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12<sup>th</sup> Annual Edition

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# BUSINESS JET TRAVELER

## 2021 BUYERS' GUIDE

12 Great New & Forthcoming  
Aircraft Models

**Aircraft Directory**

Financing Update

**Best New Cabin Tech  
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AVIATION**

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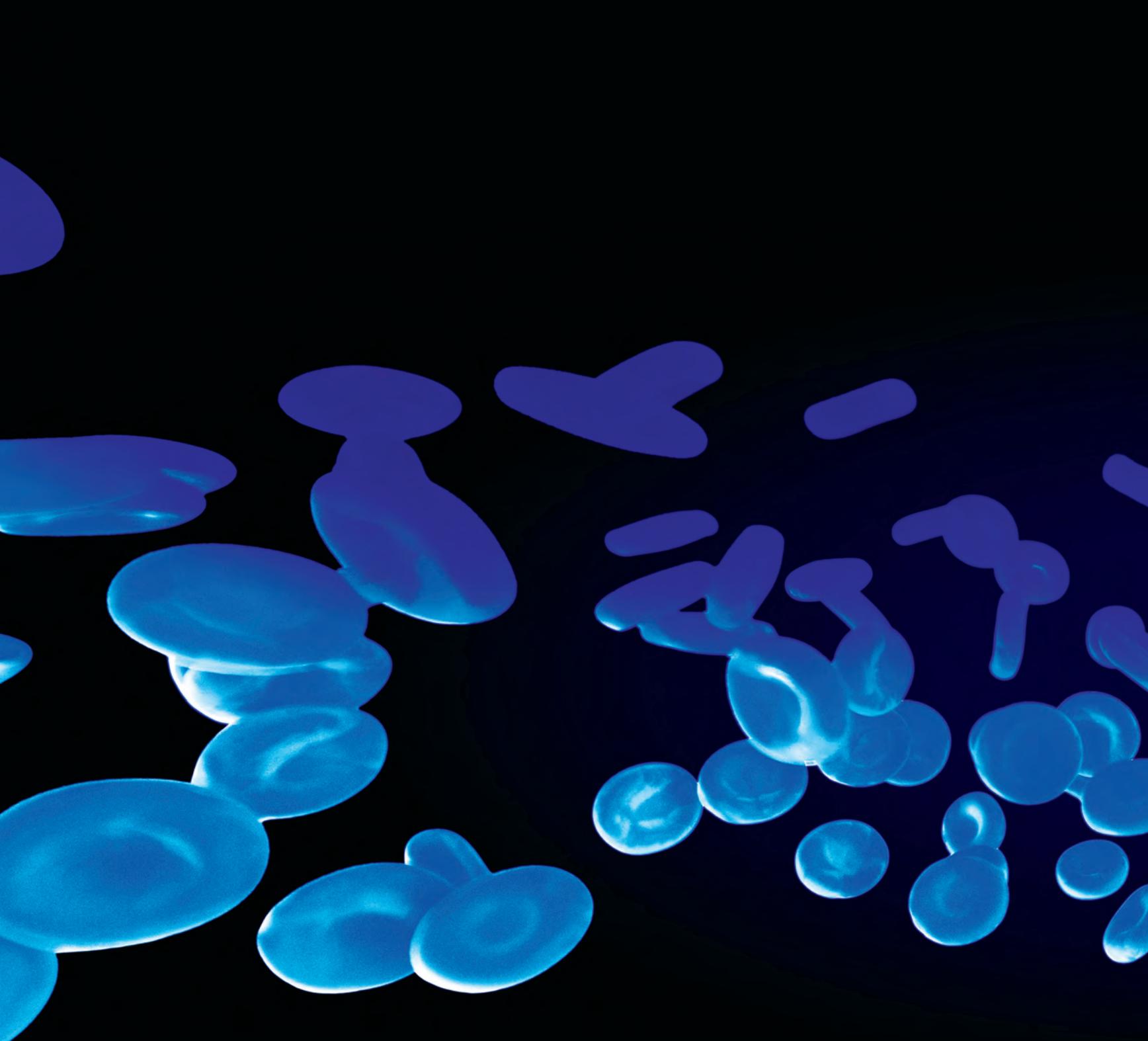
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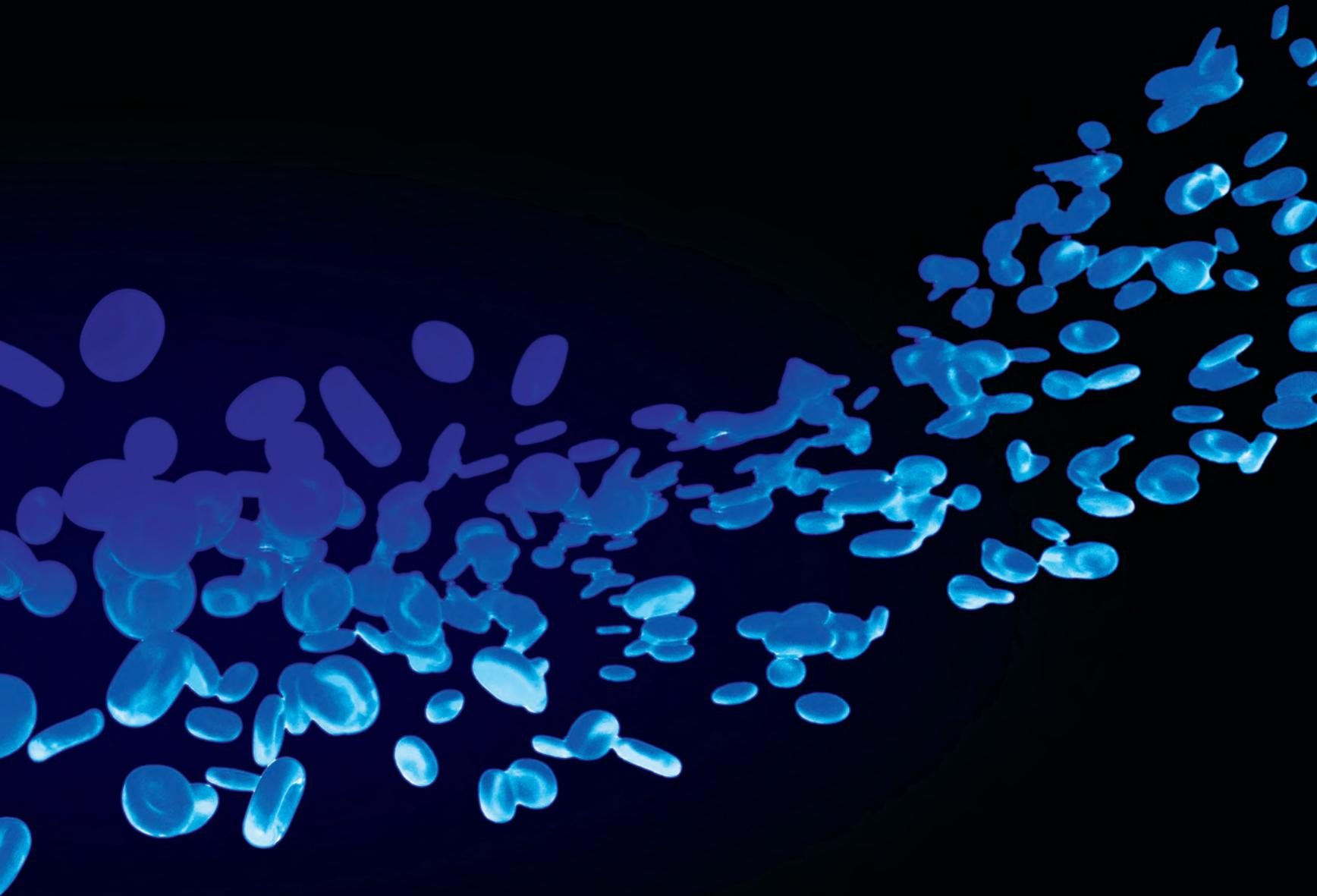
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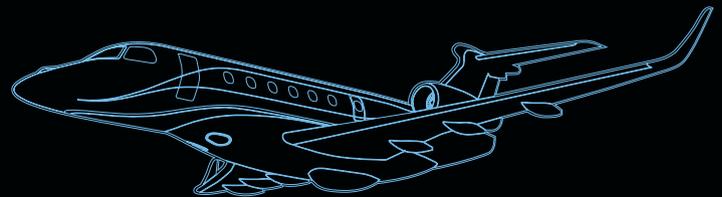


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# Up Front

**Business Jet Traveler's Buyers' Guide**—which we published annually from 2008 to 2018—is back by popular demand. In this 2021 edition, you'll find advice and information from some of our top writers (*see below*) that can help you make the best possible choices about flying privately.

In addition, this guide contains our comprehensive Aircraft Directory (*page 54*), which collects key data about all popular models of jets, turboprops, and rotorcraft. (Go to [BJTonline.com](http://BJTonline.com) for an interactive version of the guide that offers additional features.)

This issue also reports results of our 11th annual Readers' Choice survey (*page 20*). Thank you to all the subscribers who took the time to complete our poll. Your feedback sheds light on how you use business aviation, what you like and dislike, how the pandemic has affected your flying, and more.

No matter where you are in your business aviation journey, we have you covered with detailed guidance on how to charter an airplane, purchase

your own, or tap any of the options in between. Make sure you're subscribed to **BJT Waypoints**, our free twice-weekly e-newsletter, to ensure you're among the first to see all our latest content. **BJT Waypoints** also provides information about special events, webinars, and other reader offerings. We have some surprises up our sleeves for the rest of this year and 2022, and you won't want to miss any of them.



*Jennifer*  
Jennifer Leach English  
Editorial Director  
[jenglish@bjtonline.com](mailto:jenglish@bjtonline.com)

## Contributors to This Issue



### CURT EPSTEIN

Curt Epstein, a senior editor for **BJT** sister publication *Aviation International News*, writes about the FBO industry, aviation finance, the industry's climate-related initiatives, and aviation accidents. Here, he highlights the findings from *AIN's* latest annual FBO survey (*page 50*), which polls a select subset of its readership—those who can evaluate the operations most knowledgeably—including pilots, flight schedulers, and dispatchers. It's a great reference for the next time you're deciding where to park your airplane.



### MARK HUBER

If you're researching which aircraft would be the best choice for you, one of the best places to start is with the vast collection of detailed reviews (all at [BJTonline.com](http://BJTonline.com)) by Mark Huber, who has written for the magazine since 2005. His unbiased analysis, experience as a pilot, and lifelong passion for aircraft of all kinds provide rare understanding of what makes a particular jet, turboprop, or helicopter worth investing in—or not. In this issue, he highlights 12 new and upcoming models that will make you swoon (*page 6*).



### JEFF WIEAND

Jeff Wieand's Taxes, Laws, and Finance columns consistently win awards, and it's easy to see why. His stories in this issue on business jet financing (*page 42*) and technical acceptance of an aircraft (*page 16*) offer a taste of the expertise you'll find in his features on [BJTonline.com](http://BJTonline.com), where he provides advice on everything from bonus depreciation to writing off your catering bill. Wieand—whose work has appeared in virtually every issue of **BJT** since we began publishing in 2003—serves as senior vice president at Boston JetSearch and is a member of the National Business Aviation Association's Tax Committee.



### JAMES WYNBRANDT

James Wynbrandt is a multi-engine instrument-rated pilot and longtime **BJT** contributor whose award-winning, in-depth features have covered everything from business aviation's response to climate change to the impact of the pandemic on the industry. Wynbrandt—who has also written for such publications as the *New York Times*, *Forbes*, and *Barron's*—reports here on the latest offerings from charter, jet card, flight club, and fractional providers (*page 36*). He also shines a light on seven new products that are transforming the onboard experience (*page 46*).

## EDITORIAL

**Editor-in-Chief** Matt Thurber

**Editorial Director** Jennifer Leach English

**Editor** Jeff Burger

**Production Editor** Martha Jercinovich

**Art Director** John A. Manfredi

**Contributors** Chris Allsop, Mark Eveleigh, Margie Goldsmith, Mark Huber, Marilyn Jones, Debi Lander, Thomas R. Pero, Gemma Z. Price, Kim Rosenlof, Helen Ann Travis, Jeff Wieand, James Wynbrandt

**Graphic Designer** Grzegorz Rzekos

**Digital Solutions Manager** Michael Giaimo

**Developer** Ryan Koch

**Director of Video** Ian Whelan

### EDITORIAL CONTACTS

214 Franklin Ave., Midland Park, NJ 07432  
(201) 444-5075 • [editor@bjtonline.com](mailto:editor@bjtonline.com)

## BUSINESS

**Founder & CEO** Wilson S. Leach

**Chief Operating Officer** Dave Leach

**Vice President Sales & Marketing** Karl H. Elken

**Associate Publisher** Nancy O'Brien

Melissa Murphy—Midwestern U.S. (830) 608-9888

Nancy O'Brien—Western U.S./Western Canada/  
Asia Pacific (530) 241-3534

Joe Rosone—Mid-Atlantic U.S./Southeastern U.S./  
Caribbean/Brazil (301) 693-4687

Diana Scogna—Europe/Middle East (33) 6 62 52 25 47

Victoria Tod—Northeastern U.S./Eastern Canada/  
Great Lakes, U.S./United Kingdom (203) 733-4184

**Audience Development Manager** Nicole Bowman

**Marketing & Client Services Manager**

Lisa Valladares

**Sales and Marketing Coordinator:** Adam Brandwein

**Social Media Marketing** Zach O'Brien

**Sales Administrator** Cindy Nesline

**Director of Finance & Human Resources**

Michele Hubert

**Accounts Payable** Mary Avella

**Accounts Receivable** Bobbie Bing

**Advertising Inquiries**

(201) 345-0085, [adsales@bjtonline.com](mailto:adsales@bjtonline.com)

**Circulation/Subscription Inquiries**

(201) 345-0085, [subscriptions@bjtonline.com](mailto:subscriptions@bjtonline.com)



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# New & Upcoming Business Aircraft



BOMBARDIER  
GLOBAL 7500

Here's a look at a dozen noteworthy models, including some you can buy now and some that will debut soon.

by Mark Huber

Business aviation is roaring back from the pandemic. Fractional ownership companies, including market leader NetJets, are reporting record-high flight activity. The used market has been described as a “feeding frenzy” by Jason Zilberbrand, president of the aircraft valuation service Vref. And major airframers such as Bombardier, Gulfstream, and Textron are all racking up strong sales. On recent investor conference calls, the CEOs of these companies spoke effusively about market conditions.

“I must confess that we also beat our own expectations rather handsomely,” said Phebe Novakovic, chairman and CEO of Gulfstream parent General Dynamics. “More people are looking to acquire aircraft than we’ve seen in quite some time,” observed Textron CEO Scott Donnelly. Bombardier, which divested itself of everything except its business jet unit over the last two years, witnessed “growth in business jet revenues, margin expansion, and significantly improved cash performance” in 2021’s first quarter, according to CEO Eric Martel.

As business aviation climbs back to normal, no shortage of choices awaits aircraft buyers. Here’s a look at a half dozen of the most noteworthy jets, turboprops, and helicopters that are relatively new to the market as well as an equal number that should become available over the next few years.

## NEW TO MARKET

### BOMBARDIER GLOBAL 7500

Type: large-cabin, long-range jet | Passengers: 14  
Range: 7,700 nm (8 passengers) | Price: \$75 million

The Bombardier Global 7500 uses the same fuselage cross section as its legacy predecessors (six feet, three inches tall and eight feet, two inches wide) but stretches it by 11 feet to provide 2,637 cubic feet of cabin space. Virtually everything else about the aircraft is new, including the larger cabin windows and proprietary Nuage passenger seats.

Also new are the GE Aviation Passport engines, which are based on the guts of the high-efficiency CFM Leap models running in the latest-generation Airbuses and Boeings. Among the technologies incorporated into the engines is a 52-inch titanium “blist,” a single forging of the fan blades and disk that saves weight and reduces vibration.

The 7500 also features full fly-by-wire flight controls; a new, thin, high-speed wing; and the Bombardier Global Vision flight deck. The latter is based on Collins Pro Line Fusion avionics, with side-stick pilot controls and the latest displays and safety features. Top speed is Mach 0.925.

The hyper-quiet cabin can be divided into three or four zones. You can equip the forward galley with multiple ovens, including a double convection/microwave and a convection/steam model. The redesigned crew rest area is larger than the ones on earlier models. The aft lav can be fitted with a steam shower, and you can access the capacious 195-cubic-foot baggage hold from the cabin at any altitude. The 7500 comes standard with Bombardier’s Wave satcom (the Honeywell JetWave system that runs on Inmarsat’s Ka-band satellite network).

### CESSNA CITATION LONGITUDE

Type: super-midsize jet | Passengers: 8–12  
Range: 3,500 nm (4 passengers) | Price: \$26.9 million

Cessna’s long-awaited entrant into the crowded super-midsize derby received FAA type certification in September 2020. Textron Aviation is positioning the Longitude as a superior value proposition regarding both acquisition and life cycle—a main reason it eschews expensive systems like full fly-by-wire flight controls. (It has limited fly by wire for the rudder, spoilers, and brakes (“brake by wire”).

The Longitude features the Garmin G5000 flat-panel touchscreen-control avionics system (similar

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## New & Upcoming Business Aircraft



to the avionics in the new midsize Citation Latitude) with optional head-up display and enhanced vision system, a fast cruise speed of 483 knots, and a full-fuel payload of 1,600 pounds. The aircraft will be equipped with the LinxUs system to provide real-time maintenance monitoring and solutions, including when it is airborne. It also has more user-friendly maintenance access ports than past models.

The aircraft shares the midsize Citation Latitude's flat-floor cabin cross section—six feet tall and more than six feet wide—making it the narrowest in class. A variety of configurations will be available for the 25-foot-long cabin, with passenger seating for up to 12, although eight to nine will be typical; a full forward galley; and an aft lav with vacuum flushing toilet. The 112-cubic-foot baggage compartment will be accessible in flight.

The stock galley features a sink with potable water, plus ice drawers and ample stowage; but items such as convection and microwave ovens are extra-cost options. Natural light throughout the cabin comes from 14 large windows. A wireless cabin-management system that controls the LED lighting also delivers a menu of information/entertainment choices, such as SiriusXM and moving maps. You can operate the system via onboard touchscreens, controllers, or smart devices (with a downloaded app). Gogo Avance L5 connectivity is standard.



### HONDAJET ELITE S

Type: light jet | Passengers: 5–6  
Range: 1,432 nm | Price: \$5.4 million

The latest upgraded HondaJet, the Elite S, was announced in May. It offers a 200-pound increase in maximum takeoff weight, flight deck improvements, better nosewheel steering, and more available paint colors. The weight increase allows you to carry one extra passenger or stretch the aircraft's range by 120 nautical miles.

In the flight deck, new avionics features reduce pilot workload and get you to your destination faster and safer in the form of FAA data comm and aircraft communications, addressing, and reporting system (ACARS) capabilities added to the Garmin G3000 avionics suite. Data comm allows

pilots to basically text message air traffic controllers for clearances or en route services—a handy option to have in crowded airspace or congested airports where the radio frequencies can become so busy that you can wait a long time to get a word in. ACARS at supported airports enables digital receipt of airport information, weather, departure clearances, flight plan uploading, messaging, and automatic position reporting.

