainability, said NBAA president Ed Bolen. and all panellists talked about their determination to further its inclusivity record and attract a younger generation of talent to

"We are going into the heyday of business aviation... the future is super-bright," said Kenny Dichter, chief executive of Wheels Up, the New York-based firm that sells aircraft charters through Keeping up with this growth surge is undoubtedly an issue across the value chain. Jet Aviation president David Paddock said business is at levels 20% above the same time in 2019. However. with 300-400 openings globally across Jet Aviation's network of 52 locations, attracting people is its

Bolen said bringing in new talent is an "imperative", while Embraer Executive Jets president Michael



Paddock and Dichter of Wheels Up

Amalfitano said all players have to play their part to "create a new passion for folks to come back to the industry"

Dichter said inclusion is his watchword, "This has traditionally been a white, male-dominated industry... we must make it more inclusive with more women, more people of colour and more people of all orientations, and welcome them," he said.

FBACE will be a visible demonstration of an industry in transformation on many fronts, said Athar Husain Khan, secretary general of EBAA. But can all industry players cope with this robust demand? "We are managing it today, but we do need to get the balance right between supply, demand, infrastructure, services and inclusion, he told Flight Evening News.

Elements of the supply chain including third party maintenance and the provision of spare parts, are the biggest challenges seen by Wheels Up, according to Dichter. "The supply chain today is more challenged than it was pre-Covid. If we want strong and sustainable growth deep into the future industry needs to collectively deliver a supply chain that can support that."

Aston thriller

Little more than two years after launch Airbus Corporate Helicopters (ACH) has sold all but one of its initial production run of Aston Martin Edition ACH130s and has now committed to a second batch of the exclusive light-singles, marking the deal at EBACE yesterday.

"There's no question that bringing together our values of excellence and quality with Aston Martin's commitmen to high-performance automotive elegance has resulted in a helicopter that always excites customers," says head of ACH Frederic Lemos.

"But we really did not imagine that the market would move so fast so I'm lighted to be able to commit to these future production slots.

To celebrate the renewal of the partnership, ACH has the fourth production Aston Martin Edition ACH130 on its EBACE stand alongside an DB11 Superleggera car in matching black paintwork.

Orders have come from across he world including South-East Asia, Europe, Latin America, New Zealand and North America.

Daher's EcoPulse races ahead

Daher's EcoPulse hybridelectric demonstrator aircraft will take to the air from its Tarbes base by the end of this year, beginning an 18-24-month test programme that will consist of about 100 flights, Nicolas Chabbert, senior vice-president of the firm's aircraft division said at EBACE.

Although Daher is not being asked by customers for a hybrid-electric product, the firm is convinced innovative technology to drive sustainable propulsion solutions will be essential for its future TBM range, says Chabbert. "We have to define our own path," he adds.

The EcoPulse is being developed in partnership with Airbus and Safran with support from France's CORAC civil aviation research council. It is based on a TBM 900 turboprop with the Pratt & Whitney Canada PT6 engine augmented by six wing-mounted propellers each driven by a Safransupplied 50kW electric motor.

Chabbert stresses that EcoPulse is a demonstrator designed to provide "key learnings" on how to manage a high-voltage electrical system in an aircraft.

However, while Daher will not reveal any timelines, the intention is to bring new technology like this into its product range. "We will bring sustainability answers to the market as soon as possible, he says.

The addition of Stuart Aerostructures, acquired from Triumph Group in February, gives Daher a good balance between its aerostructures work for Airbus and Boeing and, when the deal closes in July, will make the important North America market its second largest in revenue terms after France, Daher chief executive Didier Kayat tells Flight Evening News.

The French, family-owned business will continue to seek strategic and opportunistic acquisitions, with the gap now more in the services side of its operation. "We get two to three offers per week,' says Kayat.



Chabbert (*left*) and Kavat

SwiftJet IFC promises faster connections

Inmarsat and Honeywell Aerospace have launched SwiftJet, their latest in-flight connectivity service for business aviation. It is due to enter service in the first half of 2023 and deliver speeds of up to 2.6Mbps - up to six times faster than Inmarsat's existing L-band-based business aviation service.

SwiftJet, which will be delivered via Inmarsat's ELERA satellite network, will be available alongside Jet ConneX (Ka-band) and SwiftBroadband (L-band), which have been activated on thousands of jets worldwide.

SwiftBroadband customers will be able to upgrade to the new service without needing to upgrade externally mounted equipment; hardware for SwiftJet s proved by Honeywell.

The new service is available to pre-order through Honeywell, with additional incentives" promised or early adopters.

Kai Tang, Inmarsat's head of business aviation, says the new service was developed in response to customer demand "for a faster, more advanced L-band offering" without "losing its trademark characteristics of resilience, reliability and availability."



Jetex having a ball

Kate Sarsfield

etex is hoping to score at this year's Qatar football World Cup by providing a backup service for operators of the expected 1,500 business jets that will fly into Doha between 28 November and 21 December. The Dubai-headquartered FBO brand has a football-themed stand here at EBACE to promote its "high-end" services during the tournament.

Adel Mardini, founder and chief executive of Jetex, says Qatar's hub, Hamad International, "simply doesn't

have the capacity to park the huge numbers of aircraft".

He says Jetex will handle customer flights from its bases in Dubai – home to its largest FBO in the region – and Muscat in Oman.

"We will fly the customers in and out of Doha – where we have a partnership with local handler Qatar Airways – for the matches and park their aircraft at one of our bases," says Mardini.

Customers also have the option of basing their aircraft in other Gulf states, such as Bahrain, Kuwait or Dubai's UAE neighbour Abu Dhabi. "All of these bases are a 45min flight from Doha but Dubai is particularly ideal," Mardini says. "We offer 150,000sq m of parking and 6,000sq m of passenger lounge area."

He adds: "I am confident we can secure well over 50% of the World Cup business aviation traffic."

Jetex has a network of 34 FBOs located in Africa, Europe and the Middle East. On the eve of EBACE it announced it will operate the FBO at Hangar 510 at London Biggin Hill airport under an agreement with Avia Solutions Group. This marks the company's first foray into the UK market.

"We are pleased with our arrival in London. Jetex already has a strong presence in Continental Europe with a flagship private jet terminal at Paris Le Bourget, and the new flagship Jetex London is a natural evolution of our operations," says Mardini.

Signature currently operates the FBO at Hanger 510.





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Kate Sarsfield

is described by the French



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Agnès Gervais, head of industrial design at Dassault Aviation, in the suite at the show

Dassault adds a bit of privacy

French airframer reveals business aviation cabin first as it updates on 10X and 6X programme development

assault is promoting at the show a new cabin concept for its top-end Falcon jets and has been updating the industry on the progress with its in-development 6X and 10X. The privacy suite, which visitors to the Dassault stand can sample. manufacturer as "an individual

compartment designed to offer more personal space, greater peace and quiet, and a more comfortable and restful sleep on long flights".

Up to now, privacy suites - individual compartments partitioned off from surrounding passengers and equipped with an electrically operated reclining lie-flat bed - have been common on passenger airliners but this is a first for business jets, Dassault savs.

The suite will initially be offered on the in-development super-wide Falcon 6X twin and 8X long-range tri-jet. The patented innovation is the result of a two-year collaboration between Dassault's in-house design studio and its engineering department.

The suite is separated from the cabin aisle by an adjustable midheight partition. The seat itself is 22in wide in the 8X and 24in wide in the 6X

Dassault also announced at the show that its in-development Falcon 6X and 10X are making strides towards certification and service entry.