A new nosewheel advanced steering augmentation system reduces pilot workload, according to Honda, by helping to keep the aircraft on the runway centerline during the landing rollout, particularly during adverse weather. Think strong crosswinds in rain, ice, or snow. The system uses new control logic in the nosewheel steering to detect yaw rate—that uncomfortable side-to-side or fishtailing motion—and automatically correct for it.

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## New & Upcoming Business Aircraft



### BEECHCRAFT KING AIR 360/360ER

Type: twin turboprop | Passengers: 9-10/13-14  
Range: 1,806/2,692 nm | Price: \$7.9/\$8.795 million

Deliveries began late last year of the most recent iteration of Textron Aviation's big turboprop—both the standard and extended-range (ER) versions. Improvements include autothrottles, a digital pressurization system, and a redesigned cabin. The ThrustSense autothrottles from Innovative Solutions & Support reduce pilot workload by managing engine power from takeoff to landing, while the digital pressurization system automatically adjusts cabin pressurization during climb and descent. Cabin altitude is now a comfortable 5,960 feet while the 360 cruises at 27,000 feet.

The redesigned cabin comes in five new color schemes: lava saddle, new pewter, latte, buttercream, and alpaca. It features new seats; more refined cabinetry, partitions, and side ledges; higher worktables; LED lighting; lower-profile air and light components; new switches; and power outlets and USB charging stations. The cabin measures 57 inches tall, 54 inches wide, and 19 feet, six inches long, and while you can configure it for more passengers, it comfortably seats eight in its executive layout.



### DAHER TBM 940

Type: single turboprop | Passengers: 4-5  
Range: 1,730 nm | Price: \$4.37 million

The TBM 940 offers 300-plus-knot cruise speed while burning just 50 gallons of fuel per hour. The manufacturer continues to add refinements and capabilities to this fast, pressurized single-engine turboprop, whose production roots date back to the 1980s.

Since last year, the aircraft has come standard with the HomeSafe one-button emergency landing system. Based on the Garmin Autoland technology, the system automatically guides the aircraft to a safe landing in the event of pilot incapacitation by integrating weather, traffic, terrain, fuel, range, and airport information. An autothrottle system and automatic deicing are also standard. The deice provides airframe, propeller, and windshield deicing and triggers the inertial particle separator to prevent engine icing.

As most TBMs are operated single-pilot, Daher's e-copilot technology, available on the earlier TBM 930 and the current-production 910, employs guardrails built into the Garmin autopilot to maintain flight within the aircraft's design envelope, using pitch and bank-angle inputs to protect against excessive bank angles, speed departures, and hypoxia

incapacitation; when cabin altitude exceeds 11,500 feet, the emergency descent mode automatically activates.

Beginning last year, TBM models have been available with a choice of colors, leathers, and other materials; an optional extended palette offers 40 more colors. The interiors have additional cupholders and a quick-change storage unit that replaces the left-side intermediate seat to offer more space for carry-on items.

### AIRBUS H160

Type: medium twin turbine helicopter | Passengers: 4-8  
(executive) Range: 475 nm | Price: \$14 million

The Airbus Helicopters H160 introduces a variety of technologies, including "Blue Edge" active tracking main rotor blades in a five-blade system with a double sweep design that reduces noise and improves ride smoothness. The canted Fenestron tailrotor further decreases the H160's noise signature. The Fenestron and the biplane horizontal stabilizer on the tailboom also combine to improve lift.

New Safran Arrano engines offer 10 to 15 percent improved fuel consumption. The engines (1,300 shaft horsepower each) are designed to cut fuel consumption in all phases of flight and help propel the H160

**3**

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## New & Upcoming Business Aircraft

to a maximum cruise speed of 150 knots and a service ceiling of 20,000 feet. Airbus Helicopters maintains that the Arranos will have lower maintenance costs than other engines in their class.

The Helionix avionics system, with four large displays, uses architecture that's already flying on other Airbus twins, including the H135, H145, and H175. The avionics couple to a four-axis autopilot. Other advanced avionics features include traffic and weather advisories, terrain avoidance, and a synthetic-vision system. Airbus decided to skip a pricey fly-by-wire flight-control system and to make rotor-blade deicing an option.

COMING SOON

### DASSAULT FALCON 10X

Type: large-cabin, long-range jet | Passengers: 12-18  
Range: 7,500 nm | Price: \$75 million

Dassault expects the 7,500-nautical-mile (at Mach 0.85) Falcon 10X to enter service in 2025. The twinjet pushes the design envelope not just in terms of size but also design and technology.

Dassault says the 10X will feature the most advanced avionics and the tallest and widest cabin in its class, and it calls the model “the largest and most capable purpose-built business jet.” Compared with offerings from its bizjet peer group, the cabin of the 10X will be at least eight inches wider and five inches taller. It's six feet,



eight inches tall; nine feet, one inch wide; and 53 feet, 10 inches long, yielding 2,780 cubic feet of cabin space. The larger tube also accommodates a more capacious forward lav and a galley big enough for scratch cooking. Humidity levels can be set, and a new air filtration system delivers what the airframer says is “100 percent pure air.” Cabin altitude at 41,000 feet is just 3,000 feet.

The 10X features a new, all-carbon fiber, highly swept wing with integrated winglets and a clever flap and leading-edge slat design, as well as a pair of Rolls-Royce Pearl engines bolted onto the back. The Pearls deliver more than 18,000 pounds of thrust each and incorporate new design features that make them cleaner and more efficient.

Up front, the digital touchscreen “next-generation” flight deck—based on the Honeywell Primus Epic system—features full fly-by-wire controls, automatic flight envelope, and “recovery” protections. It also offers the “FalconEye” system, which combines enhanced and synthetic vision and a dual head-up display that allows either pilot to fly—and land—without referencing the instrument panel, a particularly useful thing to have when visibility is limited. The flight deck is also extremely comfortable, allowing the pilots to take turns completely reclining their seats to the near-lie-flat position for rest during the cruise portion of long flights.

### GULFSTREAM G700

Type: large-cabin, long-range jet | Passengers: 13-19  
Range: 7,500 nm | Price: \$75 million

Gulfstream unveiled its new G700 flagship in 2019 and expects it to enter service in 2022. Five test aircraft are already flying.

The G700 builds on the success of its G650 and G650ER predecessors. Its long legs, increased capabilities, and comfort are derived from engines, curved winglets, avionics, flight controls, a flight deck, a cabin, and seating employed by its smaller G500 and G600 stablemates.

Like the cabins in the G650 series, the one in the G700 provides a sanctuary of understated elegance. The new cabin is 10 feet longer, though, for a total length of nearly 57 feet—a mere three feet shorter than a regulation bowling lane—and can be carved into as many as five distinct living zones that can be configured to seat from 13 to 19. (On the really long hauls, you can take only eight passengers and four crew.)

While the G700 offers many cabin layouts and seemingly endless finer details, what makes it a true lux long-hauler is the available “Grand Suite” in the aft fuselage. It can be equipped with a curved-edge, queen-size bed opposite a full-size dresser. The adjacent aft lav features two windows, a stand-up closet, a large vanity, and an optional stand-up shower. The lav also provides



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## New & Upcoming Business Aircraft

GULFSTREAM  
G700



in-flight access to the pressurized, 195-cubic-foot baggage hold, which can convey 2,500 pounds.

Gulfstream has also addressed the historical bugaboo of bizjet cabins: seat comfort. While the seats on the G650 are more than adequate, the airframer has enhanced the ones on the G700 to cope with passenger ergonomics on long flights with new styling, articulating back panels, recessed controls, accent lighting, and a menu of cover fabrics, materials, and pattern choices. The G700 seats won a 2020 design award from the Yacht Interior Society.

Power comes from a pair of Rolls-Royce Pearl 700 engines that each deliver 18,250 pounds of thrust. The Pearls are improved derivatives of the BR725 engines on the G650 series and are cleaner and more efficient. They provide 8 percent more thrust while consuming 3.5 percent less fuel and

meet or exceed international standards for noise and nitrous-oxide emissions.

### DASSAULT FALCON 6X

Type: large-cabin jet | Passengers: 16  
Range: 5,500 nm | Price: \$47 million

Dassault's large-cabin Falcon 6X could be delivered starting as early as next year. Test aircraft are already flying. The 6X is powered by a pair of Pratt & Whitney PW812D engines (13,500 pounds of thrust each) and features the latest version of the Honeywell Epic-based EASy III avionics with full digital fly-by-wire flight controls.

The new wing is designed to mitigate turbulence and is equipped with flaperons, leading-edge slats, and trailing-edge flaps. The flaperons save weight,

improve control, and smooth out turbulence by combining flaps and ailerons into a single control surface: flaps deploy to increase lift at low speeds while ailerons regulate bank and roll. The new wing provides good high- and low-speed performance; its leading-edge slats and trailing-edge flaps combine to lower takeoff and approach speeds—up to 10 knots slower than those of comparable bizjets. At maximum takeoff weight, the Falcon needs a balanced field length of as little as 5,480 feet. It can also access airports requiring steep approaches such as London City.

Like the 10X, the 6X will offer a capacious passenger experience, albeit with slightly smaller dimensions, with a cabin that measures 78 inches tall, 102 inches wide, and 40.4 feet long. The cabin can accommodate up to 16 passengers in three lounge areas. Compared with earlier Falcons, the 6X's aisle is five inches wider. Baggage is accommodated in a 155-cubic-foot compartment inside the pressurized vessel, and there's also a 76-cubic-foot unpressurized compartment.

### BEECHCRAFT DENALI

Type: turboprop single | Passengers: 6-10  
Range: 1,600 nm | Price: \$4.8 million

The Beechcraft Denali is Textron Aviation's answer to Pilatus's phenomenally successful PC-12. The aircraft features a 53-by-59-inch rear cargo door (slightly larger than the door on the PC-12) and a digital pressurization system that maintains a 6,130-foot cabin altitude to 31,000 feet. Options

CONTINUES ON PAGE 18

DASSAULT  
FALCON 6X



BEECHCRAFT  
DENALI



# THE MOD

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# A Crucial Document for Airplane Buyers

‘Technical acceptance’ is like getting engaged—  
not a final step but still important.

*by Jeff Wieand*

Most jet purchases involve delivery of a “technical acceptance certificate.” The word “technical” suggests that the aircraft isn’t really accepted, which may be why aviation attorneys dream up alternate (and even more prosaic) names for the same thing, like “post-inspection notice.” An aircraft technical acceptance is more like getting engaged than getting married; the real “acceptance” of the aircraft takes place at closing, when the buyer hands the

seller a “delivery receipt,” takes title, and assumes the risks that go with ownership.

Still, delivery of a technical acceptance certificate is an important step and is generally required after completion of the buyer’s pre-purchase (or in the case of a factory-new aircraft, pre-delivery) inspection. If technical acceptance is like an engagement, the prebuy inspection is like a courtship. With the inspection finished, the purchaser has effectively

completed due diligence and must decide whether to proceed with the acquisition.

That’s where the technical acceptance certificate comes in. It usually offers three choices, and the buyer makes a selection by checking one of three boxes.

By checking the first box, the buyer can accept the aircraft “as is” and without asking the seller to fix anything or remedy any “discrepancies” between the current state of the aircraft and the condition in which



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**ACCORDING TO SEVERAL MEDIA SOURCES, THE AIR CHARTER INDUSTRY SAW A MARKED INCREASE IN THE NUMBER OF PASSENGERS WHO FLEW PRIVATELY FOR THE FIRST TIME FROM MID-2020 THROUGH 2021 DUE TO CONCERNS SURROUNDING THE COVID-19 PANDEMIC. ONE U.S.-BASED CHARTER COMPANY WITNESSED A YEAR-OVER-YEAR INCREASE OF 125 PERCENT IN BOOKINGS IN JUNE 2020 VERSUS JUNE 2019.**

The ability to social distance and reduce incidental contact by using private aviation remains a high safety priority even as COVID vaccinations become more available. Business jet activity was reportedly 30 percent higher in the first two weeks of July 2021 than in the same period in pre-pandemic 2019. So many new customers have flocked to the air charter industry that the largest jet charter operator, NetJets, temporarily paused sales of fractional shares, leases, and jet cards for two of its most popular aircraft models and put prospective light jet customers on a waitlist in July 2021.

Sales of new and used aircraft also spiked during the pandemic as some individuals and companies became airplane owners for the first time. According to the General

Aviation Manufacturers Association, sales of new piston and turboprop aircraft increased 7.3 and 18.3 percent, respectively, in the first quarter of 2021 compared with the same period in the previous year. While new business jets didn't see a similar jump in deliveries, used business jet sales were reportedly up 36 percent in the first four months of 2021 versus the same period in 2020.

If you're new to business aviation, you may have a lot of questions about how the industry works. And some of those questions may center on the one or two people at the front of the aircraft whose job it is to fly you from one airport to another. You may now be making decisions that affect your pilots' proficiency—or your own if you're the aircraft owner/operator—such as how and

where your pilots receive recurrent training.

One choice you can make is to go (or send your pilots) to FlightSafety International for training in its FAA-certified Level D full-motion simulators. Founded in 1951, the company now delivers more than 1.7 million hours of training each year to customers nearly 170 countries, with approximately 700,000 of those hours conducted in simulators and the rest in classrooms or with other training devices. Designing and building its simulators in-house since 1962, FlightSafety operates more than 300 of them at more than 30 locations worldwide (not including nearly 30 military locations), offering initial and recurrent training courses for more than 130 aircraft models, from twin-engine turboprops to business jets and helicopters.

**AT FLIGHTSAFETY, WE'RE HERE TO ENSURE THAT YOU AND YOUR PILOTS OPERATE TO THE HIGHEST LEVEL OF SAFETY. THIS MEANS MORE THAN MEETING A PROFICIENCY THRESHOLD ESTABLISHED IN THE REGULATIONS, OUR TRAINING ENSURES THEY ARE PREPARED TO MANAGE ABNORMAL SITUATIONS, AND THEREFORE YOUR SAFETY WITH TOTAL CONFIDENCE.**

**Here are answers from our top executives to some questions you may be asking about recurrent flight training.**

**If I or my corporate flight department manager have hired competent pilots, why do I need to send them to recurrent training?**

**Brad Thress:** Flying is a perishable skill, and pilots require training and repetition to stay proficient and at peak readiness. The FAA requires general aviation pilots to complete a flight review every 24 months, and pilots of certain type-rated or jet-powered aircraft to pass written and in-flight competency checks every 12 months. Some insurance companies may require recurrent training more often for larger aircraft or higher-risk operations. But beyond the regulatory and insurance requirements, there are human factors and safety reasons for pilots to receive training as often as practical.

Day-to-day flight operations tend to become repetitive and routine. What we train for are the special circumstances when the flight suddenly becomes non-routine. If your pilots haven't trained for those circumstances in quite a while, they can lose precious seconds in an emergency.

There are many ways to comply with the regulation: train in the airplane for a couple of hours, go with a simulator company that trains to the minimum regulatory standard in a couple of days, or train with us. We consider ourselves the gold standard

in business aviation. Since our primary objective is to enhance safety, our curriculum goes above and beyond the minimum regulatory standards. We provide pilots with realistic scenarios to better prepare them for those non-routine circumstances when their airmanship and skillsets get challenged.

**Richard Meikle:** A good professional is always learning. Our view is that you or your pilots want to come to training to enhance your safety performance, and we'll satisfy the regulatory process along the way.

One of the differentiators between us and other simulator training companies is that we identify safety issues impacting the aviation community and spotlight them in the training. For example, runway overruns (the aircraft failing to stop before the end of the runway) are a significant industry problem, but there's a simple countermeasure for them: deliver the airplane at the right speed and altitude to control your touchdown points. Spotlight training does exactly as the name would suggest, it puts an intense illumination on specific aspects of operating the aircraft. We're not always adding new items to the curriculum, instead we emphasize different items in each training cycle such as precision delivery on every landing to reduce runway overruns and enhance safety.

## MEET FlightSafety EXECUTIVES



### **Brad Thress, President and CEO**

Brad joined FlightSafety International as president and CEO in February 2020. He was previously with Textron Aviation where he held several leadership roles within many business areas including engineering, flight operations and customer service. Brad earned a Bachelor of Engineering degree from the University of Tennessee and an MBA from Baker University.



### **D. Richard Meikle Executive Vice President Safety and Regulatory Compliance**

Richard joined FlightSafety International as executive vice president, safety and regulatory compliance in March 2020 after 25 years at NetJets Aviation. Richard flew in corporate, regional airline and fractional aircraft ownership operations and is type-rated in a wide variety of business and commercial aircraft. He holds a U.S. airline transport pilot license, and an Australian commercial pilot certificate with instrument and multi-engine instructor ratings. Richard earned a Master of Science degree from Embry-Riddle Aeronautical University with a minor in safety program management and serves as an adjunct associate professor for the university.

**Thress:** We'll also take aggregated FOQA (flight operational quality assurance) data—or your own fleet or aircraft FOQA data if you share it with us—and we'll customize spotlights to match where your flight performance shows that you or your pilots could use some help.

Working with you, our customer, we can produce all sorts of scenarios that are subtly different, but fundamentally the same in terms of the learning point that we're trying to achieve, such as the precision delivery, loss of control, night vision goggles for helicopter operators, or operations to black holes [unlit airfields]. Maybe a particular company or aircraft owner wants to go into a dark, unlit region because that's where their private airport is located. We can build the visuals for that private airport so you or your pilots can practice takeoffs and landings there as part of the curriculum.

**Meikle:** And we can vary the scenarios enough that if you have 10 pilots going through training in succession, even if the first crew talks, the following crews won't have "the answers to the test" before they get there. We want the variation to be there without being so different that the pilots don't feel they are completing different training goals.

Part 91 operators—generally owner/operators and corporate flight departments—have the most control over their training, and yet they frequently exercise this control the least because they're usually comfortable just taking the standard course. Don't sell yourself short—you're missing the opportunity to really focus on things like automation modes that you're not particularly comfortable with, or systems that you don't understand as well as you'd like to. Ask us to customize the course to focus on what you or your pilots really need.

**AREN'T SIMULATORS JUST EXPENSIVE VIDEO GAMES FOR PILOTS? WHY SHOULD I GO THROUGH THE EXPENSE OF SENDING MY PILOTS TO SIMULATOR TRAINING RATHER THAN TRAINING IN THE AIRPLANE I ALREADY OWN AND THAT THEY'RE USED TO FLYING?**



**Thress:** Our simulators are vastly different from video games. They are completely immersive to the extent that when you're training in the simulator, you get nervous and you sweat; you have the same reactions that you would have in the airplane. Between our high-resolution wrap-around visuals, six-axis full-motion base, and identically replicated flight deck layouts, our simulators are realistic to the extent that the FAA and European aviation authorities have certified them for certain check rides.

Also, you can do far more training safely in the simulator than you can in the airplane, like handling multiple system failures in challenging weather at an unfamiliar airport. It feels very real; the pilots feel real pressure trying to handle the scenario. And the instructor has control over what systems fail and when, how much wind and weather to throw at the pilots, et cetera,

so he or she can increase or decrease the scenario's intensity depending on what the pilots can handle.

**Meikle:** There's an adage in aviation that one peek out the window at the horizon is worth a thousand instrument scans. You can get a snapshot of your situational awareness in a one-second peek, and when you're training in the aircraft in simulated instrument conditions and getting a little disoriented, it's easy to take a quick peek. Not so in the simulator. There is no sneak peek at the horizon. You are in the weather the whole time. In the past 12 to 15 months, you'll find numerous accidents related to individuals who trained exclusively in the aircraft. One extremely high-profile helicopter accident was flown by a pilot who had done all his recent checks in the aircraft, with training that included inadvertent encounters with instrument (low-visibility) conditions.



Training is far more than manipulative skill practice. It's really about decision-making. Rarely are the really difficult decisions in flying answered solely with a checklist. Often there's ambiguity in the scenario. And that's where being able to present the ambiguous scenario in the simulator is so effective—it allows the crew to “build their own adventure” by deciding what path to take, since every decision drives them down a slightly different path.

Many of the system failures that pilots really need to experience in training can be safely done only in the simulator since some decisions lead to undesirable consequences. In the simulator, we can discuss the decision-making, reset the scenario, and try again. That may be impossible in the airplane.

**SO, WHILE IT'S LEGAL TO TRAIN IN THE AIRCRAFT, IT JUST DOESN'T PROVIDE THE SAME LEVEL OF PERFORMANCE.**

**Thress:** Simulator training is generally more efficient and cost-effective than in-aircraft training. You don't have to burn the time and fuel climbing to altitude or positioning to practice a certain approach, so you can get much more training done in the same amount of time. In the simulator you can skip cruise flight and go straight to approaches and landings at more than 600 airports all over the world.

Because we have such a large database of airport visuals, scenarios, and profiles, if you want to fly a certain runway set that's typical with a mission or a trip that you take, we either have it or can build it. We have a huge profile library that the instructors share with one another, so we can develop all kinds of scenarios at various airports in challenging wind and weather conditions.

**Meikle:** Also, very high-altitude and very low-altitude training is generally unsafe

or inefficient to accomplish in the aircraft. Several corporate jets have been lost due to loss of control at high altitude nearing high Mach numbers—the most recently certified aircraft can cruise at more than Mach 0.9—and we can replicate these situations in the sim to safely teach the critical effects to avoid inadvertent excursions into supersonic regimes. Other maneuvers best practiced in a simulator include high-speed rejected takeoffs on short runways, upset recovery beyond the normal envelope, and for helicopters, vortex ring recovery and loss of tail rotor effectiveness.

Of course, the ability to pause the simulator while the instructor and students discuss the situation, and then reset at a certain location, altitude, speed, and aircraft configuration if needed, is one of the greatest advantages of simulator training.

We also do upset training in the simulator—where the instructor places the aircraft in an unusual attitude and the student must effectively recover and return to level flight—but this is one area where additional in-aircraft training can be effective. We have a partnership with Flight Research, Inc., an in-aircraft upset recovery training provider out of Mojave, California. They teach real-world application of skills for both jet and piston pilots.

The two types of upset training dovetail nicely with each other, because as I mentioned, there are some things you just can't do in the aircraft safely. And there are other things that the simulator doesn't replicate as well, such as working through g-forces and looking out the window at a lot of ground, which has a vastly different motivational force than simulated ground in the sim.

**HOW CLOSELY WILL THE FLIGHTSAFETY SIMULATOR MATCH MY AIRCRAFT? WHAT IF MY AIRPLANE HAS DIFFERENT AVIONICS THAN THE SIMULATOR? CAN THE SIMULATOR BE CONFIGURED TO MATCH MY AIRCRAFT?**

**Thress:** Each of our simulators is a full and true representation of that aircraft model as it rolled off the assembly line. The pilots

strap into the same crew seat that they strap into when they fly the aircraft. The switches are exactly the same as in the aircraft. The systems all function exactly the same way as the aircraft until we program them not to, in which case the learning really starts to occur. So, they get that muscle memory from practicing with the actual controls.

Take the Gulfstream GV, for example. It has been out there for quite a few years, and then it became the G550 and the avionics suites between the two aircraft are quite different. As the fleet grows, we pick a serial number to base the simulator on. So, the first simulator will be a very early serial number. And then as more simulators are needed to support the growing fleet, we'll pick the next serial number that we want to use, which will often contain a different avionics suite or other modifications.

With a 70-year history, we have some long chains of aircraft families represented by our simulators, and they're not carbon copies of each other, but reflections of the iterations or options available for that model. We have 375 simulators in our fleet, and some of those go back to early legacy aircraft. Give us your aircraft's serial number, and we're more likely to find a simulator that matches your exact configuration than any of our competitors.

**Meikle:** We partner with the aircraft manufacturers to make sure the simulator faithfully represents the aircraft in both physical and flight aspects, and to ensure that the most current information is in our courseware. Our simulators are so true that some have been used by the aircraft manufacturers to help with the development of new models, including conducting certain procedures in the simulator before flight testing them in the aircraft to reduce the risk to the test pilots.

**Thress:** We also have simulators that are convertibles, in which portions of the flight deck can be removed and replaced with a different avionics suite. In most cases, the conversion is between two close models of the same aircraft, such as a Citation M2 to a Citation CJ3+. Those airplanes are essentially 90 percent common.



**“ WE CONSIDER OURSELVES THE GOLD STANDARD IN BUSINESS AVIATION. SINCE OUR PRIMARY OBJECTIVE IS TO ENHANCE SAFETY, OUR CURRICULUM GOES ABOVE AND BEYOND THE MINIMUM REGULATORY STANDARDS. ”**

**Meikle:** The other thing we can do is differences training. If you have an older Citation CJ2 with a Collins avionics suite, and the only device that we have available to fit your schedule is a Garmin-equipped CJ2+, then we will train you in the CJ2+ simulator and give additional training on a Collins kiosk to make sure that you understand the avionics differences.

**Thress:** Regarding third-party avionics upgrades, we'll provide differences training until the demand is large enough to justify converting a simulator to the new avionics suite. For example, there's a Garmin G5000 avionics upgrade out for the Citation Excel. Initially, we were doing differences training on it, but we were finding the population of aircraft owners who have completed that modification had grown fairly large, so we converted a simulator and dedicated it to the G5000.

But like on the Excel, if we have multiple simulators of an aircraft, we won't upgrade all of them. We'll keep one or two in the legacy avionics suite. So, those owners who choose not to upgrade their aircraft still have

that platform available to train their pilots.

**Meikle:** We're also in the early days of integrating virtual reality into our courses, and so far, we have two primary uses for it. The first is for training preflight inspections, especially for initial training of a pilot to a new aircraft model. We don't have an airframe for every aircraft we train on in the centers, so we're developing 3D virtual-reality walkarounds to accomplish that task in a very real way. Right now, we have VR walkarounds available for the Pilatus PC-12, and we're rolling out others rapidly. We're also in the early stages of using virtual reality to train maintenance technicians on certain procedures, and we already have regulatory approval for some of these classes.

**Thress:** We've also introduced a mixed-reality procedure trainer that uses virtual reality for your upward vision along with physical, tactile controls. These are being used in military applications, particularly with the T-6 Texan II for U.S. Air Force and Navy undergraduate pilot training. The mixed-reality trainer allows students to fly an entire mission at their squadron desk before they fly it in the real airplane. And we're using the same concept in helicopter training.

#### **HOW IS FLIGHTSAFETY DIFFERENT FROM OTHER SIMULATOR PROVIDERS?**

**Thress:** One thing that sets us apart is our longevity. We've got 70 years of simulator training experience, starting with our

founder, Albert Lee Ueltschi. He was “the man” in terms of aircraft simulation and is considered the father of modern flight training. We still use his motto: the best safety device in any aircraft is a well-trained crew.

Through those 70 years, we’ve cultivated an exceedingly high level of customer service. No one can touch the level of service that we provide, and I’m not simply bragging—we have the data to back that up in customer and industry surveys.

The culture of customer service at FlightSafety is strong, and that’s well recognized among our customers. For one thing, as soon as you’re signed up as a client, we give you access to what we call your “flight bag,” a year-long subscription to the training guides and all the materials used in the course. And you can use it both in advance and after training for review. And then there’s the fact that we encourage all our customers to ask us for customization in their training courses; it’s something we’re proud to do.

**Meikle:** Our simulators can also be available for ad-hoc training. We have a full-service contract option where those clients can come by

any time they want. So, if they haven’t done a night landing in 90 days and they just want to swing by and get three night landings in for currency, no problem. If they are between their usual training intervals and they’ve got a big trip planned to say Reykjavik, Iceland, which has a rather short runway, they can come in and shoot a few landings with blowing snow and half-mile visibility just to see what it could be like. Anything they want to do, we can do it either on or off schedule.

**Thress:** Our instructors are also generally available to answer questions even after training has been completed. The overwhelming majority of our instructors will give students an email address and/or a contact number, so a pilot can call and ask for help or advice later.

**Meikle:** As with any product, there are top-end providers. If you’re driving a Ferrari and have a problem with it, you’re not going to take it to the corner mechanic. You’ll take it to the experts at a dealership where they’ve got the tools, the knowledge, and all that experience to manage the problem. You want the same thing for the pilots that are flying your airplane.

The question becomes: How prepared are your pilots to deal with issues that might be confronting them in an ever-changing environment? When something bizarre is happening in the middle of the night over the North Atlantic with your family on board, you aren’t going to want to turn to your spouse and say, “Hey, we got the training for this crew for a lot less money because we didn’t waste the extra cash to go to a top-notch provider.” I don’t think that conversation is going to go as well as, “Rest assured, these pilots are confident and competent in what they’re about to handle because they’ve been put through scenarios like this at FlightSafety.” Simply put, safety costs more than baseline, but when your life, or the life of your family depends on it, everyone is happy to pay the difference and then some.

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There's training to check a box and training for excellence. When training to meet a requirement, the result is proficiency. When crew train with the best—to be the best—skills are sharpened, preparing them for anything. It's like this: Proficient is capable. Prepared is unshakeable.

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it must be delivered under the purchase agreement. The idea of accepting a business jet after a prebuy inspection without asking for any repairs or corrections will strike veteran buyers as wildly humorous, yet attorneys continue to insist on adding the option.

In over 30 years of aircraft transactions, I've never seen an aircraft go through a genuine prebuy with no maintenance or paperwork issues and nothing discovered that requires fixing. Even a factory-new aircraft will have many issues that need to be addressed by the manufacturer. Checking the first box sounds less like the finale of a courtship than love at first sight. In sum, unless the acquisition is a wholesale deal with minimal due diligence, sellers should not be surprised or disappointed if the first box isn't checked.

A second option on the technical acceptance certificate is to reject the aircraft. If buyers have the right to do this in their sole discretion, the purchase agreement would provide that, should buyers check the second box, the deposit would be refunded, subject to payment of any costs the buyers are responsible for under the agreement, such as the bill for the pre-purchase inspection itself. On the other hand, when buyers need a reason to reject the aircraft under the agreement and reject it without one, they will typically forfeit their deposit unless the seller is in default. Valid reasons usually include undisclosed damage history, material corrosion, and repairs that would cost more than a specified amount.

Note that the technical acceptance certificate is usually due within a few business days after the pre-purchase inspection, not at delivery. Buyers who want to reject an aircraft because they believe the seller can't satisfy all the contractual delivery conditions should think carefully about the best way to deal with this issue, which may not be checking the rejection box on the technical acceptance certificate unless no reason is needed. The seller might argue, for example, that the buyer didn't give the seller a full chance to satisfy the delivery conditions in the time permitted by the agreement, and that the buyer must be treated as rejecting the aircraft without any right to do so, thereby forfeiting the deposit.

The box most often checked is the third one: the acceptance of the aircraft conditioned on the seller fixing everything required by the purchase agreement. Some attorneys like to leave it at that (though of course they may use many more words to say the same thing), but it's more common for the technical acceptance certificate to contemplate that a list of discrepancies will be attached that the buyer wants (or the contract requires) to be repaired. This raises a question: Can the buyer make acceptance conditional on the seller fixing anything the buyer dreams up?



## IF A SCRATCH IS SO IMPORTANT, LET THE BUYER ASK THE SELLER TO FIX IT; THE SELLER CAN ALWAYS REFUSE.

Suppose, for example, the wood veneer of the aft bulkhead contains an unsightly scratch. Most jet purchase agreements would regard such a scratch as “cosmetic” and not something the seller must fix. If an agreement requires a buyer to purchase the aircraft as long as the seller complies with the delivery conditions, listing the scratch in the technical acceptance certificate as a condition to the buyer's obligation to close is mere wishful thinking on the buyer's part. The seller, smiling broadly, is likely to remind the buyer what his or her options are under the agreement.

On the other hand, when buyers have the option to reject the aircraft in their sole discretion, the situation can be more complicated. Sellers' attorneys like to write the technical acceptance form so as to prevent buyers from even asking sellers to cure something as minor as a scratch on the wood veneer; in that case, technically, buyers can make acceptance conditional only on sellers fixing things he or she is required to fix. This seems silly, since buyers have the right to walk away from the deal in their sole discretion anyway, just by checking the second box. Why not encourage buyers to try to keep the deal together? If the scratch is so important, let the buyer ask the seller to fix it; the seller can always refuse.

Perhaps our imaginary seller's attorney is trying to preserve a right for her client to argue that the buyer is technically in default by failing

to tender a valid technical acceptance certificate within the required time period. If the buyer thinks that's a possibility, she might be smart to have a conversation about the scratch with the seller before requesting on a technical acceptance certificate that it be fixed. In any case, unlike the scratch, many discrepancies fall into a gray area where it's not 100 percent clear whether the agreement requires that they be repaired. The best purchase agreements are drafted to try to hold the deal together, not to encourage bickering.

Holding the deal together and getting the buyer to accept the aircraft may involve a price concession or holdback, depending on the discrepancies found and the estimated time to repair them. Sellers sometimes worry that the buyer will use the technical acceptance certificate as an excuse to renegotiate the purchase price by threatening to walk away. It doesn't follow, though, that the buyer should be required to produce a reason to reject. It's impossible to write down in a purchase agreement all the reasons why a buyer should be able to reject an aircraft. I remember a buyer rejecting a business jet on a technical acceptance certificate because he discovered a bad smell in the cabin that the seller couldn't get rid of. Needless to say, the contract didn't address the cabin's olfactory quality.

If a technical acceptance is like getting engaged, signing a delivery receipt is like getting married. There's nothing technical about that. **EJT**

## New & Upcoming Business Aircraft

CONTINUED FROM PAGE 14

include an externally serviceable belted lavatory with pocket door enclosure in the aft of the cabin.

The cabin incorporates large windows, LED lighting, a refreshment cabinet, and an in-flight-accessible baggage compartment. The interior is designed to be easily and quickly converted between passenger and cargo configurations. The cabin features smooth, clean lines; curved side rails; robust sidewall tables; and attractive single seats with arms that retract into the backs, creating a more spacious feeling. The company said it applied lessons learned from its midsize Latitude jet to the cabin of the Denali, which is more like what you'd expect to find in a private jet than in a turboprop.

The Denali's stylish flight deck will be equipped with the Garmin G3000 touchscreen-controller avionics suite and will offer high-resolution multifunction displays. Pilots will also benefit from such features as synthetic vision, weather radar, an advanced terrain awareness warning system, and automatic dependent surveillance-broadcast (ADS-B) capabilities.

The aircraft will be powered by a 1,300-shp advanced Catalyst turboprop engine from GE Aviation. It will feature full authority digital engine controls (fadec) and single-lever power and propeller control—making it much simpler to operate as any engine/propeller combination can be, and also dramatically cutting pilot workload.

### BELL 525

Type: super-medium twin helicopter | Passengers: 8-12 (executive)  
Range: 580 nm | Price: not available

Certification for the Bell 525 could come later this year. The helicopter is the most ambitious project to emerge from Bell since it started making V-22 "Osprey" tiltrotors with Boeing for the U.S. military in the 1980s.

Entry to the 525's 4.5-foot-tall cabin is through a pair of hinged doors between the flight deck and the forward cabin or through two large aft sliding doors. Passengers enjoy 88 square feet of floor space and a 128-cubic-foot baggage hold—bigger than what you'll find on most corporate jets. Indeed, this is the largest civil helicopter that Bell has ever built. It has a range of 580 nautical miles and an all-composite, five-blade main rotor system with a diameter of 54.5 feet.



The 525 is comparatively fast with a top speed of 160 knots. It's aerodynamically slick and features fly-by-wire controls and touchscreen-controller Garmin G5000H avionics. Gone are the traditional cyclic sticks between the pilots' legs. The flight deck has sidestick controls and a decidedly futuristic feel. The pilots' seats swivel into position for ease of egress. Ahead of them is a low-slung digital instrument panel and an enormous field of Plexiglas that affords superb visibility over the nose and down to the ground. Bell calls the 525's flight deck ARC Horizon—for Awareness Reactive Control. It thinks faster than a human and automatically does things to keep pilots and their passengers out of harm's way.

### LEONARDO AW09

Type: turbine single helicopter | Passengers: 5-7  
Range: 430 nm | Price: \$3.5 million (estimated)

Kopter's long-struggling efforts to develop a big turbine single with a light-twin-sized cabin appear headed for daylight now that the company has been acquired by the Italian defense-industrial conglomerate Leonardo, a company with long helicopter manufacturing experience and deep pockets. A representative prototype is in flight test with more aircraft to follow.



The helicopter once known as the Marengo Swisscopter SKYe SH09 has now been renamed the AW09. The big single is designed to fly a variety of missions: passengers, patients, and cargo can be loaded through two ample side fuselage sliding doors or two enormous rear clamshell doors. The AW09 also features a five-blade main rotor that promises to deliver reduced vibration at high speeds, a ducted tailrotor that will lessen its external noise signature, and a full suite of modern digital avionics. The Honeywell HTS900-2 turboshaft engine (1,020 shaft horsepower) offers the promise of excellent high/hot performance. It will be fitted with full authority digital engine controls (fadec) and requires less maintenance than comparable engines.

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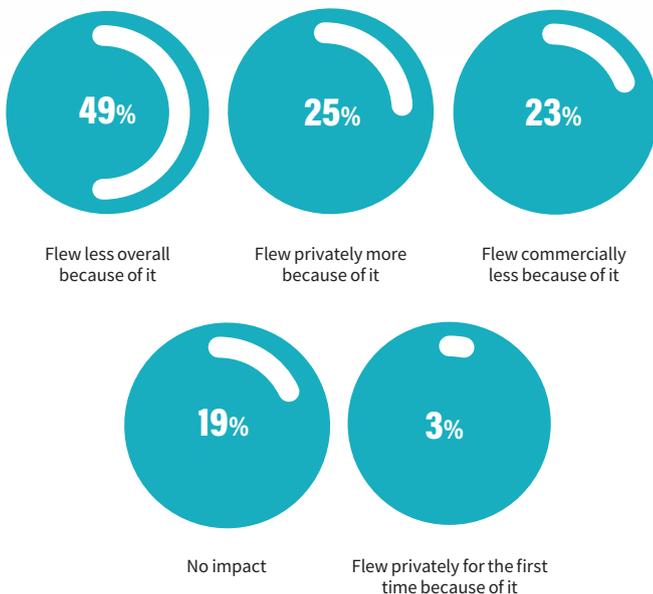


# BUSINESS JET TRAVELER'S 11<sup>TH</sup> ANNUAL READERS' CHOICE SURVEY

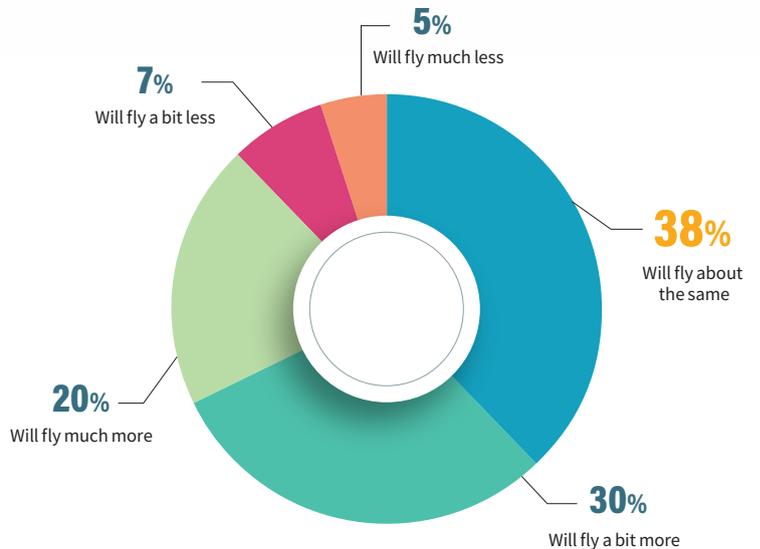
Here are the results of our 2021 Readers' Choice survey. Our thanks to everyone who took the time to share their opinions and experiences. As promised, we have made a contribution for every completed survey to Corporate Angel Network, which arranges flights on business aircraft to treatment centers for cancer patients.