A little over a year since its launch, production and assembly of the topof-the-range Falcon 10X is gearing up at sites around Europe and North America, with final assembly of the ultra-widebody twin set to begin next year.

A new production hall at Dassault's Biarritz plant in southwest France is dedicated to the Rolls-Rovce Pearl 10X-powered aircraft's all-composite wing. The initial example is in final assembly and will be placed in a static test rig in the third quarter.

"We are making excellent progress in getting this new aircraft into production, and the coming months will see an increasing flow of parts, subsystems and large structures into our facilities in the south of France," says Dassault Aviation chief executive Eric Trappier.

With a cabin height of 2.07m (6ft 8in) and a volume of 79cu m (2.780cu ft). the 10X - which is being displayed in mock-up on Dassault's stand - will have the largest cabin of any traditional business jet.

Dassault has not disclosed when the 7,500nm (13,900km)-range 10X will make its maiden sortie, but it is confident the aircraft will enter service as scheduled in 2025.

Flight testing of the 6X is well under way. Three flight-test aircraft have already logged over 850h and completed a number of major flight-test activities - including cold-soak tests, high-elevation tests - and expanded the flight envelope well beyond the aircraft's Mach 0.90 maximum operating speed. The flight trials remaining includes natural icing tests and contaminated runway tests, says Dassault.

Certification of the 5,500nm-range twin is scheduled for mid-2023. This is around six months later than originally scheduled with Dassault attributing the delay to supply chain issues.



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Rolls-Royce powers ahead with Pearl 10X campaign

Rolls-Royce is ramping up testing on the Pearl 10X engine that will power Dassault's developmental Falcon 10X ultra-long-range business jet.

To date, the powerplant programme has accumulated 1,000h, using both the initial Pearl 10X test engine and the manufacturer's Advance2 demonstrator.

First runs for the over 18,000lb thrust (80kN)-rated engine took place earlier this year, beating its targeted thrust levels Rolls-Royce says the testing to date "has proved the reliability of the engine" and shows it will meet Dassault's performance requirements. The Pearl 10X is the first Rolls-Royce powerplant to be selected by the French airframer. Evaluations so far have included trials of a new 3D-printed ultra-low-emission combustor compatible with 100% sustainable aviation fuel - and a new accessory gearbox. The first full powerplant housed

within its Spirit AeroSystems-



Progra ne has notched up 1,000h of te

designed nacelle will enter the test programme later this year.

Dr Dirk Geisinger, director business aviation, Rolls-Royce, says: "Our Pearl 10X team is extremely focused on the development of the engine and it makes me proud to see the continuous progress of the programme."

The Pearl 10X uses the engine core developed under the Advance2 programme and combines it with a new low-pressure system. Rolls-Royce claims the new turbofan is 5% more efficient than the previous generation of its business jet engines.

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Our first fully digital flight control system was for the Mirage fighter in the 1970s, later refined for the Rafale fighter, and then introduced on the first fly-by-wire business jet, the Falcon 7X, which made its maiden flight in 2005. That system has proven itself—delighting pilots and passengers—for more than 15 years.

In our advanced Falcon 6X, the Digital Flight Control System (DFCS) has expanded capabilities, managing all flight control surfaces, including spoilers, slats and flaps, a new high-lift flaperon control, even nosewheel steering. The next iteration of DFCS, in the Falcon 10X, will be even more advanced, with new levels of automation and new safety protections.

A DESIGN PHILOSOPHY BORN OF FIGHTER JET EXPERIENCE

Dassault DFCS is fundamentally different than competitor fly-by-wire systems, which essentially replicate conventional flight controls.

Pilots of those systems are forced to make constant flight path adjustments and manual trim changes to achieve a desired aircraft trajectory.

DFCS in Dassault fighters and business jets is a "closed loop" system, meaning that the system itself is making subtle adjustments of multiple control surfaces continuously to maintain a stable path along the trajectory the pilot selects. Trim is automatic, as is flight path stability, in any configuration.





A SMART SYSTEM THAT EASES PILOT WORKLOAD

You can see how this would be valuable in a single seat fighter, with a pilot multitasking in a fast-paced combat situation. The benefit is similar in a business jet, where pilots are freed to focus on the big picture. With DFCS, the pilot sets trajectory and can release the "smart sidestick." Hand flying is easier, adjustments to flight path fewer and more precise.

In the back of the aircraft, passengers benefit from a smoother ride on autopilot or during hand flying, because DFCS corrections are quicker, smoother and smaller. It also smooths the bumps in rough air and pilots are less inclined to disconnect the autopilot in turbulent conditions. Full envelope protection is ensured. Safeguards

are layered and significantly exceed certification requirements as well as those of our competitors.

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Falcon DFCS represents the highest level of flight control, safety and comfort in the industry. But there is only one way to appreciate its advantages over competitors. And that is to fly with it. Then you will truly understand.

FALCONS FLY BETTER AND SMARTER. ASK A FALCON PILOT.



FlyExclusive Cessna

New entrants are driving momentum in flying hours, says JSSI

Jet Support Services (JSSI) says travelers who used business aviation for the first time during the pandemic and have become converts are driving growth in the sector.

This is feeding through to demand for aftersales services, with the US-based fixed-cost maintenance provider reporting a "dramatic" increase in flying hours in the first quarter from the equivalent period in 2019.

"We are hitting all-time highs," says chief executive Neil Book. "It is largely due to people who have entered the sector who are not leaving.

Chicago-based JSSI offers an "agnostic" alternative to the aircraft manufacturers' own maintenance programmes by offering packages covering most makes of aircraft, engines and auxiliary power units. It does not carry out its own maintenance but "sends work to whoever provides the best price and highest quality", says Book. Around 2,000 aircraft are covered by its schemes.

It also offers spare part lease packages.

The company has been broadening its portfolio in recent years, moving into maintenance tracking.

Last year, it acquired maintenance data specialists Traxall and SierraTrax to add to its 2018 purchase of Conklin & de Decker, a provider of operating cost reports.

"It's a beautiful fit," says Book. "We have been collecting maintenance data for more than 30 years, including for the 2,000 aircraft we manage, but 3,000 more. That is 20% of the global market.'

At EBACE the company plans to announce a new branding strategy which "will catch up with the integration that has taken place", says Book



a brand-agnos service to operator



Charter provider confident about competing with giants of shared ownership segment

Murdo Morrison

im Segrave has no fears about directly taking on fractional ownership giants NetJets

and Flexjet, after the charter company he founded, FlyExclusive, launched its fractional programme in April with a purchase agreement with Textron Aviation for 30 new Cessna Citation CJ3+ jets.

The service is being offered as an adjunct to FlyExclusive's membership and ad hoc charter offering. With a fleet of around 90 aircraft - all Citations apart from seven large cabin Gulfstream GIVSPs - the Kinston, North Carolina-based firm claims to be the fourth biggest private charter operator in the USA.

Although the new CJ3+ aircraft will not begin arriving until the first half of 2023, Segrave will launch the fractional product using Citation light jets already in the fleet.

A number of attempts to launch fractional ownership programmes in the USA have ended in failure. However, Segrave, who sold an earlier company, Segrave Aviation, to a subsidiary of Delta Air Lines in 2009, believes many made the mistake of trying to do it from a standing start.

"You can't just launch a fractional without aircraft. We are launching with 20 CJ3s and Encores in our fleet, so we have that critical mass.

that back-up already," he says. ElvExclusive also has the benefit of an existing membership base for its charter services, some of whom, hopes Segrave, will trade up to fractional ownership. However, he also hopes to entice new entrants to the market

At the same time, he believes that FlyExclusive will "deliver a better level of service" than its larger rivals because they have up to 20 owners for every aircraft, creating operational challenges when demand is high. "We have 4.5, so we can take on 2,000 customers and still have the same [per aircraft] ratio as Flexjet or NetJets," he says.

Under the agreement with Textron, FlyExclusive will take delivery of five aircraft next year with the option to purchase additional aircraft for deliveries through 2025. Segrave anticipates operating up to 80 fractionally-owned Citations "in short order" as part of an overall 200-strong FlyExclusive fleet by 2025. "We are going to be adding planes at a rapid rate," he says.

He expects to supplement the CJ3+ light jets with midsize types; Textron's main offering in this segment is the Latitude.

FlyExclusive is still determining what fractional packages to sell, although Segrave says: "We like 5% as an entry point." He says the decision to opt for fractional ownership is not necessarily based

on annual hours flown but "whether they want to fly a new airplane every time", as well as the opportunity to offset tax against a depreciating capital asset.

The company, which owns or leases its entire fleet, uses an identical livery and registration convention on all its aircraft and is moving towards common cabins savs Segrave.

FlyExclusive says a "year of explosive growth" in 2021 vaulted it from seventh to fourth largest charter operator in the country, with its 43,000 flying hours 75% up on 2020. Segrave had been operating his previous company since 1994 when it was acquired by Delta AirElite. After a short time heading the Delta subsidiary Segrave set up FlyExclusive in 2015. After a rebrand, Delta AirElite was in turn subsumed into charter operator Wheels Up in 2020.

On 22 April, FlyExclusive launched a carbon offset programme in partnership with rating company 4Air, offering the change to customers to mitigate the environmental impact of their flights by funding carbonreduction schemes.

"Being part of a larger cause is a core value of FlyExclusive, and that includes our commitment to helping our company and customers become more sustainable," says FlyExclusive president Tommy Sowers.









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Agusta in the mood to make a name for itself

Leonardo Helicopters unveils three interior concepts under new VIP brand

Dominic Perry

eonardo Helicopters is celebrating the return of EBACE with a double debut: it is the first air show where the manufacturer is solely represented by its Agusta corporate and VIP brand, and the airframer is also showcasing a trio of newly developed interior concepts.

Launched in October 2021, Agusta revives a brand that had slowly fallen from prominence thanks to successive reorganisations at the Italian company, with the only remaining vestiges of the name in the AW designations of its helicopters.

But the company believes the Agusta moniker neatly encapsulates the characteristics of its VIP business.

"Agusta is a unique combination of best-in-class performance, comfort and refined Italian style," it says.

Manuela Barbarossa, head of the VIP and corporate segment at Leonardo Helicopters, says the revival of the Agusta name has been welcomed by customers.

"We are leveraging our heritage and what we have done historically in this particular segment to give back to the market the name they were clamouring for," she says.



But in parallel with the rebranding, the company has developed some "inspirational" interior concepts - called Agusta Interior Moods which it is presenting for the first time at EBACE.

Barbarossa stresses they are not predefined VIP cabins but a series of broad design palettes inspired by three of the most striking cities

in the world - Firenze, or Florence, London and New York - designed as a "way to promote and present to our customers how to create their perfect habitat".

Firenze symbolises the Renaissance and features "warmth and harmony" with a cool classical elegance: London highlight the contrast of old-world refinement

and modern style inherent in the UK capital; New York, meanwhile, conveys the cosmopolitan and constantly changing nature of the Big Apple.

"So far we have conceived these moods... they are essentially a way to help customers start thinking about their own habitat," she says.

Discussions with potential clients are ongoing, says Barbarossa, hopefully leading to a first delivery of a city-inspired interior in late 2022 or early 2023.

The Interior Moods will be available across the manufacturer's range, including on the AW609 civil tiltrotor which is due to enter service in 2023.

In addition, she says there is a great deal of interest in Casa Agusta - a new VIP rotorcraft terminal launched last year: an nitial facility has been built in Dubai and is being operated by Falcon Aviation Services.

And that region could be a strong source for future sales for the rotary-wing FBO: "We have several conversations ongoing, but let me say that the Middle East is an area that has demonstrated a lot of interest."

The airframer has a single AW169 medium-twin on its EBACE stand, a helicopter it sees as gaining popularity in the segment.

Yacht stuff

Yacht brokerage Edmiston has completed a brand takeover of Farnborough Airport near London, with the welcome wall and customer service vehicles featuring the company's red logo.

In addition, an Edmiston Lounge has been created inside the terminal, and, in July, the airport's radar tower will feature the brokerage's branding.

Farnborough says it will be the largest ever airside advertisement at a UK airport. The Edmiston lounge includes fabrics, furniture, photography and a library that reflect the company's brand.



"We believe there is great brand synergy between Edmiston and Farnborough Airport in offering exceptional service and an unrivalled private travel experience," says Simon Geere, chief executive of the airport.



In brief.

Turkey's DHMI sticks with Citations

urkish Aerospace is to fit out two essna Citation Latitudes and a ongitude with flight calibration guipment for inspecting navigationa ds at the country's regional airports ne twinjets will be operated by urkey's DHMI state airports authority nnouncing the order on 12 May, extron Aviation, which owns the essna brand, said DHMI has a "long gacy" of using Citation aircraft for ght inspection. The authority bega ing two Citation V jets in 1993, placing them with a pair of Citation LS types in 2009

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/eb Manuals, which digitises hard ppy aviation manuals, is marking s 10th anniversary at EBACE. The ompany, which is based in Malmo. weden, has 440 customers in a ariety of sectors, including business viation. It uses a cloud-based oplication to store documents, whic an be updated online "hassle-free"

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Kate Sarsfield

many countries.

much is open to debate.

are watching closely' For now, GAMA says OEMs are

"on a case-by-case basis to aviation regulators".



Hogben: Most operators have been able to redeploy aircraft from the Russian market



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A General Dynamics Company

Russian private aviation, like much of the country's economy, has been shut off from the world as a response to the war in Ukraine. How deep will the impact be on the industry, from aircraft sales to services?

ussia's invasion of Ukraine prompted outrage across the world and a slew of sanctions designed to weaken the country's war economy as well as a cabal of influential oligarchs seen as supporters and enablers of President Vladimir Putin's regime. The measures have seen an almost complete sealing off of Russian aviation - commercial and private - with manufacturers stopping the sale and supply of aircraft and components, as well as bans on Russian-registered aircraft and those known to be used by the elite from entering the airspace of or landing in

Until a decade or so ago, Russia was seen as one of the great emerging markets for both commercial and business aviation, alongside the likes of China. Brazil and parts of Southeast Asia. The ostracisation of Moscow will certainly have an effect on the ability of oligarchs to travel the world for business and pleasure - although many popular destinations such as Turkey and Dubai remain open to them. However, sanctions will also impact the industry, although how

While describing Putin's actions as "deplorable" and something that will have an impact on the global economy, the General Aviation Manufacturers Association (GAMA) says damage to the business aviation industry is "limited at present" due to the relatively small Russian market. However, it concedes that "the secondary impacts of the sanctions are still developing, and it is something we

managing scheduled deliveries ensure complete adherence to the guidance being provided about the implementation of the sanctions within each jurisdiction, including by

Traditionally, the Russian market accounts for around 2% of new





Closed for business

aircraft sales each year, according to Daniel Hall, senior valuation consultant with data analytics firm Cirium. "While this is a valuable sector for the airframers - particularly the makers of high-end jets such as Airbus, Boeing, Bombardier, Dassault and Gulfstream - these sales are absorbed now thanks to the huge demand for business aircraft from international markets, particularly the USA," he says.