Note: Percentages don't always total 100 due to rounding and because respondents were allowed to select multiple answers for some questions.

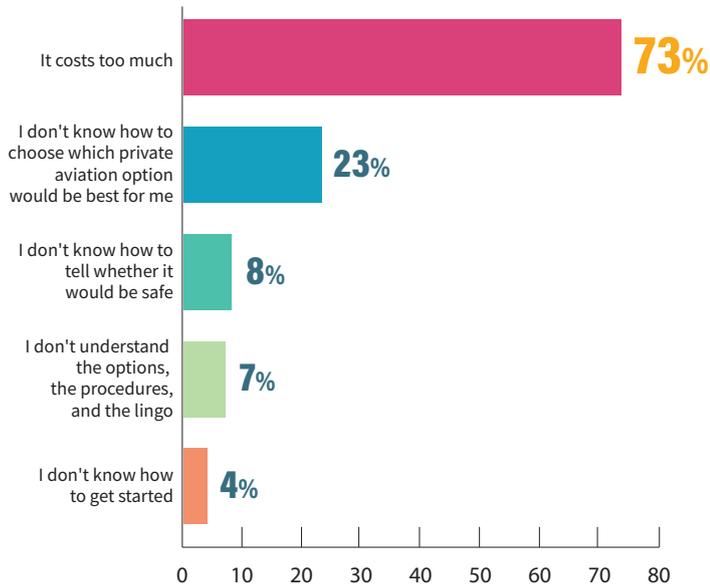
How has COVID-19 affected your private flying?  
(check all that apply)



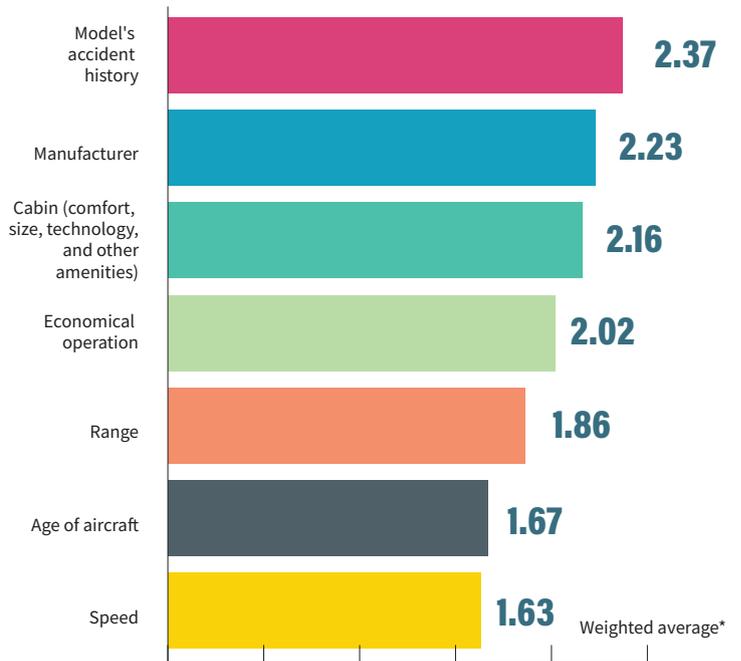
After the COVID-19 crisis ends, how do you expect your private flying over the following year will compare with your private flying in the year before the crisis?



If you don't now fly privately, or don't fly privately as much as you'd like to, what are the main obstacles? (check all that apply)

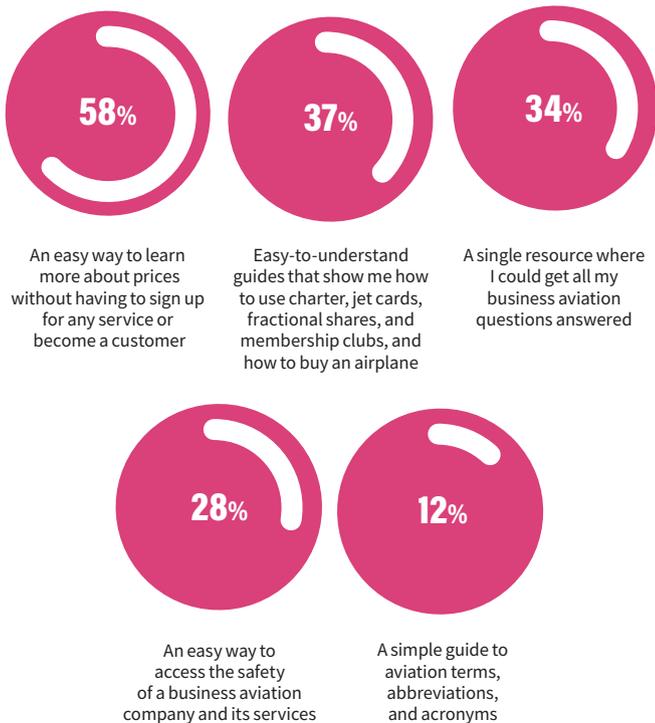


Which of these aircraft features are most important, second most important, and third most important to you?

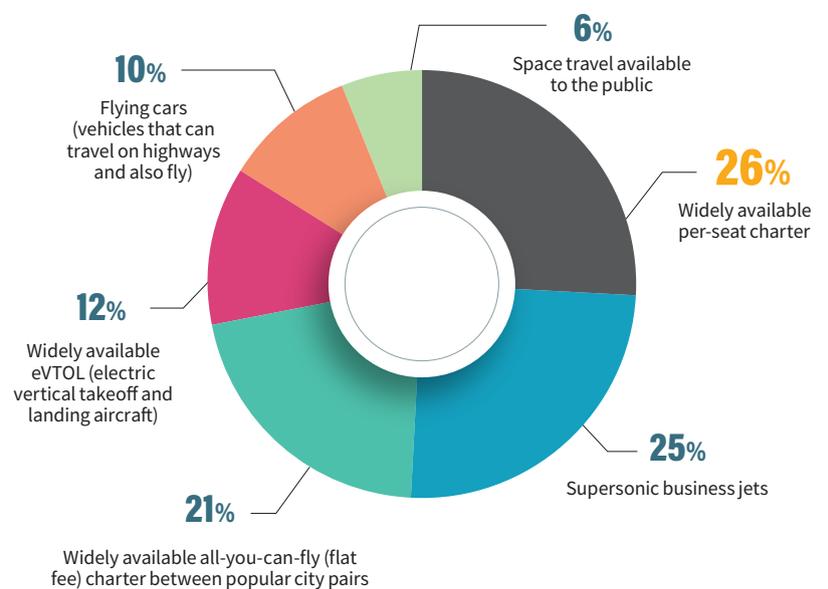


\*Determined by assigning points to responses: most important (3), second most important (2), third most important (1)

Which of these tools would you find helpful? (check all that apply)



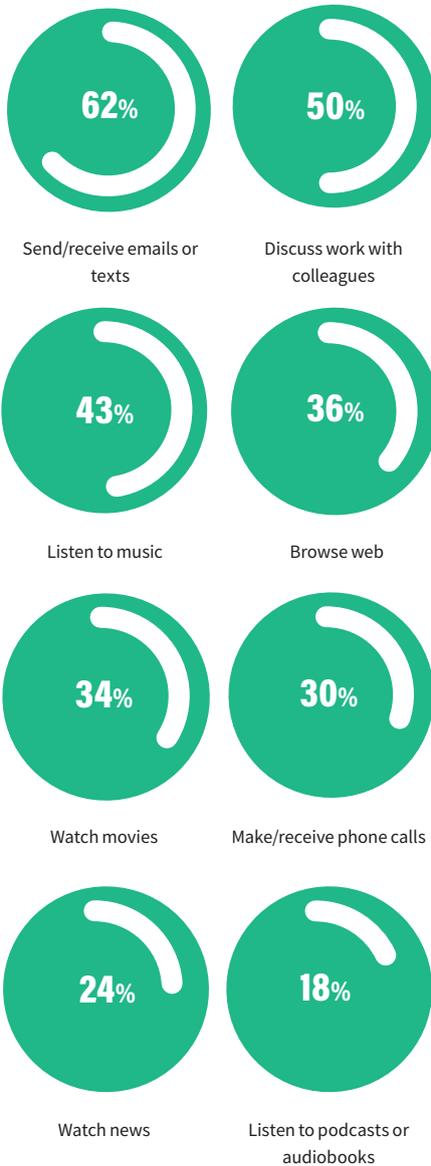
Which of the following would most interest you? (check one)



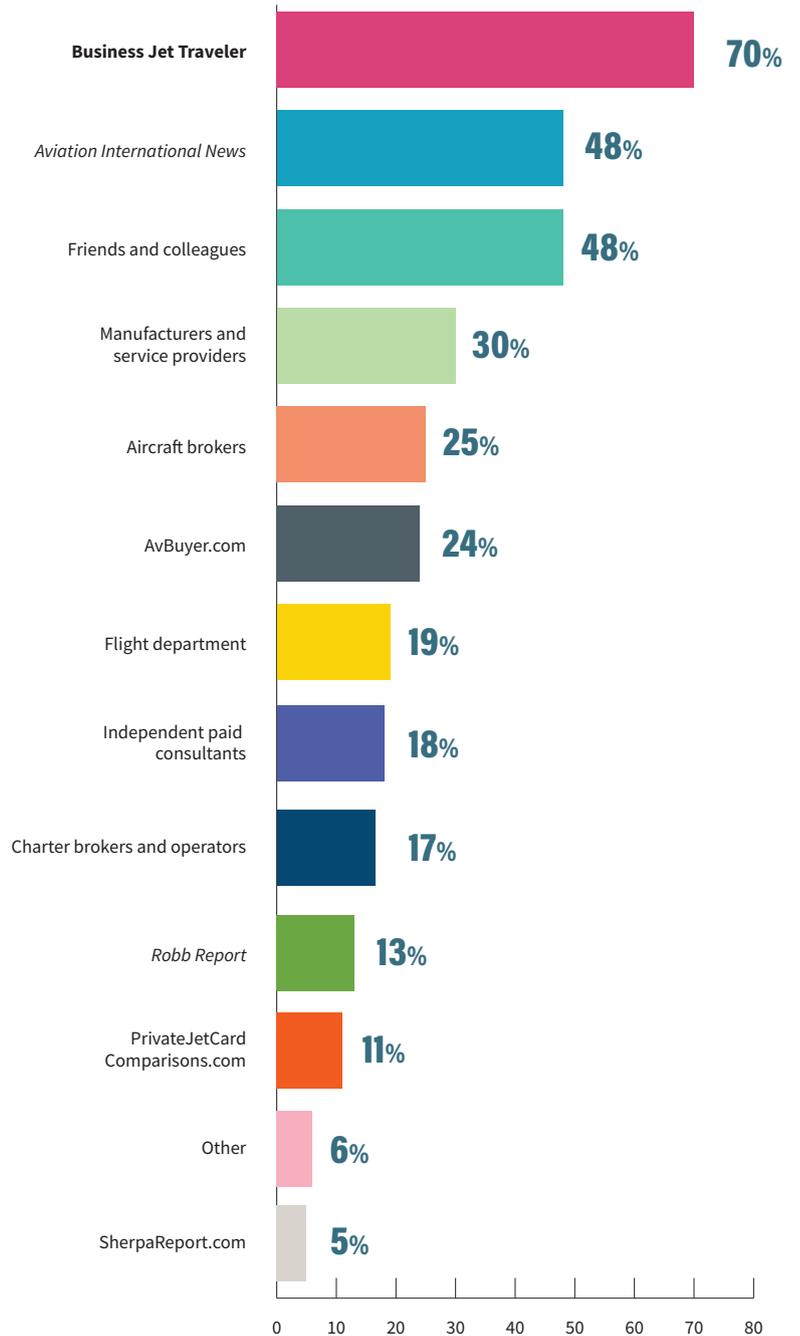


DASSAULT AVIATION

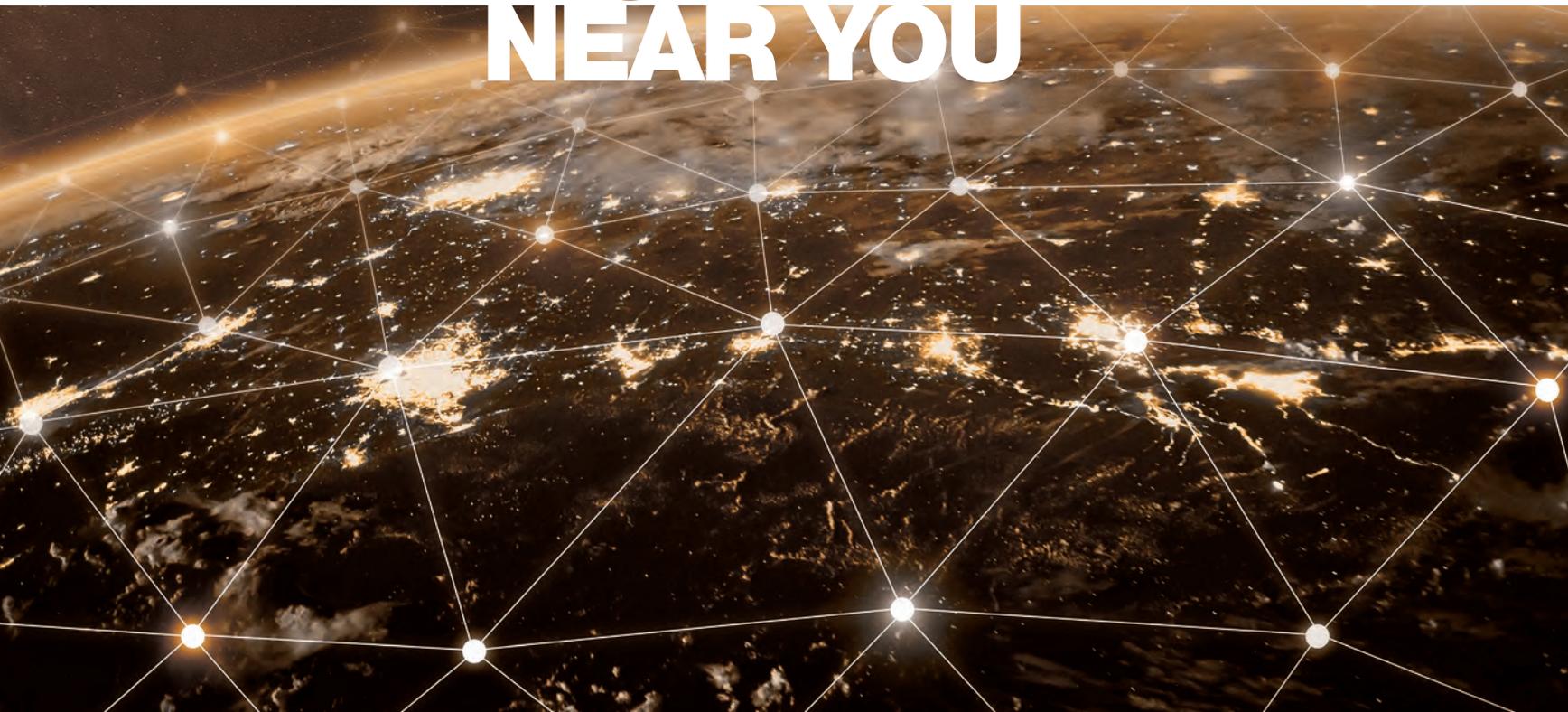
Which of the following do you frequently do in flight?  
(check all that apply)



Please indicate which of these sources you rely on for pre-purchase information about business aviation products and services.  
(check all that apply)



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Comlux Completion  
HAECO Private Jet Solutions  
Jet Aviation  
Sabena Technics

\*The ACJ Service Centre Network comes in addition to the Airbus Worldwide Support Network.