Hall's view is echoed by business aviation analyst Rolland Vincent. "The hot market is providing alternate demand for aircraft that were lined up to deliver to Russia," he says. In fact, he notes that manufacturers can sometimes benefit from a legal ban on selling aircraft to sanctioned customers.

"It is very welcome for OEMs given pressures to show revenues and earnings growth and today's stronger pricing environment the same plane gets sold twice.

and the second sale is at a higher price, although returning the deposit to the Russian customer is problematic," he savs.

There is also a challenge with redirecting jets destined for Russia that have already begun a completion process. "The larger the aircraft the bigger the challenge in redesigning the interior," says Vincent. "Customers in this part of the world tend to fit their aircraft to a very high specification."

The sanctions have made it impossible to service, support or even operate any aircraft with links to a Russian entity anywhere in the world

According to Cirium there are around 120 business aircraft registered in Russia, but Hall puts the total of Russian-owned and operated models worldwide at over 400 - around 2% of the active global fleet and 5% of the inventory of super-midsize to ultra-long-range

jets. These aircraft are largely found on the registers of Austria, Germany, Isle of Man, Luxembourg, Malta and San Marino and managed and operated by companies in more than 30 countries.

"Collateral damage around the OEMs includes such things as local sales agents and customer service representatives, approved repair stations, parts warehouses, and other OEM-sponsored support networks," says aviation consultant Brian Foley.

With Canadian, US and European airspace now closed to any Russian registered aircraft or non-Russian registered aircraft owned, chartered or otherwise controlled by a Russian legal or natural person. many owners and operators are focusing on non-sanctioned markets - notably the UAE. However, in the absence of OEM support, the continued operation of these aircraft remains in doubt.

) "I imagine there is already a healthy secondary market that has emerged inside Russia with respect to parts and - to a lesser extent services," says Vincent. "However, aircraft already in-market cannot go too long without parts and technical support.'

In general, if aircraft are not maintained or preserved, they will become non-airworthy. "Some probably have already," he suggests, and this will hit residual values. "Who is managing the maintenance log books? I don't know a broker who will go near one of these aircraft today - and that effect will linger on even if this war goes away soon," says Vincent.

For the European Business Aviation Association (EBAA), the absence of support and maintenance oversight on these sanctioned jets in a major concern. "If aircraft are not kept in an airworthy condition, the consequences are stark from a safety point-of-view," says EBAA chief operations officer Robert **Baltus**

He believes a handful of Russian-owned aircraft have been sanctioned and grounded in Europe alone to date. This includes a Bombardier Global 6500 believed to be used by Russian energy industry executive Eugene Shrivdler.

The Luxembourg-registered aircraft (LX-FLY) – operated by European management and charter company Global Jet Luxembourg landed at Farnborough Airport near London on 4 March, after a flight from New York.

The long-range jet's arrival came just a few hours after the UK government introduced new legislation making it a criminal offence to handle any aircraft that has any connection to Russia through registration or ownership, or even if chartered.

Describing aviation-related sanctions (including NOTAMS) as a legitimate tool "in the fight against the Russian invasion", the UK transport secretary Grant Shapps said the new legislation had been necessary to close loopholes that could have allowed aircraft under different national registrations to evade existing controls.

These restrictions - largely mirrored throughout Europe and North America - included a rule that all aircraft seized must be grounded with immediate effect. This order

was greeted with consternation by For many, the wide-ranging the industry, Baltus says. nature of the sanctions unfairly

"It was a knee-jerk reaction to the crisis and the consequences were not thought through," he suggests. "Leaving an aircraft untouched and exposed to the elements is unsafe. pointless and serves no purpose."

concerned industry groups secured permission from the European Commission and UK government to allow seized aircraft to be stored under a protection plan to keep them safe, free from corrosion and their engines turned as necessary," savs Baltus. "It is a small concession but an important one."

Aviation lawyer Aoife O'Sullivan agrees that knee-jerk legal actions by governments can end up having undesired effects. "Aviation is incredibly complicated, it's not like freezing a bank account," she says. "The asset needs to be looked after

O'Sullivan suggests that the farreaching nature of the sanctions and NOTAMS - sweeping up all Russian nationals whatever their links to the regime - and the harsh penalties imposed on the rule breakers make "this is a scary time for aviation lawyers".

She adds: "There is no grey area with these sanctions, no go-arounds and no tolerance of smart-arses. It is a criminal offence to breach the rules and ignorance of the law is no excuse. Perhaps not surprising some lawyers are not willing to give sanctions advice



tough response from the Wes



"This one size fit all approach

Steve Varsano, founder and chief

end business aircraft brokerage and

showroom. The Jet Business. "Many

of the people affected are not on

the sanctions list but are swept up

in the legislation simply by being a

passport," he adds. "Although the

market for used aircraft is really

hot right now, we cannot trade

sanctions are clear cut."

law firm Withersworldwide.

"I am uncomfortable and

descriptor 'Russian nationals

anywhere and in any context

is always individualisation not

generalisation. But the reality of

incredibly generalised in nature,

process and other rights of some

That said, these regulations

are fixed and immoveable, he

concedes, "so professionals in

wealthy Russian nationals." he notes.

which arguably violate the due

sanctions regimes is that they are

with these potential buyers. The

Russian national or having a Russian

Varsano's views are endorsed by

Paul Jebely, global head of asset

finance for London-headquartered

indeed unhappy using the blanket

because I believe that key to justice

penalise Russians who have little

or no connection with the country in general or the Putin regime in particular. is simply wrong," maintains The EBAA along with other executive of London-based high-

or it can be dangerous."

this industry should be under no delusion that things will return to normal anytime soon" Of course, the sanctions are not one-sided. Russia in retaliation introduced harsh restrictions on NATO and EU members and has closed its vast airspace to all aircraft registered in these countries

"This has impacted operators with clients based in Russia or with a Russian connection," says Glenn Hogben, chief executive of the Air Charter Association. But thankfully, he concedes, these restrictions have come at a time when demand is extremely high for private aviation and capacity is extremely limited. "so the majority of affected operators have been able to re-deploy their aircraft on other routes"

Typically, Russia accounts for a small percentage of global traffic says Hogben, IATA data from 2021

shows the country accounted for 1.3% of global movements, while international air traffic to and from Russia accounted for 5.7% of total European traffic, "The closure of this airspace has therefore had a relatively small impact on business aircraft operators overall," he says.

The shuttering of Russian airspace is however causing a headache for some western operators, notably on flights linking Europe and North America to Asia.

"These routings all create further issues in terms of added time, increased fuel costs, limited divert options and additional conflict zone risks [such as Afghanistan]," says Matthew Borie, chief intelligence officer and co-founder of aviation risk assessment company Osprey Flight Solutions.

Polar routes from western Europe are being used by some operators to avoid Russian airspace. "As a result of the increased time and distance, some routings to Asia may require a fuel stop at an airport such as Anchorage in Alaska, reminiscent of Cold War-era flights when the airspace over the Soviet Union was closed," he says. The current Russian airspace ban also mean diversion options are limited.

"Flights from London to Singapore, Tokyo and Shanghai for example are each longer in distance and time. This creates increased fuel costs, crew rest complexities [on commercial flights] and additional aircraft maintenance requirements," Rorie notes

While the conflict shows no signs of ending. Foley puts things in perspective for the business aviation industry. "This too shall pass. Business aviation has been through so many trials and tribulations over the years that this is just another day at the office " he says The outlook for the Russian

business aviation market, however is grim

"Regretfully, this is the end of the peace dividend in private aviation as it involves Russia and Russian nationals for years to come," says Jebely

He notes that while the country's private aviation market from an international perspective is "not guite dead", since aircraft have continued to operate domestically and within certain narrow flight corridors such as Russia to the UAF "it is firmly on death's doorstep".

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As Swiss group unveils new aftersales services arm, its chief executive explains why demand for the biggest business jets remains strong, and why investing in ACJ TwoTwenty is paying dividends



Murdo Morrison

Business aviation group Comlux has arrived at EBACE with another division under its wing. Comlux Tech, the latest sub-brand from the Swiss company, offers a range of aftersales services, including cockpit and cabin upgrades, base maintenance, pre-purchase aircraft inspections and sourcing flight crew, and complements Comlux's existing activities - aircraft management and charter, completions, and transactions - says chief executive Richard Gaona.

While Comlux has long provided maintenance, repair and overhaul at its Comlux Completion unit in Indianapolis, the firm has lacked the infrastructure to market it to its global client base, many of whom are based in Europe, the Middle East and Asia. To address this, Comlux announced at November's Dubai air show that it will open a maintenance and refurbishment hangar – with room for two Airbus ACJ or Boeing BBJ aircraft – at the city's Al Maktoum airport in late 2023.

The hangar, work on which will commence this year, will embrace a number of environmental features, including solar panels on the roof that will provide half the power for the air conditioning. It will also include offices and a showroom with visual representations of various Comlux interiors.

The Dubai site will also serve as a base for an Airbus ACJ TwoTwenty that Comlux will manage for luxury hotel operator Five. Comlux is seeking maintenance approval for the facility from Airbus and the United Arab Emirates authorities. The company was the launch customer for the variant and says it has customers for another two ACJ TwoTwenty jets it ordered when the variant was launched in October 2020. Gaona says he is considering ordering more.

Five's ACJTwoTwenty is being completed at Comlux Completion. Comlux took delivery of the aircraft - a VIP version of the A220-100, which began life as the Bombardier CSeries - at the end of last year and it will enter service with Five in early 2023. The ACJTwoTwenty is intended to compete with large cabin offerings from Bombardier, Dassault and Gulfstream and can transport 18 passengers for 12.5h non-stop.

Zurich-based Comlux has an agreement with Airbus to outfit the first 15 ACJ TwoTwenty cabins in Indianapolis. The second aircraft is due to arrive there in October this year, with number three following next April. After the first 15 examples, owners will have a choice between Comlux Completion and Airbus's own outfitting facility in France.

Comlux Tech will be run by the parent company's chief operating officer Andrea Zanetto, with Gaona saying the goal is to "develop further the synergies between Comlux Aviation operations, Comlux Transaction expertise and Comlux Completion know-how in VIP cabin engineering and craftsmanship". He tells FlightGlobal: "We already had a lot of these competencies, and Comlux Tech brings them together. Our plans are to grow this business." Comlux is unique in the world of business aviation charter in that it specialises in airliner-derived jets, with governments among its major customers. Although its managed fleet of 22 aircraft includes Bombardier Challengers, an Embraer Praetor 600, and a Pilatus PC-24, most of its conventional business aviation types are used exclusively or primarily by their owners. Its charter fleet includes a Boeing 777-200LR, 787-8 and 767-200ER, as well as two ACJ319s and an ACJ318.

For such a large operator, the company's model is also unusual in that it does not plan to own assets long-term. It frequently purchases aircraft with the intention of selling them to new owners. "I don't own any aircraft except for those I buy



on spec," says Gaona, a former Airbus executive who set up Comlux 15 years ago. "My aim is not to be an aircraft owner. Although I take the risk by ordering aircraft, I have never ended up with a plane delivered that I do not have a customer for."

The company's global footprint and ability to cater to different markets also gives it an edge, says Gaona. Its 777 and 787 are based in the USA, and its 767 in Dubai. One of its 737s, based in London, is fitted in an all-executive layout and is popular with traveling sports teams and performers. Its ACJ318 has its home in Clark in the Philippines. "A lot of customers are not prepared to pay for empty leg repositioning flights, so having aircraft on the doorstep is an advantage," says Gaona.

Covid-19 travel restrictions in much of the world impacted the Comlux charter business in the first half of 2021 much more than it did the more resilient market for smaller business jets, says Gaona. However, after July 2021, the lifting of many border closures saw demand for larger aircraft "rocket", and the second half of the year was as strong as the equivalent prepandemic period, he says. The first quarter of 2022 continued that trend.

Comlux is showing an ACJ318 that is for sale on the static display. However, Gaona plans to have an ACJ TwoTwenty on display at EBACE 2023. There is even an outside chance of the first aircraft making a brief appearance at the NBAA Business Aviation Convention and Exhibition in Orlando this October.



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Cirrus has had some

General aviation manufacturer continues to fly high with Vision Jet and SR range, but chief executive warns against headlong rush into charter market

Murdo Morrison

irrus may be one of the most successful brands in general aviation, with 528 aircraft delivered in 2021 and that total set to rise this year. However, chief executive Zean Nielsen is cautious about jumping too quickly into business aviation, despite a presence at this year's EBACE where it has an SR22 piston-single and single-engine SF50 G2 Vision Jet on static display.

"Our planes are built for a retail consumer," says Nielsen, who took the reins at the Chinese-owned airframer three years ago. "We have recently put wi-fi on the jet for instance. But there are a couple more product adaptations we want to make before we really get into this market. When we do get there we have very bullish expectations."

The former Tesla executive is also conscious that for Cirrus to be a significant player in the corporate and air taxi segments, it needs to invest in its service network. Catering largely to owner-flyers is a different proposition to supporting operations flying several dozen hours a week. "Before we dive head first into these markets, we want to make sure all the infrastructure is in place." he says.

There is perhaps another reason Nielsen is not pursuing the business sector too aggressively. He does not need to, for now at least. Cirrus deliveries have been rising for years - they dipped slightly in 2020 only because of a six-week shutdown to introduce Covid-safe protocols. "Demand continues to be strong. We don't have a demand issue. We have a capacity issue," he says.

All that is not to say that Cirrus does not have a significant Part 135 presence already. One of its newest customers is Florida air taxi startup Verijet, which took delivery of its first Vision Jet in September 2020 and now operates a fleet of 17 with more on order. The company operates in the South Eastern and Western USA and is planning an expansion to the Caribbean

Despite the failure of the nascent jet-based air taxi market championed by the likes of Eclipse Aerospace and DayJet - in the 2000s, Nielsen believes the seven seat Vision Jet could play a role in resurrecting the segment, as its performance makes it perfect for 500nm (926km) flights that are costlier in larger jets and will be out of the reach of electric vertical takeoff and landing platforms.

Cirrus is represented in Europe by five sales agents and a network of authorised training and service centres, although the company has just opened its own sales office in Valenciennes. France, and will establish a regional operations office in Rotterdam, the Netherlands in June

It comes as Nielsen looks to





increase Europe's share of Cirrus deliveries to 20-30%

The region accounted for 43 SR types and 11 Vision Jets in 2021, a more than 40% increase on the 2020 total, but only roughly a tenth of the 528 aircraft Cirrus shipped globally. "Europe is a very good market for us, but it could be a lot better," says Nielsen. He puts this down to a lack of infrastructure, more expensive fuel and insurance, and less of a GA culture.