**ACJ**

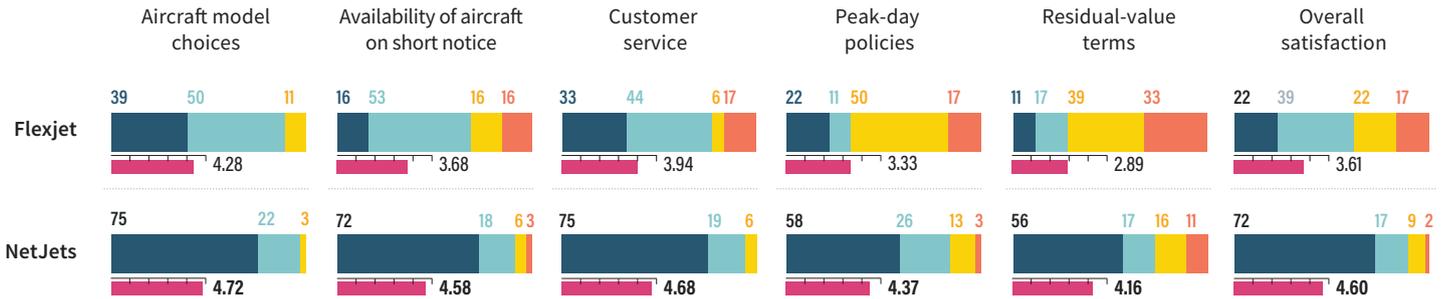
CORPORATE JETS

**AIRBUS**

# FRACTIONAL-SHARE PROVIDERS

■ Excellent 
 ■ Very Good 
 ■ Average 
 ■ Fair or Poor 
 ■ Weighted Average\*\*

Please rate the fractional aircraft provider you've used the most on each of these factors\*:

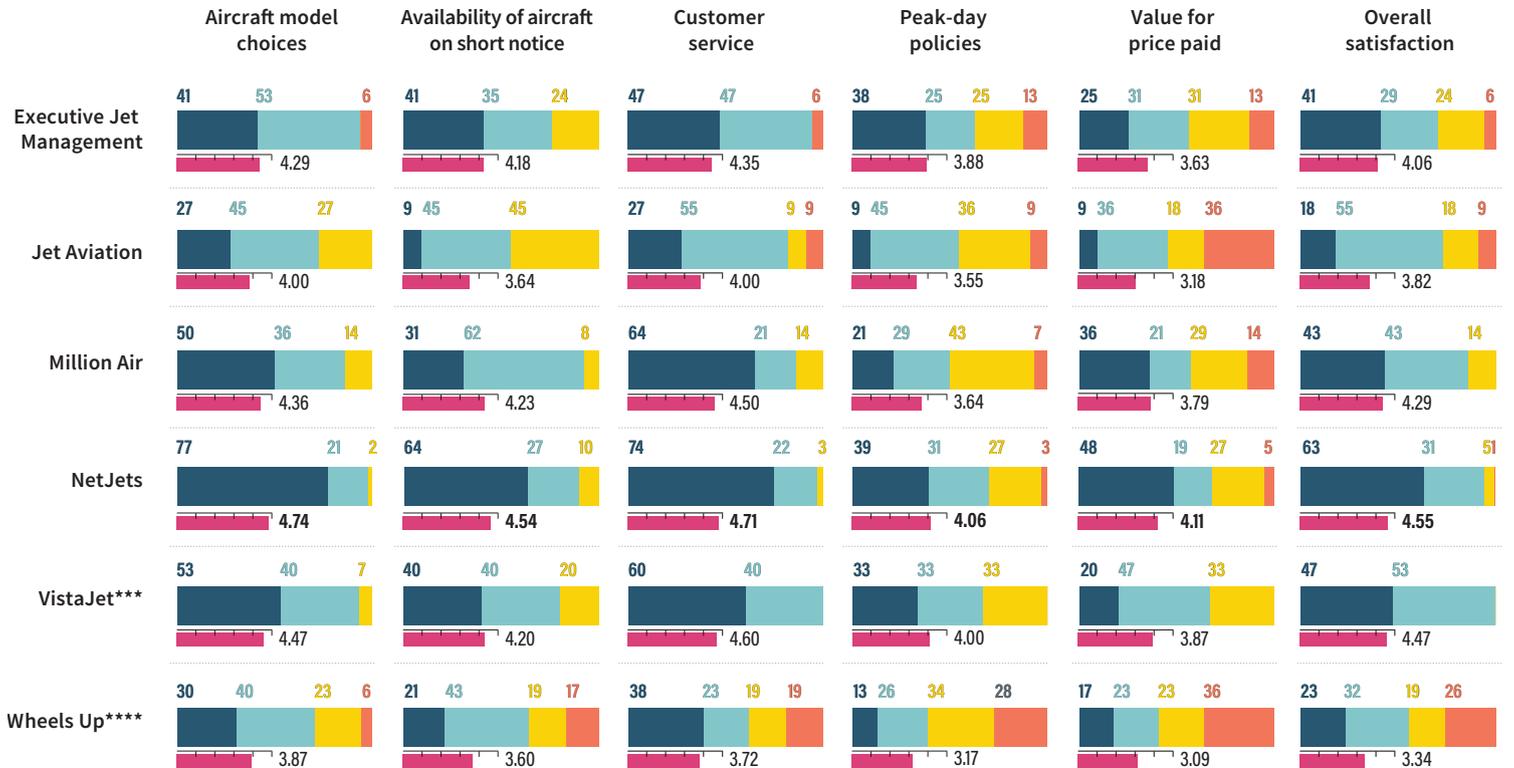


\*Asked of respondents who owned a fractional share in the past three years. Companies listed are the ones for which we received sufficient response to allow for meaningful results.  
 \*\*Determined by assigning points to ratings: Excellent (5), Very Good (4), Average (3), Fair (2), Poor (1)

# CHARTER AND JET CARD PROVIDERS AND MEMBERSHIP CLUBS

Please rate your most recent experience with air charter, a jet card, or a membership club on each of these factors\*:

■ Excellent 
 ■ Very Good 
 ■ Average 
 ■ Fair or Poor 
 ■ Weighted Average\*\*



\*Asked of respondents who used a charter operator, jet card, or membership club in the past three years. Companies listed are the ones for which we received sufficient response to allow for meaningful results.  
 \*\*Determined by assigning points to ratings: Excellent (5), Very Good (4), Average (3), Fair (2), Poor (1); \*\*\*Includes XO; \*\*\*\*includes Delta Private Jets & Travel Management Company



## OWNED AIRPLANES

Please rate the owned airplane you use the most on each of these factors\*:

■ % Excellent 
 ■ % Very Good 
 ■ % Average 
 ■ % Fair or Poor 
 ■ % Weighted Average\*\*



\*Asked of respondents who said that they or their companies have owned an airplane in the past three years. Companies listed are the ones for which we received sufficient response to allow for meaningful results.

\*\*Determined by assigning points to ratings: Excellent (5), Very Good (4), Average (3), Fair (2), Poor (1)



# The Future of Aircraft Management

A conversation with Clay Lacy Aviation president and CEO **Brian Kirkdoffer**



Industry consolidation, technological advancement, environmental accountability and a post-COVID surge in demand: positive changes are sweeping the aircraft management field, and few companies are better positioned to assess and address them than Clay Lacy Aviation. The family-owned firm, founded by its namesake more than 50 years ago, has more than 130 business jets under management, ranking it among the world's largest operators. President and CEO Brian Kirkdoffer – who has logged more than 10,000 hours as a captain – provided his thoughts on critical issues affecting owners and managers alike.

**Consolidation is reconfiguring the aircraft management field. Yet management has long been considered a relationship business built on close bonds between aircraft owners and company leadership. How can a management firm reconcile large operations with close relationships?**

Absolutely, we are in a “relationship business,” but in the best management companies, the relationship has evolved to be more thoughtful, effective and enduring. The most valuable “relationship” is between the aircraft owner, their staff and a high-functioning aircraft management team of subject-matter experts focused and empowered to provide an exceptional ownership experience. This relationship has proven to be the most reliable and beneficial management relationship in the long-term for every aircraft owner.

Our teams include experts in data analytics, dispatch reliability, cost and revenue controls, asset maintenance and enhancement, and mission-specific pilot training – all dedicated to making the ownership experience exceptional. The total value that a top-tier management company provides today is exponentially better than it was 10 years ago.

Leadership is responsible for setting the company’s moral compass, mission, business plan, service culture and allocation of company resources. These should all be clearly stated, understood and aligned to support the goals of every aircraft owner. Customers should expect absolute operational optimization and efficiency and have the trust and confidence that comes with a great relationship with their management company.

**An unprecedented infusion of private capital is driving some consolidation, as business aviation has become a hotbed of investor interest. Your thoughts?**

The recent investment activity in our space is impressive and welcome – and further strengthens our confidence in the substantial resources we are investing in our long-term business plans.

We are currently building new hangar facilities at our three FBOs: our headquarters in Los Angeles, Van Nuys Airport; Orange County, California, John Wayne Airport; and in the New York Area, Waterbury Oxford Airport. [The company also has airport support facilities in San Diego and Seattle.] We are

seeing a large increase in opportunities for us to partner with other great companies that if combined can create unique synergies and benefits for our mutual clients. We are finding that these companies are spectacular at serving customers in a particular region but can substantially benefit by accessing the technology, resources, expertise and full suite of Clay Lacy Aviation support.

We do not operate on other people’s money, so we may look at opportunities a little more closely than others. Consistent organic growth has proven to be the most successful and sustainable for us and our decisions are based on a minimum of a 10-year plan.

**Good management companies have varying approaches to providing support services, from outsourcing them (without adding fees), to offering some or all in-house. What’s Clay Lacy’s approach, and what do you see as the customer benefits?**

Providing services in-house is all about expanding options and benefits for the aircraft owner: the more options available, the better we can positively affect aircraft availability, dispatch reliability and operating costs.

There are some people with the misconception that providing in-house maintenance, repair, and overhaul (MRO) services runs in conflict with aircraft management. The fact based upon data is clear: you cannot achieve the highest level of those three important performance metrics without offering 24/7, in-house MRO services.

We pioneered operating the personal business jet 53 years ago. There were no or very limited support options – we had to build all required support services to assure the highest-level aircraft availability, dispatch reliability and operational cost efficiency. We invested heavily over six decades in process, procedures, training, technicians, tooling, mobile resources, parts inventory and facilities to best support our owned fleet which has evolved now to best serve our client aircraft owners. We are continually measuring and evaluating the benefit this provides our owners through quarterly and annual analytic reports. We provide our clients the best options based upon what is most advantageous for their particular circumstances and operations.

### **A few large firms have recently added aircraft brokerage services to their in-house offerings. Clay Lacy hasn't.**

We offered limited brokerage services until 2016. However, it was not our core competency, and we want to devote 100 percent of our focus to being the best in the industry at managing, operating and maintaining jet aircraft. There are spectacular brokers

with a lifetime's worth of knowledge and data, and we work closely with each aircraft buyer along with recommending the best brokers in the industry. Our team surrounds the owner throughout the process of searching, identifying, evaluating and purchasing the right airplane, but [in acquisitions] we think the client is better served by having the best acquisition team and that a management company should not be the single source.

### **How are you using technology to improve the ownership experience?**

Technology is a major area of our focus and financial resources. Aviation is heavily regulated and complex, and we are continuously working to simplify it. There are no off-the-shelf solutions that deliver the level of services and information we feel owners need, so we have continued investing in our proprietary platform and technology capabilities to deliver the highest level of service.

We established a financial-planning and analytics department, fully devoted to our management clients, and focused on monitoring trends and delivering information in a transparent, straightforward and practical way. Our clients receive proactive recommendations for making the most informed decisions. Our updated owners' portal also provides an unprecedented amount of meaningful, actionable information in real time, and we continue to receive great feedback on the value provided by these substantial investments in technology.

### **Environmental concerns are a new wild card in business aircraft operations. How are you addressing the challenges?**

Addressing environmental concerns and sustainability is very important to us for three primary reasons. First, it's just the right thing to do to take care of our earth for current and future generations. Second, we foresee more environmental regulations coming, so being a leader helps us drive the most positive, beneficial and impactful industry changes. Finally, we feel that socially and environmentally conscience companies will thrive and be of more value to everyone in the long term.

In 2019, Clay Lacy developed a comprehensive sustainability strategy focused on reducing our own carbon footprint in concert with offering solutions for our clients to reduce their carbon footprints. We are now implementing that plan in partnership with 4Air, which has established a verifiable sustainability rating system for business aviation. Pursuant to that, we are introducing a continuous supply of Sustainable Aviation Fuel (SAF) at our FBOs, reducing emissions from our ground equipment and sourcing electricity from renewable resources, among other initiatives.

### **What do you see now and what do you predict is ahead in business aviation as the world reopens?**

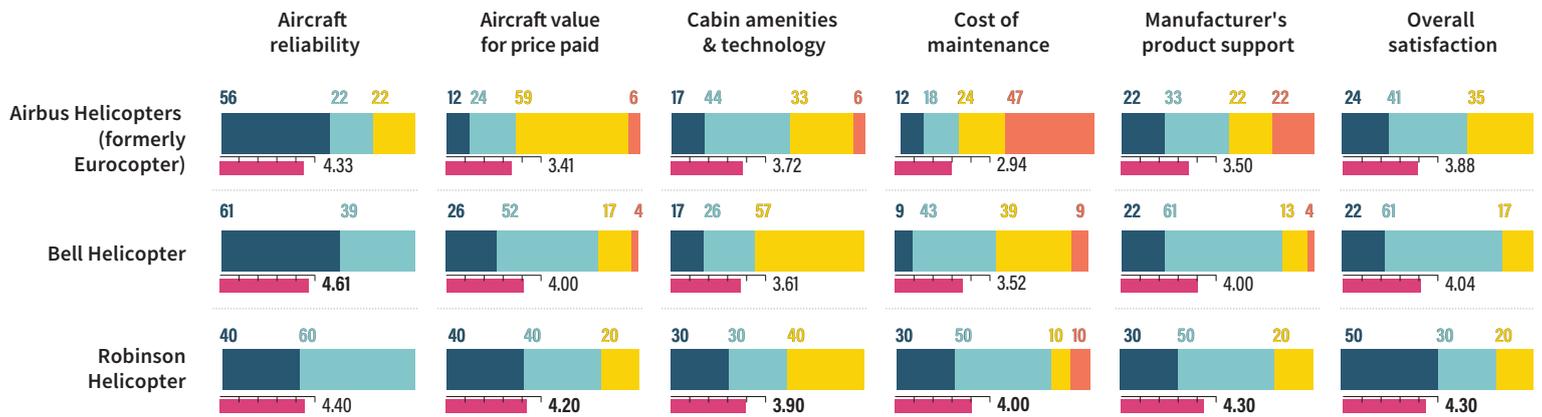
We are seeing exponential growth in both new clients and demand for our services. The health and environmental benefits of traveling on business jets have been reinforced, and having a wide breadth of service offerings that can best control the entire client experience will continue to be valued. Predictions: 2021 will be much better than 2020, and 2022 will be the best in the last 10 years. Our industry is based upon innovation. I hope and think we will see expansion of electric aircraft throughout the aviation industry as our industry learns from others, and as hybrid technology and energy density of batteries improves in the coming decade.



# OWNED HELICOPTERS

Please rate the owned helicopter you use the most on each of these factors\*:

% Excellent % Very Good % Average % Fair or Poor % Weighted Average\*\*



\* Asked of respondents who said that they or their companies have owned a helicopter in the past three years. Companies listed are the ones for which we received sufficient response to allow for meaningful results.

\*\*Determined by assigning points to ratings: Excellent (5), Very Good (4), Average (3), Fair (2), Poor (1)



AIRBUS



# GE's OnPoint<sup>SM</sup>

Global support for your peace of mind

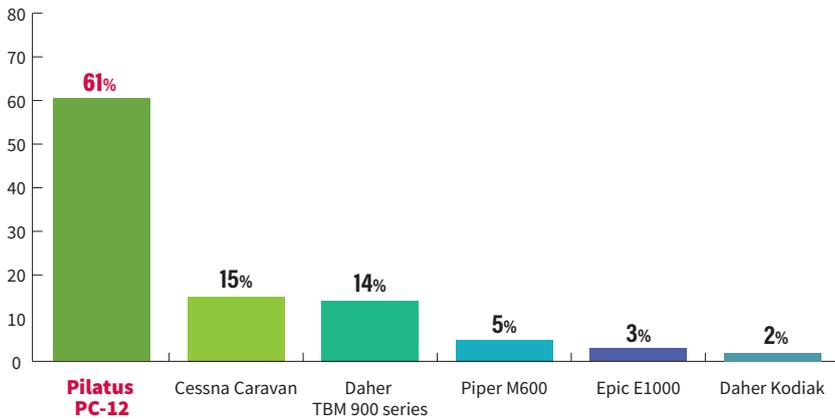


GE's OnPoint program provides the most comprehensive business jet engine coverage in the market. GE offers a full risk transfer of your engine maintenance, support, and diagnostics, ensuring your aircraft retains the highest level of performance and residual value. With 100% coverage that starts day one, OnPoint delivers expertise straight from the engine OEM to keep you flying.

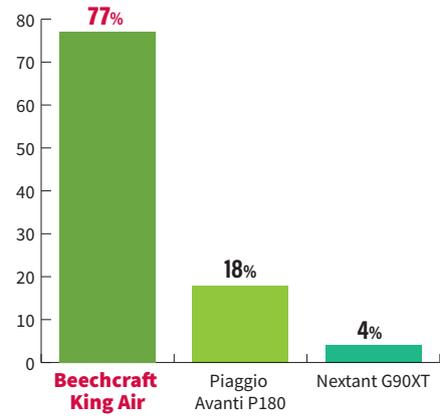
# PREFERRED AIRCRAFT

If you could regularly fly on any of these aircraft, which would you choose in each category?

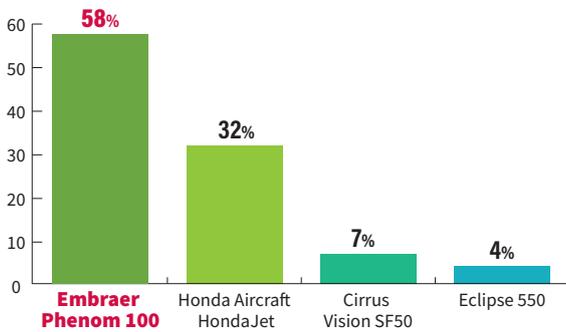
## Single-engine turboprops



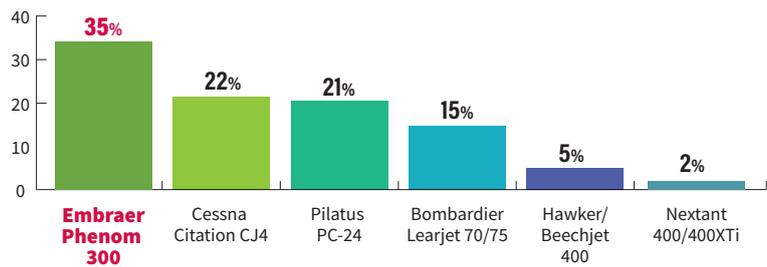
## Twin turboprops



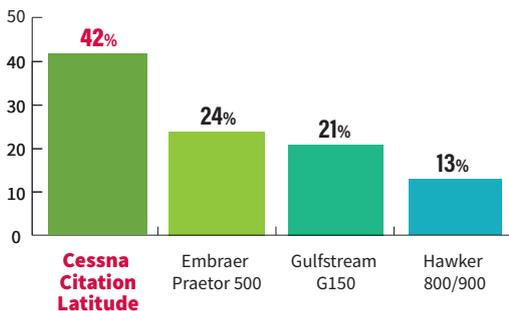
## Very light jets (VLJs)



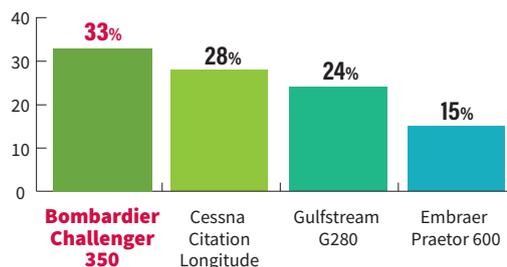
## Small-cabin/light jets



## Midsized-cabin jets



## Super-midsized-cabin jets





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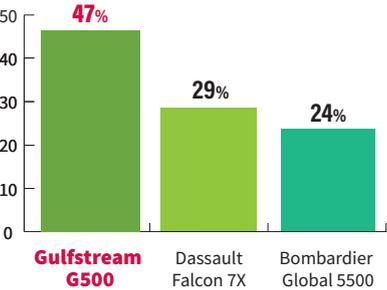
Gulfstream G650ER, G600, and G500

BARRY AMBROSE

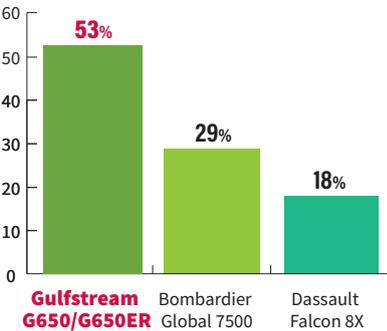
## PREFERRED AIRCRAFT

If you could regularly fly on any of these aircraft, which would you choose in each category?