"We have 5.000 small airports in the US where fuel is readily available," says Nielsen, who is himself Danish. "In Europe it's just more expensive to own an airplane There are a lot of airports you can't land in after dark. But the potential, wealth and desire are

all there. We want to help create that environment where owning an aircraft is more accessible."

Expanding Cirrus's "addressable market" is core to his philosophy. Despite Cirrus's growth over the past 25 years, the pool of private pilots is finite.

Rather than compete against other manufacturers, his aim is to increase the number of pilots by making training and flying simpler and more fun. "Most training dates from a different generation of aircraft. The whole syllabus needs to change," he says.

To help with this, Cirrus has in the past year set up its own flight schools, in Tennessee, Arizona, Texas and Florida, as a way of enticing would-be aviators into the brand.

t has already had considerable success in expanding the market. According to Nielsen, almost four in 10 Vision Jet orders are from owners who have never owned an aircraft.

Another new initiative - aimed at attracting would-be pilots who want to own an aircraft but have not obtained their licence - is "concierge service" VisionAir, so far available in and around Duluth, Knoxville, and Dallas. Cirrus manages the aircraft and flies to the customer's nearest airport when required. The owner can relax in the back, sit next to the pilot, or fly the aircraft under instruction.

In July last year, Cirrus unveiled the latest version of its Vision jet, the G2+, which comes with Gogo in-flight wi-fi and an improved version of the Williams International FJ33-5A engine. It also features Safe Return, Cirrus's version of the Garmin Autoland emergency selflanding system that won last year's prestigious Collier Trophy.

Safe Return, combined with the parachute system that is fitted to every Cirrus aircraft, allowing it to descend slowly in the event of an engine failure or pilot incapacitation, is "hugely important" to Cirrus's reputation for safety, says Nielsen. 'The spouse factor is also key," he notes. "Knowing that these features are on the aircraft plays a huge role in reducing any anxiety felt by loved ones.'

That 'insurance policy', which works so well in the owner-flyer segment, could be just as applicable to air taxi charter and other parts of the traditional business aviation market.

- Jeff McClean, Vice President Global Flight Operations, Procter & Gamble



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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



Michael Gerzanics San Jose

irrus Aircraft launched its ground-breaking, singleengined 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 airv 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 walkaround inspection of our preview aircraft. N275CM: a productionrepresentative G2+. There was little to visually differentiate this from the original variant, but keen eyes might notice the two broadband intennas 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) nstalled before the ailerons to mprove 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 BLEfree 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.

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Cirrus SF50 Vision Jet G2+ specifications						
Dimensions		Passenger cabin				
Length	9.3m	Length				
Height	3.3m Width					
Wingspan	11.7m	Height				
Wing area	18.18sq m	Cabin volume				
Weights**		Baggage stowage* C				
Maximum take-off weight	2,722kg	Performance				
Maximum landing weight	2,517kg	Take-off distance**				
Basic empty weight	1,610kg	Operating ceiling				
Useful load	1,112kg	Range***				
Usable fuel capacity	907ka	Maximum operating Mach s				

907kg	Maximum operating Mach speed	MC
205kg	Landing distance****	9

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 Pipe 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 voke-mounted autopilot (AP) disconnect switch will disengage Safe Return.

Safety first

the runway



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	
Notos: *Plus optional 011cb m/19kg **MTOW/S		

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

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 laver 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 takeoff 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 anding field.

Cleared for take-off, I advanced the TL to the full forward take-off (TO) detent. On the 24°C day TO oower 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

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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-

Conversation point

promised and over-delivered.

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 noisecancelling 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 | 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. Ladvanced 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

Eclipse 500 SF50 Vision Jet 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) 1.484r 920nn 1,125nn 2 x P&W Canada PW610 1 x P&W Canada PT6 nal EJ33 2.722kc 2.722ka Iseful load 1,112kg 1,089kg 1,089kg 973m 742m 803m ake-off distar 850m 810 nding distance 311kt 375kt 67kt 69kt 62k 31% 30% ng loading (kg/sg m) 150 203 \$2.98m \$2.85m

Cirrus SF50 Vision Jet G2+ versus competitors

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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 he 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 iet with docile handling qualities and a remarkable number of safety features. Increased takeoff 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 ives. 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+. 🕨

This article was originally published in Flight International's October 2021 issue

Christian Luwisch, executive director of NetJets Europe, opens up about the business's fleet expansion, the increasing appeal of shared ownership, and the impact of the pandemic

Fractional attraction



You have just added the 100th jet to your European fleet - a Textron Aviation Citation Latitude. What are the plans for further investment in your portfolio this year and how big will the fleet be by December?

We've seen increased demand across Europe in recent years and are dedicated to expanding our business across the continent. While 2021 started off slowly due to Covid-19 restrictions Net lets Europe ended the year with 39% more flights versus the same period of 2019, pre-pandemic. NetJets has the third-largest fleet in the world and in 2021 we committed a multi-billion-euro investment for more than 130 additional aircraft to join our global fleet before the end of 2022, with 55 aircraft introduced in 2021, with plans to add at least 75 aircraft in 2022.

> What is the fleet mix in terms \checkmark of types and segments, and how does it compare to the **US business?**

> > The North American fleet currently comprises 10 types of iet The European fleet continues to expand with the introduction of our 100th jet and currently comprises six different light. mid-size, large and long-range jets.

Describe the NetJets business in Europe? How does it split between shared ownership and other travel solutions, including jet cards?

There are three different types A There are unce and and of NetJets ownership options available across Europe. Net lets shared ownership. NetJets lease and private iet cards. We understand that every individual's needs are different and we strive to be as flexible and adaptable as possible.

The NetJets shared ownership programme is the optimal private aviation solution for personal or business iet travellers who fly 50 or more hours per year and prefer the benefits of owning the asset. Whereas the NetJets jet card is best suited for those who travel less than 50 hours a year or who want to try out the luxury and convenience of private jet travel. Then finally, the NetJets lease offers similar benefits to a NetJets share, with a different payment structure for those who do not want an initial capital outlay.

The market in Europe is quite Gragmented, with a handful of household names such as NetJets, but also many independent operators, and, when it comes to charter, brokers have a large influence. How do you set the NetJets brand apart?

Our fractional ownership 🕇 programme. long-standing reputation and leading industry expertise truly set the NetJets brand apart. We are proud of the strong personal relationships we build with our owners, which inspires them to pass down their NetJets

ownership through their families and businesses. In fact, fostering this level of loyalty has resulted in more than one third of our owners flying with us for 10 or more years.

NetJets owners are afforded the luxury of knowing their safety and travel needs are prioritised at the highest level. Whereas with private jet charter, for example, travellers have to trust that the charter operator will meet safety and travel expectations. Travellers are also at the mercy of the market and what's available at the time they wish to fly

How did the pandemic impact NetJets Europe, and how is the market looking today? What did Covid-19 change in the way your customers fly and do business?

Undoubtedly, Covid-19 changed the way our customers fly and do business. People and companies who owned their own jets before the pandemic may decide that they aren't now worth the expense and effort when they see the ease and value provided by fractional jet ownership

The volume of new prospect calls and website inquiries has consistently increased since flying became a possibility again. This is partly because of reduced commercial airline schedules and the fact that consumers are prioritising their health and safety. As of March 2021, we've experienced daily flight volumes greater than pre-pandemic levels and alongside this have seen the average age of owners, joining since the Covid-19 pandemic, lowering on average by five years compared with the pre-Covid period.

With a rival-beating range performance of up to 8,000nm, Gulfstream's G800 will also provide an exceptional passenger experience when deliveries start from next year



Jon Hemmerdinge

avannah airframer Gulfstream caught the aerospace industry by surprise last October when it rolled out the prototype of its newest ultralong-range business jet, the G800.