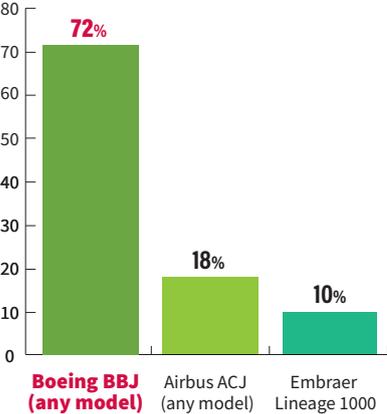
### Large-cabin jets



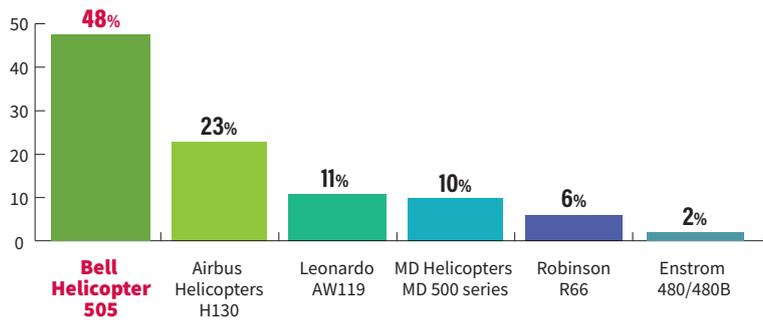
### Ultra-long-range/heavy jets



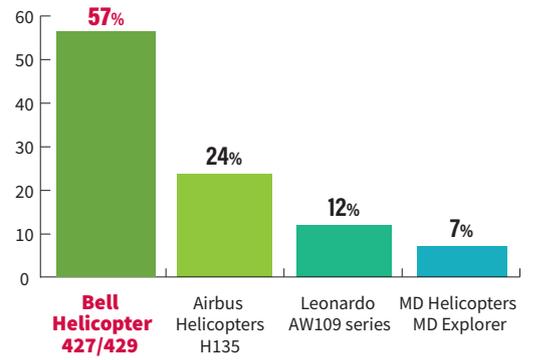
### Bizliners



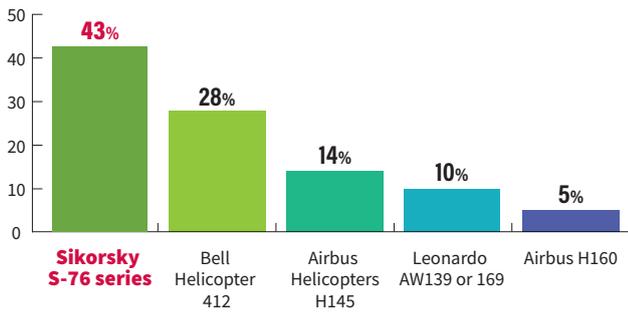
### Light single-turbine helicopters



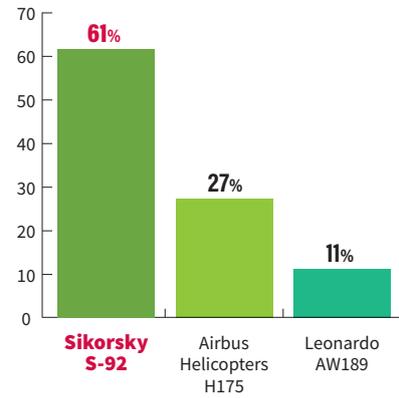
### Light twin-turbine helicopters



### Medium twin-turbine helicopters



### Large twin-turbine helicopters



# A New World of Access Options

Despite COVID-19, charter, jet card, fractional, and membership offerings continue to expand. Here's a look at programs introduced or expanded in the past year.

by James Wynbrandt

Though the pandemic produced a sudden and prolonged decline in business aviation flight operations, the industry has lately been staging a remarkable resurgence with many new providers, programs, and products. Today you'll find more options than you had a few years ago but also spill-over effects from demand for access at all levels of private aviation.

As NetJets said in July, when it announced a temporary hold on sales of some fractional shares and jet cards due to that demand, "Everything from fueling and ramp space to catering and ground transportation is being pushed to the limit." Data from Argus International shows significantly more charter and fractional activity in March, April, and May this year than in each of those months in

2019, which was considered a breakout year.

With the surge of travelers have come billions of private equity investment dollars, leading to multiple improvements in the charter experience for fliers as well as acceleration of the consolidation trend reshaping the access space. Also a force: untold but significant numbers of pandemic-propelled, new-to-business-aviation customers who may add permanently to demand.

"Once you start flying on private aircraft, it's very difficult to go back to flying commercial," observes Argus president and CEO

Joe Moeggenberg.

Here are some of the most notable new offerings, options, and service upgrades.



ADOBE STOCK



UK-based global brokerage **Air Partner** has updated its group charter offerings, adding Air Partner Protect and Tour Protect options. Air Partner Protect, for group travel to meetings, conferences, multi-leg trips, and other business, includes options for cabin deep cleaning, branding on headrest covers, and full aircraft livery makeovers for making a big visible impact on arrival. Tour Protect is designed for “complex world tours,” as live performances return to stages, says Air Partner, Americas president David McCown. It includes advanced COVID-19 protocols, security detail, 24/7 health and medical support, and evacuation planning.



**Amalfi Jets**, a California-based charter and jet card provider founded last year, has introduced the Amalfi Guarantee jet card, providing 12-hour call-out access to five aircraft categories at fixed hourly rates. “A representative is at the airport to meet clients before every [domestic] flight to ensure quality,” the company says. Round-trip discounts are available with the card, which requires a \$50,000 minimum refundable deposit.



Southeast Florida’s **Elite Jets** introduced its first jet card last year and recently added a membership card (\$15,000 to join; \$100,000 refundable minimum deposit) for guaranteed access to its four Embraer Phenom 300s, all of which are based in Naples (where the operator has a private

## Directional Aviation: A Big Player Grows Bigger

Directional Aviation’s portfolio includes OneSky Flight, parent to fractional-ownership and jet card fleet operator Flexjet, jet card charter brokerage Sentient Jet, and on-demand charter brokerage PrivateFly.

Flexjet, Directional’s flagship brand, has added a Flexjet 25 card for its European customers, providing access to Embraer’s super-midsize Legacy 500. (In the U.S., Flexjet’s cards offer access to Embraer Phenom 300s or Bombardier Challenger 300s.)

This spring, meanwhile, Flexjet opened a private terminal at bizav hub Van Nuys, California, its fourth U.S. location. A connectivity upgrade is underway for its Praetor 600, Bombardier Global, and Gulfstream 450 and 650 fleets. The super-midsize Praetor 600s, operated on transatlantic and domestic European routes, are getting Viasat Ka-band systems, while the large-cabin jets are being outfitted with advanced Ku-band communication systems that are upgradable to Ka-band.

Sentient Jet has extended its jet card’s range, introducing one-way, fixed-rate transatlantic flights this spring, with departures from New York, Chicago, and South Florida airports to destinations including London; Frankfurt, Germany; Milan, Italy; and Paris. Once in Europe, cardholders can get fixed-rate flights to a host of destinations, including Tel Aviv, Israel; Moscow; and St. Petersburg, Russia.

Private Fly last summer also introduced the PrivateFly Jet Card, for access in Europe to light, midsize, and large-cabin jets. Rates are the same for the PrivateFly and Sentient jet cards, ranging from about \$7,000 to \$13,900 per hour, but Sentient’s card offers a super-midsize category. Sentient will handle arrangements for U.S. flights for PrivateFly’s European card customers.

On the environmental front, in May Flexjet reported that year-to-date U.S. and European flight operations were carbon-neutral and carbon-negative, respectively, thanks to its purchase of verified carbon-counteracting credits from 4Air. (Customers were not charged.) Sentient Jet achieved carbon and emissions neutrality through 4Air on all its flights, according to the jet card provider.

Demonstrating the synergies that help propel Directional’s growth, FXAir, a premium charter provider launched in 2020, offers on-demand service aboard Flexjet-operated Challenger 300 and Global Express jets retired from the fractional-ownership program’s fleet, in addition to lift from vetted operators. Its Aviator membership provides fixed trans-continental rates, dynamic pricing, late-cancellation guarantees, and an escrow-account option.

Directional’s vertical expansion also continues. This year it purchased Associated Aircraft Group, a Northeast-based helicopter fractional-share and card-program operator, while OneSky Flight added U.K. rotorcraft fleet operator Halo Aviation, as part of its expansion into managed helicopter services. Through Halo, OneSky ordered 200 eVTOLs from Embraer-backed Eve, an urban air mobility developer, and partnered with the company to build eVTOL operations in the U.S. and U.K. Deliveries of the first vehicles are expected in 2026.





Jet Edge

terminal). The hourly rate is \$5,250 one-way (or \$6,500 for travel more than 200 miles from the continental U.S.) Members also have access to Elite's Embraer Legacy 500 super-midsize fleet.



Among the largest charter operators in the U.S. by hours flown, mid-Atlantic based **FlyExclusive** debuted the Jet Club last year, providing guaranteed access to the company's Wi-Fi-equipped fleet of more than 65 light, midsize, and super-midsize Citation jets at low hourly rates. The program requires a \$150,000 deposit and has two tiers: Fly Club, a two-year, no-fee membership, charges hourly rates from \$5,450 (for light jets) to \$7,650 (for super-midsize); Exclusive Club is a recurring membership with a \$20,000 annual fee and hourly charges from \$4,750 (for light jets) to \$6,950 (for super-midsize).



California charter management firm **Jet Edge** has introduced AdvantEdge, a three-tiered

block-charter program for jet owners that guarantees revenue minimums in return for exclusive use of their aircraft for a set number of weeks per year. "Tell us when you are not using your aircraft and we will charter it," says CEO Bill Papariella. "It's like Airbnb."

Edge 250+ provides a minimum of 250 hours of charter in return for 14 weeks of aircraft access; Edge 500+ doubles those figures while Edge 900 delivers 900 charter hours in exchange for exclusive use of the aircraft all year. AdvantEdge members can charter aircraft from Jet Edge at preferred rates and change programs if needed.

A \$150 million investment from private equity firm KKR fueled the program and will also fund digital technologies Jet Edge is bringing onboard as well as expansion of its charter sales division.



Florida-based **VeriJet**, founded last fall, operates an expanding charter fleet of Cirrus SF50 Vision Jets, the single-engine VLJs equipped with a ballistic recovery

## NetJets Adds Aircraft and Programs

NetJets, the world's largest private jet operator, will take delivery of more than 50 new jets this year (individual models and numbers undisclosed). But record demand has forced suspension of fractional share and card sales for some aircraft models and brought restrictions to cardholder benefits for new customers in others.

Sales of shares, jet cards, and leases for the Phenom 300 and Citation XLS were suspended in July; prospective customers are joining a wait list. Earlier this year, NetJets suspended peak-day access (formerly available at a surcharge) on some cards and withdrew its Citation Latitude and Classic jet cards (current cardholders are unaffected). Meanwhile, prices across its cards have recently increased.

The demand crunch shows no signs of deceleration. NetJets president Patrick Gallagher notes that corporate owners are asking to add more executives to their lists of eligible users, while NetJets' internal research indicates most shareowners plan to increase their flying for both business and pleasure.

For the European market, NetJets has introduced a pay-as-you-go card for long flights across the continent. The card provides access to super-midsize jets for journeys over 3.5 hours at a discounted rate.

Last fall, NetJets announced an expanded global sustainability program, which includes reliance on sustainable aviation fuel where available (including its Columbus, Ohio base and headquarters), and offsetting emissions for all administrative and training flights in the U.S. beginning this year. The first of the company's planned biannual progress reports this spring cataloged the emissions countered, flight hours covered, and other metrics quantifying the sustainment efforts. Its European operations have been carbon neutral since 2012.



FlyExclusive



NetJets



parachute and a push-button emergency Autoland system that can fly and land the aircraft automatically. The Vision Jet can carry three to four adult passengers and two children, and the interior can be reconfigured during stops for the mission at hand.

The charter rate is \$3,000 per hour within a 600-nautical-mile radius of Orlando, with no charge for taxi time. The jet is certified for single-pilot operations and flown that way by VeriJet, but customers can opt for a second pilot for an additional \$875 per flight. Scheduling and operations are managed by an AI platform already proven in the charter arena from Coastal Technologies Group, a company that VeriJet founder and CEO Richard Kane established in the 1990s. Some six jets were in the fleet at mid-year, and plans call for 16 by year's end. In July, meanwhile, the company announced that it is expanding to the Los Angeles area.



In June, **Clay Lacy Aviation** added Citation X and Challenger 300 super-midsize jets to its Seattle-area charter fleet.



Boca Raton, Florida's **Journey Aviation** began 2021 with a newly refurbished Challenger 300 on its charter certificate, bringing its fleet to 18 midsize to heavy jets.



**Planet 9** added two ultra-long-range jets early this year to its floating charter fleet: a Global Express (positioned in the U.K.) and a Falcon 7X (in Long Island, New York). They join the two managed Global Expresses, a 7X, and the California-based charter operator's own 7X in its fleet, which also includes GVs, a G550, and a G650, all sporting "sparklingly refurbished cabin interiors," says co-founder and director of business development Matt Walter.

Planet 9 partnered with the Culinary Institute of America this year to help the charter operator deliver superior onboard service.



Dallas charter brokerage and jet card provider **Status Jet** has opened an office in Paris, its first international location, to cater to its growing base of European clients, says company president David Gerard Henry.



**Solairus Aviation's** new Search, Book, and Fly! mobile app accesses the California operator's nationwide managed fleet of some 200 aircraft, and more from vetted operators, then "guides the user from searching to booking in minutes," says the company's senior vice president of charter sales, Paul Class.



Available for Android and iOS devices, the app supports flight sharing, special handling requests, and live chat with Solairus staff, and can store favorite routes and manage payment information.



**Airstream Jets'** Distance Card is offering a discount of \$1,000 off its \$25,000 Silver Distance Card, and \$4,000 off the \$100,000 Gold Distance Card. Rather than charging for flying time, the Boca Raton, Florida broker's cards provide fixed rates, priced by the mile flown by direct routing, with the charge dropping every 1,000 miles; a light jet costs from \$16 down to \$11 per mile; and a heavy jet from \$26 to \$17. The cards are sold in \$25,000 increments.



New-to-market **Ajax Jets** offers two-tiered jet card access (guaranteed, or as available) to its leased fleet of some dozen refurbished and upgraded Dassault Falcon 50 and Falcon 900B trijets, operated by Chicago Air Group. Transcontinental rates are capped at \$27,500 on the Falcon 50 and \$37,500 on the 900B, and the one-way fixed-rate service area includes Hawaii. The relatively old but airworthy airframes lower acquisition costs for the aircraft, and consequently charter rates, says founder John Sullivan.



Jet card fleet operator **Jet Linx** has introduced a joint-ownership program (two owners per aircraft limit) that it claims provides a better experience than traditional fractional plans, which have up to 16 owners per aircraft. Also unlike traditional fractional plans, this one is set up so that owners will fly only on their own aircraft with dedicated crews, says company president and CEO Jamie Walker. Jet Linx will source and purchase the aircraft based on the owners' needs. Operating some 120 jets, Jet Linx can also charter the aircraft to its jet card customers when owners aren't flying. The company this year joined the 4Air aviation sustainability certification program.



Its ground network expansion continues, meanwhile, with private terminals opening in the past year in the Minneapolis area and San Antonio, and one scheduled to debut this fall at Miami-Opa Locka. Jet Linx has also broken ground for a flagship private terminal and hangar at its Omaha, Nebraska home base that is slated for opening in June 2022.



**Outlier Jets**—which offers the Elite and Select jet cards (respectively providing models with an average age of six years and ones made before 2000)—eliminated peak-day surcharges this year. Call-out time on these 18 days, however, has lengthened from 10 to 96 hours. With offices in Boston, Houston, and Los Angeles, Outlier relies on a core of fewer than 300 carefully vetted jets for lift, says CEO Michael Farley.



**Magellan Jets** has added jet cards for Cessna Citation CJ3 and Bombardier Challenger 605 access, as the Boston-based brokerage has revamped its jet card offerings and decreased some pay-as-you-go rates.



The bespoke charter division of Qatar Airways, **Qatar Executive** has introduced its first jet card, the Diamond Agreement 50-hour card, providing aircraft-specific options for ultra-long-range models, including the Gulfstream 650 and G500 and Bombardier's Global XRS and Global 5000.



Dubai-based **Vista Global Holding** this year bought U.S. charter broker Apollo Jets, which claims 4,000 clients, and VGH expects the acquisition to boost its North American flight volume by 20 percent. Apollo has become a division of VGH's XO, the subscription-based, business-class on-demand charter brand. Apollo also holds a share in MRO services firm Talon Air, which XO will incorporate into its

own management and maintenance services, while Talon Air's managed aircraft will join XO's owned and managed fleet of some 160 jets.



**VistaJet**, VGH's flagship block-charter operator, announced orders this spring for a dozen more Global 7500 and 10 Challenger 350 jets for delivery over the next two years, to meet demand from corporate customers (up 50 percent over the past year, according to the Malta-based operator, while new memberships surged 90 percent). Because of COVID-19, the company has also added VistaJet Protect, which removes all cancellation fees up to 48 hours prior to a scheduled departure for a 20 percent premium over the flight's price.



California management company **Silver Air** has introduced Flight Club, a three-tier program (Simple, Secure, and Stealth) that it labels as "not a card, a club." The Simple plan is pay-as-you-fly, with dynamic pricing and no membership fee. Secure provides fixed, all-inclusive hourly rates, guaranteed availability, and round-trip discounts, and requires a small monthly fee. Stealth is a customized, "build your own" membership (sans membership fee), allowing clients to choose the jet type, secure fixed-route pricing, and access a dedicated concierge. Hawaii is included in Silver Air's primary service area.



Maryland-based **AeroVanti**, launched this year, offers membership access in the Eastern U.S. to the Piaggio



Silver Air

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## VISTAJET HAS ORDERED A DOZEN MORE GLOBAL 7500 AND CHALLENGER 350 JETS.



Wheels Up

### Wheels Up Introduces Several Programs

Wheels Up, progenitor of the membership access model (the membership fee provides access to a closed fleet of aircraft), announced more roll-ups and product rollouts as it prepares for an IPO expected this year that would value the company at \$2.1 billion.

Product debuts in 2021 include Up for Business for the corporate market, which provides charter, aircraft management, and aircraft-ownership solutions, and allows members to book flights on Wheels Up and with partner Delta Air Lines. Also new: Long Flight Capped Rates for transcontinental flights, now topping out at \$8,995 or \$9,295 per hour (based on deposit level), which cuts the maximum cost for a six-hour flight by about 44 percent, the company says.

The New York-based company has also launched a loyalty program and opened some bookings to Delta SkyMiles members, allowing them to redeem miles for Wheels Up charters.

On the acquisitions front, the company bought Citation X super-midsize-jet operator Mountain Aviation, using its Colorado-based fleet to offer capped rates on flights between the East Coast and the Western U.S. (maximum \$29,995, seven-day advance booking).

Also this year, a security breach at Wheels Up data and booking platform Avianis affected data at several operators and management companies, though the extent of the compromise has not been disclosed. Meanwhile, in the first quarter, membership grew 56 percent year over year, to 9,896, the company reported.

DAVID MEINTOSH



## AIRSHARE'S FRACTIONAL PROGRAM GUARANTEES ACCESS FOR A SET NUMBER OF DAYS RATHER THAN HOURS.

P.180 Avanti, the Italian executive twin turboprop pusher, at “ultra-competitive pricing,” the company says. Monthly fees range from \$1,000 (individual) to \$2,500 (corporate), and the hourly rate is \$1,995.



**Airshare** will add up to 20 Challenger 350 super-midsize jets to its fractional fleet, three for delivery this year, and options for up to 17 more, part of a move to “expand the Airshare brand nationally,” says president and CEO John Owen. The Kansas-based AirShare currently operates only Phenom 300s.

Airshare’s fractional program guarantees owners access by the number of days, rather than hours; the minimum 1/16th share provides 20 days of unlimited flight time (maximum 14-hour crew duty day). Discounts for round and multi-leg trips can cut hourly costs more than a third, according to the company. Airshare also offers the Embark jet card, as well as aircraft management, on-demand charter, and maintenance services.



**Jet It’s** all-HondaJet program, introduced in 2018, offers day-based fractional shares and “hybrid charter” for customers planning to buy into its fleet of the distinctive, above-the-wing engine-mounted light jets. Now the program is expanding into Europe



via newly launched sister company JetClub, with a Maltese air operator certificate awarded in June. Jet It claims to be the world’s largest HondaJet operator.



After adding a pair of new Phenom 300Es last year, **Nicholas Air** in June introduced an additional 300E and a Citation Latitude to its fleet, with plans to acquire more of each. The pair bring Nicholas Air’s fractional fleet to 25 jets; an additional 12 managed aircraft are not on its charter certificate. The company reports that it registered 45 percent growth in flight hours and a 62 percent increase in revenue last year.



In the last three years, **Partners in Aviation’s** managed co-ownership program, which matches two prospective owners to share one aircraft, has cut the time to match from six months to two, founder Mark Molloy says. He cites the “critical mass” the company has reached in establishing a nationwide pool of co-owner candidates who share a geographic region and target aircraft category. Co-ownerships arranged thus far involve aircraft ranging from turboprops to heavy jets, Molloy says.



**Priester Aviation** sees rising demand among FAA Part 91 owners to use their aircraft for “internal charter,” making them available to businesses within their portfolios under Part 135 charter rules, rather than to third-party charter customers. An IRS regulation finalized this year exempts owners from paying federal excise tax (FET) for their flights on owned aircraft that are also used for on-demand charter. That regulation can exempt internal charter flights from FET charges as well, while also offering Part 135 liability protection, which is stronger

than Part 91 operations provide. Several of the Chicago-based charter and jet card operator’s Part 91 management customers “are taking advantage of the new structure,” company president and CEO Andy Priester says.



HondaJet access program operator **Jet Token**, founded in 2018, signed an order for four jets from the U.S. airframer in December and is offering HondaJet Elite fractional shares and jet cards under the Pearl service banner. A one-fifth share (\$1.25 million base price) provides 75 flight hours per year and a five-year term, has no monthly management fee, and bills quarterly. Las Vegas–headquartered Jet Token’s 25-hour jet card offers access 365 days a year and starts at \$123,750; a 10-day jet card provides all-day access for \$173,500 plus \$1,499 per flight hour.



European flight operator **Luxaviation** launched a U.S. expansion this year with a new Miami base and is poised to introduce America to its premium charter service and ancillary benefits, including Luxaviation Experiences bespoke travel packages. At the facility opening, group CEO Patrick Hansen called the U.S. market “more crucial than ever” to the Luxembourg-based bizav powerhouse’s future. All U.S. flights will use sustainable aviation fuel.

Luxaviation also expanded its European and Mideast charter fleets, adding a Bombardier Global 7500 and Gulfstream 600 based at London Luton—the first of each model available for charter from the U.K.; and an Embraer Lineage 1000 and Legacy 600 under San Marino Registry for the Mideast market.

**BJT**

*Note: Prices quoted in this article do not include federal excise tax.*

# How Long Will the Good Times Last for Business Jet Financing?

Though the answer is unclear, one thing is certain: more than ever before, you need professional help if you want to buy the right aircraft at the right price—or any aircraft at all.

by Jeff Wieand



**M**any banks expected 2020 to be a quiet year for business jet finance, but it turned out to be something of a roller coaster. For a while it was quiet; financings almost ground to a halt in the spring as the pandemic developed and transactions were adversely affected by uncertainties about where aircraft values were headed. The pace picked up as the year went on, though. And as soon as the vaccines arrived and (as one banker put it) people could see the light at the end of the COVID tunnel, interest in buying jets skyrocketed. For many jet financiers, 2020 ended with the busiest—and craziest—fourth quarter and December anyone can remember.

Several banks reported better-than-ever years for aircraft finance in 2020, with earnings 35 percent over budget at one and a record number of closings for jet financings at another. One banker told me his institution made an amount equal to its entire 2020 budget in the fourth quarter alone.

But not all the deals got done by year end. Closings held over from 2020 helped make the first quarter of 2021 very busy for many banks, and several aircraft finance departments reported record results for the first three months of 2021 as well. Overall, however, the lively pace at the end of 2020 has not carried into 2021, though banks and other business jet financiers remain busy. They just wonder how long the current activity level will continue.

Key factors likely to have an impact are not hard

to identify. First, though some bankers report that modest inflation has raised concerns among aircraft buyers, financing rates remain incredibly low and fixed-rate financings continue to rule the roost. As of this writing, at least, LIBOR is actually lower than it was a year ago. It is scheduled to go away in 2023, which will require banks to use a new index, and that in turn could cause floating rates to rise and necessitate new documents and add new transaction costs for current floating-rate loans.

Recent aircraft financings, however, have already provided a LIBOR replacement plan in many cases. Meanwhile, floating rates are well below 2 percent. Some lenders continue to use a “LIBOR floor” to ensure that floating-rate loans stay at an acceptable level.



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Fixed rates, on the other hand, generally remain in the mid 2 percent range (mid 3 percent for less-than-stellar credit). Lenders still want to finance only 90 percent (or less) of an aircraft's value, but 100 percent financing continues to be available at some banks for the right clients buying the right aircraft. Most lenders require a creditworthy borrower for the jet financings they provide, but for those who are willing to put down a higher percentage of an aircraft's value, PNC's asset-based jet financing may be appealing. Half of PNC's jet financings involve non- or limited-recourse loans with no financial disclosure, estimates Keith Hayes, senior vice president and national sales manager of its Aviation Finance division.

### Prepayment Penalties Are Higher

Even though rates are unlikely to be headed down, banks (especially those whose jet loans are made by equipment finance divisions) are perhaps more insistent these days on higher and longer-lasting prepayment penalties, and some banks are now asking for prepayment penalties for the first four years, instead of the standard three. High-net-worth individuals financing a jet purchase through their private bank are less likely to encounter prepayment penalties because such banks are more focused on keeping up good relations with their clients than, as one banker put it, "maintaining an earning asset."

A second factor sometimes mentioned as having an impact on jet finance is that the presidential election is over. Anxiety about where the country is headed in advance of a presidential election traditionally has a negative effect on the purchase of business jets, which abates once the election is over. This is borne out by the tidal wave of business jet transactions at the end of 2020.

A related factor is the continued availability of 100 percent bonus depreciation—the ability to write off the entire price of a jet in the year it is purchased and "placed in service" in the taxpayer's business. This is easier to accomplish if you acquire the jet at year end, when you need only a few business flights to capture the 100 percent deduction, at least for the moment. Concerns that the Biden administration might seek to cut back or even eliminate bonus depreciation also helped fuel the aircraft buying frenzy in late 2020. So far, these fears have proven unjustified, and 100 percent bonus depreciation remains fully available through the end of 2022 (2023 for "longer-production-period property" and "certain aircraft").

As Steve Altman at Citizens Bank points out, "how successful business jet finance will be this



ADOBE STOCK

## NON-BANK FINANCIAL INSTITUTIONS HAVE MORE LEVERAGE.

year depends on whether buyers can find an aircraft they want to buy." Manufacturers of new aircraft seem to have recovered from the slowdown in 2020, and the preowned markets for many business jet models have historically low availability. Unlike houses, where the market is also tight, business jets generally decline in value, as they are operated over a relatively short life span. Nevertheless, for some models, the lack of available aircraft has actually caused prices to go up.

More than ever, in this market, buyers need professional advice and assistance if they want to buy the right aircraft at the right price—or any aircraft at all. Some buyers are so desperate to acquire a preowned aircraft that they are foregoing a pre-purchase inspection, which may well prevent them from obtaining financing for the jet.

### Expect Shorter Amortization Periods

Any tightness in jet markets today is unlikely to affect assumptions by banks about depreciation over time or residual values. Bankers I've spoken to are assuming that business jets will depreciate between 6 and 9 percent per annum, depending on age and model. These assumptions directly affect loan amortization. Bankers today are more conservative, and the days of 20-year amortization are mostly over. Jet buyers can now expect loans to amortize over 10 to

15 years, which if nothing else helps prevent them from having to make a balloon payment at the end of the term that exceeds the aircraft's value.

Non-bank financial institutions have more leverage. Rob Polichetti at First National Capital says his institution can still offer 20-year amortization depending on the age of the aircraft, annual usage, and the loan-to-value ratio.

It remains to be seen whether the pandemic will have any significant long-range impact on business aviation. In 2020, lenders reported financing an unusual number of small jets like the Cessna CJ4 and HondaJet Elite for first-time buyers seeking to avoid the airlines or chartering other people's aircraft. To some extent, the influx of first-time buyers has continued. On the other hand, corporations have learned a great deal in the pandemic about working remotely and about the ease of attending virtual meetings instead of in-person ones that require traveling long distances.

As Jim Crowley at BciCapital (City National Bank in Florida) says, "There's still a huge amount of pent-up cash available that discourages financing jet purchases." It's hard for me to understand why. Most companies and individuals who can afford a business jet have better things to do with their money than invest it in an airplane. This is especially true given the low cost of borrowing today.

The major downside of financing a jet purchase is that, if you decide to sell it during the first few years, you may have to pay that prepayment penalty mentioned earlier. In any case, many buyers who are supposedly “paying cash” are actually borrowing on credit lines backed by securities at their private bank—securities that can decline in value and require posting additional collateral. Such loans may also be based on a lower loan-to-value ratio than the aircraft finance that is available (up to 90 or even 100 percent of the aircraft’s value). Under these circumstances, it certainly makes sense to consider a loan.

Concerns about aircraft values have continued to steer some banks away from lease financing. Leases depend on residual-value assumptions; when the lease is over, the lessor still owns the aircraft, so if the lessor overestimated what its fair market value would be at the end of the lease, it may be in trouble. Many banks that purchased and then leased business jets found themselves in that position as a result of the 2009 recession and have been wary of leases ever since, and the uncertainties about aircraft values during the pandemic haven’t helped the situation.

### Consider Leasing from Institutions Other than Banks

Banks thus have an incentive to be very conservative about residual values, and that tendency drives up the monthly lease rates and discourages jet leases. Alternatively, banks may just decide to stop writing leases altogether. For this reason, if you’re interested in a lease, it often makes sense to go to a financial institution that isn’t a bank, which may be less risk-averse and more willing to consider a lease.

But why lease an aircraft? A common rationale is that you don’t want to take the risk of owning a depreciating asset. Leasing may limit that risk, but it is worth remembering that, after having been burned in the past, bank lessors these days do their best to offer a lease rate and terms that are conservative enough to ensure that they don’t lose money.

Another rationale for leasing is a desire to keep the aircraft off the company balance sheet. This may work for private companies, but as a result of changes in accounting rules, information about the lease will still appear in public company filings.

A major concern about leases (as opposed to loans) is that it’s hard to get out. A seven-year lease, for example, might have an early-buyout option in year three or five, but otherwise the lessee’s only choice may be to stay in for the full term. You may be able to negotiate a lease termination with the lessor, but it’s likely to be costly unless you plan to replace the leased aircraft with one that will be financed by the lessor. You could also try to negotiate a right to terminate the lease in any month (usually after a blackout period of two or three years) at agreed-upon prices that are set forth on a monthly schedule in the lease.

In the end, the decision to borrow instead of lease often comes down to a desire to take advantage of 100 percent bonus depreciation, which would not be available for a lessee. Buyers who take a 100 percent tax deduction in the year the aircraft is placed in service should consult their aviation tax advisers regarding what must be done to preserve that deduction in future years.

Loan or lease, the key word is “shop.” Get proposals from several financial institutions, including banks that you have a relationship with. A listing of banks and finance companies offering business jet loans is readily available in the company directory at [BJTonline.com](http://BJTonline.com). **EJT**

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Rosen Aviation's OLED 4K displays offer vastly improved picture quality.

# Cabin Technology and Furnishings

A look at seven new products that are transforming the onboard experience.

*by James Wynbrandt*

We could fill this entire magazine with reports on the innovative new products and technologies that are redefining what's possible in a business jet cabin. Instead, we've culled through information on many dozens of the latest offerings and winnowed the list down to seven that we consider particularly noteworthy.

## Shape of Screens to Come

Rosen Aviation's OLED 4K displays, with diameters ranging from a few inches to well over four feet, provide a vastly improved viewing experience compared with current-generation onboard displays—and at a big weight savings. With power units and other

components, Rosen's 55-inch OLED (organic light-emitting diode) display is just 26 pounds—half the weight of current displays that size, according to the company.

OLED technology also boasts wider viewing angles, higher resolution, and better colors than LED displays. Plus, super-thin OLED panels can be bent to conform to a variety of shapes and surfaces, opening future application options throughout the cabin. Inputs include SDI, HDMI, Ethernet, and USB ports.

Created in partnership with Japan OLED, Rosen's 48- and 55-inch screens are slated for introduction this summer; the company expects 22-, 27-, and 32-inch displays to be released shortly thereafter,

first to manufacturers and then to the aftermarket.

Screens of other sizes will be available on demand. If you want to supersize, the same components are used in all, so weight increases for larger screens are only "incremental," the company says.

OLED display panels now cost significantly more than LEDs, but interior components are the same. So, according to a company representative, the final cost isn't stratospheric.

## Wi-Fi for Smaller Aircraft

Plane Simple antennas from Satcom Direct (SD) are on track to bring high-speed satellite connectivity down to airframes as small as turboprop singles at

prices well below those of the first-generation satellite broadband systems. The antennas incorporate just two line-replaceable units and simple wiring for easy, low-downtime installation.

The first two antennas—the Plane Simple Ku and Plane Simple Certus Leo—will access Intelsat’s FlexExec Ku-band network; and Iridium’s Certus LEO (low Earth orbit) satellite networks, respectively.

The Ku antenna, for super-midsize and larger business jets, features a 12-inch tail-mounted electronically steered, phased-array system developed with Germany’s QEST (Quantum Electronic Systems). It’s now on SD’s Gulfstream G350 and Falcon 2000LX, and customer evaluations commence this summer, with service entry expected in the third quarter of next year. Installation on Falcon 2000 series jets is near approval, with additional supplemental type certificates for aftermarket installations to follow by the end of this year, says SD president Chris Moore. The company is aiming for a “sub-\$400,000” cost for the Ku system, installation included.

The follow-on Plane Simple Certus Leo fuselage-mounted antenna, paired with the Certus 9810 transceiver, will deliver speeds up to 704 kbps to turboprop singles and larger aircraft, supporting high-definition video streaming and other bandwidth-intensive applications. With SD’s acceleration tools, the speed “will seem like more than a megabit per second,” Moore claims. Service entry is expected in the third quarter of 2023. No pricing has been announced.

New Satcom Direct equipment brings high-speed connectivity to small aircraft.



### Cover Story

While it can bring a cabin back to life, refreshing veneer, cabinetry, and other surfaces has traditionally been an exacting, time-consuming, and costly process. A new alternative, Duncan Aviation’s hydrodipping process, can produce similar results while saving cost and downtime and vastly expanding your interior designer’s toolkit.

One of the Lincoln, Nebraska MRO’s hydrographic solutions, hydrodipping is a film-transfer



Duncan Aviation uses a process called hydrodipping to expand cabin design options while reducing cost and downtime.

process that wraps a detailed 3D image—from fine-grain wood or stone to an abstract design or fanciful scene—onto almost any complex solid surface. Duncan adapted hydrodipping from the auto industry, developing mechanical arms and dipping tanks for smoothly transferring images onto interior components. Hydrodipping debuted in 2019 with faux-marble countertops and sinks. Today, an entire galley or interior cabinet can be hydrodipped.

Costs are 20 to 25 percent below those for traditional methods, says Nate Klenke, the company’s sales manager for modifications, and downtime is much less than the several weeks or more required for traditional woodwork. This year, Duncan received an urgent refreshment request from a Citation XLS operator who wanted the job done in just 10 days. On schedule, and in “a design similar to a flat-cut walnut veneer with a grey background,” Duncan removed, hydrodipped, and reinstalled the lavatory cabinet, vanity, aft dividers, pocket doors, drink rails, tables, left-hand forward galley, and right-hand forward entertainment cabinet.

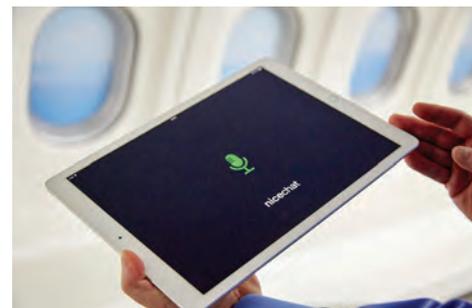
### Interior Monologue

You talk to Alexa or Siri, so why not talk to your cabin? Nicechat voice command from Lufthansa Technik will hear you.

“Consumers have the expectation of using voice

recognition in aircraft,” says the company’s Andrew Muirhead, citing the ubiquity of terrestrial voice-recognizing apps. But nicechat needs no onboard connectivity (the command library is stored locally) and will have more robust capabilities. “We’re focusing on things that take a little more effort than a simple ‘lights on, lights off,’” Muirhead says, citing choices usually made through menu displays, including ones involving entertainment modes and content, and environmental systems. But nicechat will be capable of learning, too. “The idea is that anyone interacting with the cabin-management system can make it the way they want it, based on personal preferences and where the aircraft is in the journey.”

Though developed to pair with the Hamburg, Germany MRO’s nice cabin management system, nicechat is easily adaptable to other such systems, and its debut appears at hand. Last year, Lufthansa Technik said it aimed for a 2021 service entry in partnership with an undisclosed manufacturer, with availability for aftermarket upgrades to follow shortly. The company says it has no update on the timeline.



Lufthansa Technik’s nicechat features advanced voice-command capabilities and will be available for aftermarket upgrades.

### Unplugged Command Performance

Cabin Management Solutions’ CMS Evolve cabin management and in-flight entertainment system can control lighting, window shades, and environmental, entertainment, and other systems without wires, reducing installation time and headaches. “It’s so modular and simple, an MRO can install it with minimal development time,” says Jeffrey McCormick, vice president of operations at the Texas company.

In fact, relieving MROs of the engineering burdens that wired CMS and IFE systems usually require was one of Evolve’s design goals. Its patented wireless technology communicates with devices connected to Evolve touch switch panels and remote-mount switches in the cabin. As a plus, eliminating cables or wiring throughout the aircraft also offers significant weight savings.

A supplemental type certificate for installations

Embraer's Praetor cabins employ recycled materials.



in the Dassault Falcon 900 has been approved and one for the Gulfstream G550 is in development. Most of Cabin Management Solutions' products are made using additive manufacturing technology, McCormick says, which speeds development and delivery times. Products are tested in the company's own lab, which can perform tests to RTCA DO-160 environmental standards. Cabin Management Solutions is now establishing dealerships and plans to begin taking orders for Evolve this fall.