The company had somehow managed to assemble the first test aircraft in secret, and aside from a few rumours had managed to keep the programme's existence under wraps

Perhaps this should not have been so unexpected.

The G800 has long been a central component of a product development initiative Gulfstream set in motion with the G500 and G600 about a decade ago, says company president Mark Burns.

Gulfstream had always intended for the G500 and G600 to be firstborns in what was to be a larger family of modern, technologically similar business jets. Toward that end, the company followed the G500 and G600 with the G700, which it launched in October 2019 and remains in flight testing. Gulfstream is now rounding out

the family with two additional types:

the 19-passenger G800, and the smallest member of its large-cabin family, the 12-passenger G400. The airframer, a division of General Dynamics, launched both in October

2021. "When we announced [the] 500 and 600, we were actually working on all of these airplanes - the 400, 500, 600, 700, 800," says Burns. "What we've been doing for a decade now [is] developing this new family.

That family is now nearly complete. The G500 and G600 have long since entered service and Gulfstream plans to deliver the first

G700 this year, followed by first shipments of the G800 in 2023 and of the G400 in 2025.

The line-up gives Gulfstream an answer to every segment of the large-cabin market - "an aircraft for every mission", in Burns' words.

The Rolls-Royce Pearl 700-powered G800, with a list price of \$72.5 million, is not the largest of the family - that title goes to the G700. However, no other dedicated business jet can lay claim to the G800's range. The jet can cover 8,000nm (14,800km) when cruising at Mach 0.85, or 7,000nm at a highspeed M0.90 cruise



List price for the up to 19-seat G800, unveiled in major product expansion by Gulfstream in October 2021

That betters - although not by a great deal - the range of the G800's two prime competitors: Bombardier's Global 7500 and Dassault Aviation's in-development Falcon 10X.

The GE Aviation Passportpowered Global 7500 entered service in 2018 and can connect cities as distant as 7,700nm, according to the Canadian airframer. Bombardier also has on its books an undeveloped 7,900nm-range sister ship called the Global 8000, but the company has not moved that aircraft through development.

Future competition

Dassault's Falcon 10X, with R-R Pearl 10X turbofans, will surely be an admirable competitor, with a range of 7,500nm. But Dassault expects that jet will enter service in 2025, meaning the G800, assuming it keeps to schedule, will have a two-year head start.

Range titles are great for marketing departments and bragging rights. But aerospace analyst Brian Foley sees minimal operational differences between the three competitors.

"Each of the ultra-long-range competitors now offer relatively



of managing its debt load. Another analyst, Richard

positioned.

and G800.

Gulfstream

The G800 will have a maximum speed of M0.925. At its maximum take-off weight of 47,890kg (105,600lb), the jet will need 1,830m (6,000ft) of runway to get airborne. Its 8,000nm range means that "from New York, you can pretty much go anywhere in the world other than Australia", says Gulfstream senior vice-president of innovation, engineering and flight

Vicki Britt.

orders as well," he says.

Gulfstream introduced the G800 and G400 during an event in Savannah on 4 October 2021. The 4.200nm-range G400 joins the G500 and G600 family, while the G800 joins sister ship G700 in its ultra-long-range line-up. G700s and G800s are incredibly

currently has a full plate developing two jets (the Falcon 6X and 10X), and Bombardier faces the challenge Aboulafia, with AeroDynamic

Advisory, views Gulfstream as best

"Gulfstream will stay on top," he says. "They have the largest installed base and a strong position with two different price points with the G700

"They've got the best overall global brand, too," he says of

Burns says Gulfstream has landed G800 orders, but declines to say how many or to name its customers "When we announced [the] G800 and the 400, we saw not only 800 orders but a surge in 650 and 700

similar, sharing a fuselage cross section, 18,250lb (81,2kN)-thrust R-R Pearl engines and Gulfstream's Gulfstream G800 general arrangement

10m

Symmetry Flight Deck, which has 10 touchscreen displays. Like all Gulfstream's large-cabin jets, the G800 has active-control sidesticks (both sidesticks move in tandem, so each pilot feels the other's commands).

"We wanted to build a family of airplanes with significant commonality, so that we could

get efficiency out of building the airplane, but also efficiency out of supporting it for the next 40 years." Burns savs

While the G700 measures 33.5m from nose to tail, the G800 comes in about 3m shorter, measuring 30.4m - a trade off delivering the extra range. Burns views the G800 as a successor to the G650, which

Gulfstream G8(specifications	00
Dimensions	
Length	30.4m
Height	7.78m
Wingspan	31.39m
Cabin (L x W x H)*	14.27 x 2.49 x 1.91m
Accommodation	
Passengers (maximum)	19
Powerplant	
Engine (x2)	Rolls-Royce Pearl 700
Engine thrust (x2)	18,250lb
Performance	
Maximum take-off weight	47,890kg
Maximum zero fuel weight	27,442kg
Range (at Mach 0.85)	8,000nm
Maximum operating Mach speed	MO.925
Operating ceiling	51,000ft
Source: Gulfstream / *Excluding	g baggage compartment

the company plans to produce "for a few more years". That jet entered service in 2012.

Gulfstream has produced two G800s and says the programme is on track for deliveries starting in 2023. The jet has not yet taken fliaht.

Certification timeline

"We'll fly soon," says Burns, without specifying a timeline. "We are not that far away from being ready to fly. There's some laboratory stuff that we need to do."

He concedes that certification has become more time-consuming due to increased scrutiny by the US Federal Aviation Administration (FAA) in the wake of two Boeing 737 Max crashes. The FAA faced criticism over shortcomings exposed via the Boeing jet's original



) certification process and has since has stepped up diligence.

"They are more cautious," Burns says, adding that Gulfstream has needed to perform more laboratory tests. "It's laborious... it's just one of those things you have to do."

On the bright side, Britt says some G700 certification work should carry over to the G800.

"From a flight-test standpoint, because of the commonality with the 700, there are a lot of certification tests that we will not have to repeat," she says. "It's a much-reduced flight-test programme."

That is why Gulfstream will use just three G800 flight-test aircraft, including one jet dedicated to cabin evaluations. By comparison, the G700 programme involves seven test jets – six for flight testing and one for cabin tests, says Britt.

Gulfstream engineering manager Walter Dumas has no shortage of enthusiasm about the technologies beneath the skins of Gulfstream jets. That is a good quality for an employee with his job: Dumas oversees RDC III, Gulfstream's research and development facility near Savannah/Hilton Head International airport.

Once a cotton gin, Gulfstream bought the RDC III site early last decade and transformed it into a high-tech centre for integrating and testing aircraft systems. Those include the flight control system, active-feedback sidesticks and GEmade "data concentration network" (DCN), a hub linking major systems.

One morning in March, Dumas stood in the cavernous RDC III, ticking off acronyms for FlightGlobal.

"It houses all of our AAP aircraft labs, and our FLC ITF and systems integration bench," Dumas says. "This is where we cut our teeth on a brand-new technology."

AAP is Gulfstream shorthand for Advanced Aircraft Programs, meaning the G400, G500 and G600. FLC means Future Large Cabin - the G700 and G800 - while ITF stands for Integration Test Facility, a lab

same Savannah facility as G650s and G700s "When we announced [the] 500 and 600, we were actually working on all of these airplanes – the 400, 500, 600, 700, 800"

Mark Burns President, Gulfstream

where Gulfstream evaluates systems. Work inside RDC III broadly follows three stages, starting at a Systems Integration Bench, moving to an Integrated Test Facility and ending at an Iron Bird.

The Systems Integration Bench is where Gulfstream begins connecting various systems to the DCN. At first glance, it could be mistaken for any technology laboratory. But a closer look reveals that the lab's layout generally mirrors an actual aircraft – a theme found throughout RDC III. A simulated flightdeck sits at the head of the integrations lab; behind, extending back on each side, are benches for testing various systems.

Systems integration

"Equipment is essentially positioned roughly where it would be, on the left or right side of the airplane," says Dumas. "The systems integration bench is specifically designed... for integration of equipment to the DCN."

Gulfstream uses one bench to evaluate G400, G500 and G600 systems, and a second to validate those for the G700 and G800.

Dumas walks up a few steps to the next stop in RDC III - an integrated test facility. These stations provide a "full aircraft electrical representation", enabling technicians to evaluate how avionics, cabin systems, the DCN and other systems work together, he says. Each ITF has a fully representative aircraft cockpit linked to software that simulates characteristics specific to Gulfstream's different jets. Dumas steps inside one such cockpit, noting that all cockpit components – sidesticks, throttles, monitors, and so on – are production parts found on actual aircraft.

From the ITFs, Gulfstream takes integration testing one step further by using Iron Birds. These are physical structures shaped roughly like aircraft and equipped with actual aircraft mechanical components - flight controls, landing gears and hydraulic systems, for instance.

Standing under the wing of Gulfstream's G700/G800 Iron Bird, Dumas points up to four black actuators. Those, he says, place simulated aerodynamic loads on wing structures.

"We can put this airplane in any flight condition, and it truly is proving out and testing the flight control system," Dumas says. "We are putting the right amount of force on the surface."

Gulfstream has completed some 38,000h of G700 and G800 system tests inside its research centre.

"We can create conditions in the lab that we would never want to go fly - the very corner points of the envelope," says Britt. "It mitigates programme risk and provides a more-mature product."

Gulfstream assembles G800s in the same Savannah facility that







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houses G650 and G700 assembly. Director of operations technology and support Steve Ritchie says G800 production processes benefit from assembly advances Gulfstream made starting with its G650

Component designs

With that jet, Gulfstream transitioned to using more machined components and adopted more automation. It tweaked some component designs to allow for increased use of automated riveting, such that machines install about 36% of the G650's rivets, Ritchie says.

The airframer brought those processes to its G500 and G600, and now to its G400, G700 and G800.

G800s have composite and aluminium airframes, with composite horizontal stabilisers, pylons, engine nacelles and winglets, the company has said.

Aerostructures specialist GKN Aerospace is a partner, helping to produce empennages, floorboards and metal-bonded fuselage panels. GKN also produces such components for the G650 and G700.

Perhaps no aspect of a business jet is as important to customers as its cabin, which is why Gulfstream in 2020, opened a new cabin mock-up showroom in Savannah. This houses cabin demonstrators of both the G400 and G700, and a "materials experience area" where customers can see and touch optional cabin fabrics. The G700's cabin is so similar to the G800's that one can stand in for the other, says Gulfstream director of interior design Tray Crow. "In terms of interior architecture, it's exactly the same as the G700, just one less living area."

Gulfstream sources much of its leather from cattle in Northern Europe, where ranchers do not use barbed wire fences. "You get a higher-quality hide, with fewer scars," says Crow.

The company completes upholstery work for its large-cabin jets at a Savannah site. The aircraft undergo finishing at several of Gulfstream's US facilities.

Excluding its baggage compartment, the G800's cabin stretches almost 14.3m front to back - about 3m less than the G700's cabin.

Customers can choose from several cabin layouts; G800s can accommodate either four living areas, or three living areas plus a pilot rest compartment. The cabin has 16 windows, accommodates a maximum of 19 passengers, sleeps up to 10 people and has forward and aft lavatories.

Gulfstream pays attention to the smallest details, says Crow. For instance, the G700/G800's galley cabinet door opens up, toward the ceiling, leaving the galley unimpeded. Wine glasses inside the cabinet are lit by individual light bulbs - one over each.

"We've lit the wine glasses, so there's a little bit of sparkle," he says. "Just simple details."

The galley sink has a pop-up faucet and sits hidden beneath a removable counter-top lid, allowing for maximum usable counter space, Crow adds.



a removable counter-top lid



"From a flight-test standpoint, because of the commonality with the 700, there are a lot of certification tests that we will not have to repeat"

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

To help reduce cabin noise. Gulfstream has partnered with acoustics experts from General Dynamics' subsidiary Electric Boat.

They used "sound generation equipment" to simulate flight noise, then "measured the transmissivity" into the cabin, says Dumas.

Gulfstream made its cabin so impervious to outside noise that other subtle noises became apparent, Dumas says. "Now, it's the wine chiller fan that is your problem.

The G800's cockpit has the same advanced Honeywell Symmetry avionics as the G700. An enhanced flight vision system provides pilots with infrared images of the outside world, and a synthetic vision system shows computer-generated images. The jet has dual head-up displays that can present pilots

with combined vision - meaning a meshing of infrared and synthetic images into a single view.

Gulfstream jets also have a Predictive Landing Performance System which, during approach, determines where on the runway the aircraft will stop, warning pilots of possible overruns.

Gulfstream is bringing the G800 to market amid a period of unprecedented demand for private aircraft. The sector took a hit early during the Covid-19 pandemic but has since more than rebounded, with customers flocking to aircraft showrooms. Such demand has partly reflected a desire by wealthy buyers to avoid crowded passenger jets during a pandemic, analysts say. But it also aligns with broader economic trends that have seen surging demand for consumer

products across sectors.

Speaking in January, General Dynamics chief executive Phebe Novakovic described aircraft demand as "red hot in the fourth quarter" and stronger than "anything we had seen since 2008 with the introduction of the G650"

In 2021 alone, General Dynamics' aerospace backlog jumped 40% to \$16.3 billion. Other business jet manufacturers reported similar trends

Aboulafia estimates global demand for business jets in the \$70-million-plus category will ncrease in the coming years, varying between 84 and 96 aircraft annually later this decade. That is up from demand for 72 jets in 2021.

Wing shortages With the market booming, Gulfstream has been struggling to keep pace. In January, Novakovic said wing shortages will hinder the company's ability to deliver jets in 2022. As such, Gulfstream anticipates delivering 123 aircraft this year, just four more than in 2021.

Gulfstream in 2020 brought G650 wing work in house, acquiring the work from Triumph Group. The airframer also makes wings for G400s, G500s, G600s, G700s and G800s.

"Our ability to ramp up further in [2022] is limited by the wing supply issue," Novakovic says. "We will increase production in 2022, but not to where it needs to be"

Gulfstream is addressing the bottleneck by expanding its wing facility and acquiring more tools and fixtures, Novakovic says. "All of this is underway and will be in place to satisfy our needs for [2023] and beyond."

The company plans to hike deliveries to 148 jets in 2023 and 170 in 2024.

Burns frames the wing issue differently. He dismisses talk of a shortage, saying demand is simply so strong that Gulfstream needs time to ramp up.

"It's not a supply chain problem. It's not a manufacturing issue," he says. "The issue is, demand is so great." D

II range *nal* cuta availab For the full Internationa and prints a go to flightg

also powered a cross Due to enter service in *Flight* 's longest-range jet, capability reflected with its 2022 issue G800 is Gulfstream's and by Rolls-Royce Pearl engines. shares deck appeared G700 sibling, and is May the type flight Ś cutaway 8,000nm International section and industry in its name. next year, This The the its



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