### A Renewed Sense of Luxury

Embraer Executive Jets' cabin design concept for its flagship Praetor line (500/600) features an



The CMS Evolve cabin-management system reduces weight and wiring.

interior "that merges the digital future with sustainable resources," the Brazilian airframer says. That concept is expressed in cabinetry and tabletop surfaces made from palm tree wood sourced from commercial cultivation, rather than using wild heart of palm fruit, for example, and extensive use of recycled metals.

The salvaging was inspired by Mokume-gane, a Japanese technique of using mixed-metal laminates from discarded scraps to forge new patterns and exquisite works of art. Shortlisted for an International Yacht & Aviation Award, the Praetor cabin concept proposes, for example, deploying leftover titanium, copper, and plastic for luxurious cabinetry and tabletop surfaces. Meanwhile, Embraer says it is working rigorously with current and potential suppliers to expand its portfolio of materials that meet the company's sustainability criteria.

### Seats with a Healthy Tan

Concern about sustainability is now taking a front seat in business aviation cabins, but it's nothing new to the U.K.'s venerable Muirhead Leather—although the company's Active Hygiene Leather anti-microbial seat covering is.

Established in 1840, Muirhead counts itself among the world's most environmentally focused leather manufacturers, with expertise in creating



A seat covering from Muirhead Leather is self-cleaning and employs material that's effective against viruses.

"the most-natural, lowest-carbon, high-performance leather for seat covers," says sales director Archie Browning. The latest innovation, introduced this year, is Muirhead Active Hygiene Leather, a sustainable leather impregnated during production with Polygiene ViralOff, a self-cleaning anti-microbial material that's effective against viruses including those causing COVID-19 and SARS.

Active Hygiene Leather seating also significantly reduces the need for labor and caustic agents to keep cabins sanitary, the company claims. Active Hygiene Leather seats are now available for refurbishments, custom completions, and other onboard applications, and the company is working with manufacturers to bring them to new production aircraft.

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# The World's Best FBOs

American Aero

An annual survey by *Aviation International News* finds outstanding ground-service operations in the Americas and beyond.

by Curt Epstein

FBOs (short for fixed-base operations) play a vital role in business aviation. At airports worldwide, they offer parking areas, hangar space, towing, and fuel for private aircraft. In addition, they provide amenities and assistance for passengers, including comfortable lobbies, refreshment bars, conference rooms, and customer-service agents. For pilots, there are lounges, snooze rooms, flight-planning areas, and crew cars. Some FBOs even cover greens fees at golf courses for crewmembers who are awaiting the return of their passengers.

To determine which of those locations offer the best overall experiences, BJT's sister publication *Aviation International News* (AIN) has conducted an

annual FBO survey since 1981, polling a select subset of its readership, including pilots, flight schedulers, and dispatchers—those who can evaluate the operations most knowledgeably. These individuals have access to a website that allows them to rate FBOs at any time during the year. That allows them to keep their observations up to date, with their latest rating of a location replacing their previous one.

AIN annually publishes lists of the top-ranked FBOs in the Americas and the rest of the world based on cumulative average scores for the previous five years.

Respondents to the AIN survey are asked to rate facilities on a scale of 1 to 5 in the following categories:

**Line service:** competence and professionalism of the workers who meet the airplane on the ramp and service it.

**Passenger amenities:** quality of lobbies, lounges, and conference rooms, available refreshments, and availability of ground transportation.

**Pilot amenities:** availability and quality of pilot lounges, flight-planning facilities, snooze rooms, crew showers, entertainment and recreation offerings, and complementary crew cars.

**Facilities:** cleanliness, comfort, upkeep, and convenience of the location.

**Customer service:** professionalism of customer-service desk representatives, their familiarity with the

## TOP-RATED FBOs IN THE AMERICAS (BY OVERALL AVERAGE)

FBO	AIRPORT CODE	AIRPORT	OVERALL AVERAGE	CHANGE FROM LAST YEAR	
AMERICAN AERO	KFTW	FORT WORTH MEACHAM INTERNATIONAL	4.76	0.00	Top 5%
PENTASTAR AVIATION	KPTK	OAKLAND COUNTY INTERNATIONAL	4.76	0.01	
SHELTAIR	KTPA	TAMPA INTERNATIONAL	4.75	0.01	
HENRIKSEN JET CENTER	KEDC	AUSTIN EXECUTIVE	4.74	0.03	
JET AVIATION	KPBI	PALM BEACH INTERNATIONAL	4.73	-0.01	
WILSON AIR CENTER	KMEM	MEMPHIS INTERNATIONAL	4.73	-0.02	
BASE OPERATIONS AT PAGE FIELD	KFMY	PAGE FIELD	4.71	0.03	
HENRIKSEN JET CENTER	KTME	HOUSTON EXECUTIVE	4.71	N/A	
GLOBAL SELECT	KSGR	SUGAR LAND REGIONAL	4.70	-0.01	
WESTERN AIRCRAFT	KBOI	BOISE AIR TERMINAL/GOWEN FIELD	4.70	0.03	
BANYAN AIR SERVICE	KFXE	FORT LAUDERDALE EXECUTIVE	4.69	0.02	Top 10%
HERITAGE AVIATION	KBTV	BURLINGTON INTERNATIONAL	4.68	0.05	
SHELTAIR	KFLL	FORT LAUDERDALE/HOLLYWOOD INTL.	4.68	0.01	
STUART JET CENTER	KSUA	WITHAM FIELD	4.68	0.02	
BUSINESS JET CENTER	KDAL	DALLAS LOVE FIELD	4.67	-0.02	
MERIDIAN TETERBORO	KTEB	TETERBORO	4.67	-0.01	
SHELTAIR	KJAX	JACKSONVILLE INTERNATIONAL	4.67	0.03	
ATLANTIC AVIATION	KCRQ	McCLELLAN-PALOMAR	4.66	0.03	
FARGO JET CENTER	KFAR	HECTOR INTERNATIONAL	4.66	-0.01	
SHELTAIR	KORL	ORLANDO EXECUTIVE	4.66	0.05	
WILSON AIR CENTER	KCHA	LOVELL FIELD	4.65	-0.04	Top 10%
AERO-ONE AVIATION	KDHN	DOTHAN REGIONAL	4.64	N/A	
ATLANTIC AVIATION	KMKC	CHARLES B. WHEELER DOWNTOWN	4.64	-0.02	
MILLION AIR	KADS	ADDISON	4.64	0.00	
MODERN AVIATION	KAPA	CENTENNIAL	4.64	-0.01	
TEXAS JET	KFTW	FORT WORTH MEACHAM INTERNATIONAL	4.64	0.02	

FBOs with the same overall average are listed in alphabetical order.

local area, and their assistance with hotel reservations and catering arrangements.

The survey responses demonstrate that it is not enough to excel in only one of these areas. To be a top-ranked FBO, facilities and their staff must be great across the board.

Two FBOs share the honors for highest-rated location in the Americas for 2020 with an average five-year score of 4.76: American Aero FTW, at Fort Worth Meacham International Airport in Texas, and Pentastar Aviation, at Oakland County International Airport in Pontiac, Michigan.

### American Aero FTW Emphasizes Safety

While it has occupied its permanent facility for less than five years, American Aero FTW has made its name known in the Fort Worth area, scoring in the top 5 percent in the *AIN* FBO Survey each year since 2017 and earning last year's highest overall score.

Since its beginning in 2012, safety has been the cornerstone of the company, which was the world's first FBO to achieve Stage 1 and Stage 3 registration under the International Standard for Business Aviation Handling.

American Aero FTW is also well versed in customer service, with its staff undergoing Ritz-Carlton training. That focus earned the location its highest score this year in the customer-service category (4.86).

The FBO occupies a 34-acre leasehold at FTW, with 255,000 square feet



Pentastar Aviation

of hangar space capable of sheltering the latest top-of-the-line business jets. It expects to break ground soon on an additional 70,000 square feet of aircraft storage space, and it increased its Avfuel-branded fuel storage last year to 70,000 gallons of jet-A and 33,000 gallons of avgas.

American Aero FTW's 8,600-square-foot terminal features self-tinting glass windows, white-noise speakers embedded in the lobby walls, and sound-dampening materials to provide a tranquil environment. Other amenities include a soundproofed snooze room, shower facilities, a crew dining room with china service, a well-stocked refreshment bar, a 25-seat A/V-equipped conference room, and a

high-speed dishwasher for aircraft service items. The FBO offers 80 covered parking spaces to protect against the Texas sun.

### Pentastar Offers Wide-ranging Services

Pentastar Aviation, which has been in business for nearly six decades, started as the flight department for Chrysler Corporation. It eventually extended its services to other jet operators, and two decades ago it was purchased by Edsel B. Ford II, great-grandson of the legendary Henry Ford. Now a full-service FBO, the company has 229 employees and offers everything from aircraft

management and charter to interior refurbishments and 24-hour maintenance. It even has its own kitchen, Fivestar Gourmet, which supplies catering to aircraft operators as well as meals to airport workers and customers.

Pentastar's sprawling 22-acre complex includes 130,000 square feet of hangar space, which shelters 21 aircraft ranging from an Eclipse to a Boeing BBJ, and 10 acres of reinforced ramp space. The main 5,000-square-foot building offers passenger lounges, multimedia-equipped conference rooms, and a café, while the 10,000-square-foot two-story satellite Stargate terminal is equipped to handle large charter flights such as sports teams, with its own jet bridge, baggage carousel, and departure lounge.

The Avfuel location—which also serves as a DCA Approved Gateway for flights into Washington Reagan National Airport under the DASSP Program—has achieved IS-BAH Stage I registration and is certified under NATA's Safety 1st Clean Program for Covid mitigation.

Rounding out the top three slots in the Americas are Sheltair at Tampa International (4.75) and Henriksen Jet Center at privately owned Austin Executive Airport (4.74).

### European Service Providers Earn High Marks

Outside the Americas, European service providers earned four of the top five slots, with UK FBOs Farnborough Airport (4.66) and Universal Aviation at London Stansted Airport (4.61) taking the top two and ExecuJet Australia (4.50) rated third.

The UK's Farnborough Airport continued its more-than-decade-long reign as the highest-ranked FBO outside the Americas. While ground-support operations outside North America tend to lag in terms of scores, Farnborough's overall rating is high enough that the FBO, which our readers ranked second highest in the world this year in the facilities category (4.85), would place in the top 10 percent even among North American service providers.

Its immaculate three-story, 52,000-square-foot business aviation terminal features VIP customer lounges that can accommodate up to 60 people for high-volume flights, conference rooms, a crew lounge and snooze rooms, a work area, passenger and crew shower facilities, laundry service, and a gymnasium. Drive-through customs and immigration clearance is available.

Farnborough, which features 260,000 square feet of hangar space and an on-airport luxury hotel, is the first purpose-built business aviation airport to be certified as carbon-neutral. **BJT**

## TOP-RATED FBOs IN EUROPE, THE MIDDLE EAST, AFRICA, AND ASIA-PACIFIC

FBO	AIRPORT CODE	AIRPORT	OVERALL AVERAGE	CHANGE FROM LAST YEAR
FARNBOROUGH AIRPORT	EGLF	FARNBOROUGH	4.66	-0.01
UNIVERSAL AVIATION	EGSS	LONDON STANSTED	4.61	0.04
EXECUJET AUSTRALIA	YSSY	SYDNEY KINGSFORD SMITH	4.50	0.10
JET AVIATION	EHAM	AMSTERDAM SCHIPHOL	4.48	0.02
SIGNATURE FLIGHT SUPPORT	EDDM	MUNICH	4.48	N/A
MJETS	VTBD	DON MUEANG INTERNATIONAL	4.46	0.04
LONDON JET CENTRE	EGSS	LONDON STANSTED	4.42	-0.04
ECCELSA AVIATION	LIEO	OLBIA COSTA SMERALDA	4.41	0.08
OMNI HANDLING	LPPT	LISBON INTERNATIONAL PORTELA	4.41	N/A
SIGNATURE FLIGHT SUPPORT (Formerly TAG Aviation)	LSGG	GENEVA INTERNATIONAL	4.41	-0.02

FBOs with the same overall average are listed in alphabetical order.



Farnborough Airport



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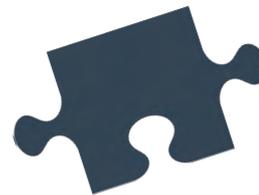
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## AIRCRAFT DIRECTORY

As soon as its first owner departs from the manufacturer’s delivery center, a new airplane technically becomes used (or preowned). For various reasons, however, 10 years after an aircraft’s final production date is generally considered the milestone separating “newer” used business aircraft from “older” ones.

In deciding which aircraft to cover, we went well past this 10-year mark to provide information on certified business airplanes and helicopters manufactured since 2000. This means our list includes some models built before that year, as long as they were still being produced as recently as 2000. As a rule, a long production run is indicative of a successful aircraft.

Visit [bjtonline.com/aircraft](http://bjtonline.com/aircraft) for an interactive version of these listings.

Our thanks to Conklin & de Decker, which provided nearly all of the production, specifications, and performance data for this directory, as well as cost figures.

### PRICING

Cost figures represent the manufacturers’ list prices for current or most-recently produced models.

### PASSENGER SEATING

The typical passenger seating on the aircraft is not the maximum certified seats. These numbers may vary for different operations (corporate, commercial, EMS, etc.).

### CABIN DIMENSIONS

Cabin volume is the interior volume, with headliner in place, without seats or other furnishings. Cabin width, height, and length are based on a completed interior. Width and height are the maximum within that cabin space. In “cabin-class” aircraft, the length is measured from the cockpit divider to the aft pressure bulkhead (or aft cabin bulkhead, if unpressurized). For small-cabin aircraft, the distance is from the cockpit firewall to the aft bulkhead.

### RANGE

For jets and turboprops, unless otherwise indicated, it’s the maximum IFR range with four passenger seats occupied, using the NBAA IFR alternate fuel reserve calculation for a 200-nautical-mile alternate. For helicopters, it’s the VFR range with all passenger seats occupied.

### PRODUCTION STARTED/ENDED

Year of the first delivery to the year of the last serial-number delivery.

N/A=Not Available

# JETS



Aircraft	Price (\$ millions)	Production		Cabin					Range (nm)
		Year started	Year ended	Pax (typical)	Volume (cu ft)	Height (ft)	Width (ft)	Length (ft)	
<b>AIRBUS</b>									
ACJ318 Elite	\$77.4	2005	N/A	19	5,300	7.3	12.1	70.9	6,360
ACJ319	\$82.0	1998	In Production	19	5,843	7.3	12.1	78.8	6,360
ACJ320	\$85.0	1989	In Production	19	6,825	7.3	12.1	91.0	6,360
ACJ321	\$115.0	1997	In Production	19	8,547	7.3	12.1	113.8	N/A
ACJ330-800	\$285.0	2014	In Production	25	N/A	7.9	17.3	147.8	10,400
ACJ330-900	\$366.5	2014	In Production	25	N/A	7.9	17.3	165.2	9,900
ACJ350XWB	\$380.0	2019	In Production	25	N/A	8.0	18.4	167.4	11,100
ACJ Two Twenty	\$81.0	2021	In Production	18	N/A	6.9	10.9	77.9	5,650
<b>BEECHCRAFT (TEXTRON AVIATION)</b>									
Beechjet 400A	\$6.7	1990	2003	7	305	4.8	4.9	15.6	1,318
Hawker 4000	\$22.9	2008	2012	8	746	6.0	6.5	25.0	3,177
Hawker 400XP	\$7.8	2004	2010	8	305	4.8	4.9	15.5	1,318
Hawker 750	\$13.3	2008	2011	8	551	5.8	6.0	21.3	2,081
Hawker 800XP	\$13.2	1995	2005	8	551	5.8	6.0	21.3	2,539
Hawker 800XPi	\$13.2	2005	2005	8	551	5.8	6.0	21.3	2,539
Hawker 800XPR	N/A	2011	N/A	8	551	5.8	6.0	21.3	2,825
Hawker 850XP	\$14.1	2006	2009	8	551	5.8	6.0	21.3	2,615
Hawker 900XP	\$16.1	2007	2012	8	551	5.8	6.0	21.3	2,825
Premier I	\$5.7	2001	2005	6	285	5.4	5.5	13.6	1,072
Premier IA	\$7.1	2006	2012	6	285	5.4	5.5	13.6	1,072
<b>BOEING</b>									
BBJ	\$71.4	1998	N/A	19	5,396	7.0	11.5	79.2	6,230
BBJ 2	\$88.8	2001	N/A	19	6,525	7.0	11.5	98.5	5,722
BBJ 3	\$96.5	2006	N/A	19	7,290	7.0	11.5	107.3	5,722
BBJ Max 7	\$91.2	2018	In Production	19	N/A	N/A	N/A	85.7	7,000 (8 pax)
BBJ Max 8	N/A	2018	In Production	25	N/A	7.1	11.5	98.3	6,640
BBJ Max 9	N/A	2020	In Production	30	N/A	7.1	11.5	107.2	6,515
<b>BOMBARDIER</b>									
Challenger 300	\$21.0	2003	2014	8	930	6.1	7.2	23.7	3,220
Challenger 350	\$26.7	2014	In Production	8	930	6.1	7.2	23.7	3,356
Challenger 604	\$26.8	1996	2007	10	1,146	6.1	8.2	28.4	4,033
Challenger 605	\$21.0	2007	2015	10	1,146	6.1	8.2	28.4	4,063
Challenger 650	\$32.4	2015	In Production	10	1,146	6.1	8.2	28.4	4,000
Challenger 850	\$32.0	2006	2012	15	1,964	6.1	8.2	48.4	2,946
Global 5000	\$50.4	2005	2018	13	1,889	6.3	8.2	42.5	5,137
Global 5500	\$46.0	2019	In Production	12-17	1,889	6.2	8.0	40.8	5,900 (8 pax)
Global 6000	\$62.3	2012	2018	13	2,002	6.3	8.2	48.4	6,600 (8 pax)



Falcon 8X

**JETS** continued



Aircraft	Price (\$ millions)	Production		Cabin					Range (nm)
		Year started	Year ended	Pax (typical)	Volume (cu ft)	Height (ft)	Width (ft)	Length (ft)	
<b>Bombardier (continued)</b>									
Global 6500	\$54.0	2019	In Production	12-17	2,002	6.2	8.0	40.8	6,600
Global 7500	\$72.8	2019	In Production	14	2,637	6.2	8	54.4	7,700
Global Express	\$45.5	1999	2005	13	2,002	6.3	8.2	48.4	6,460
Global Express XRS	\$58.5	2005	2012	13	2,002	6.3	8.2	48.4	6,390
Learjet 31A	\$6.5	1991	2003	6	281	4.4	5.0	12.9	1,251
Learjet 40	\$8.0	2004	2007	6	369	4.9	5.1	17.7	1,631
Learjet 40XR	\$10.8	2005	2012	6	369	4.9	5.1	17.7	1,601
Learjet 45	\$10.3	1998	2007	8	415	4.9	5.1	19.8	1,889
Learjet 45XR	\$13.2	2003	2012	8	415	4.9	5.1	19.8	1,841
Learjet 60	\$12.6	1993	2003	7	447	5.7	5.9	17.7	2,134
Learjet 60XR	\$14.7	2007	2013	7	447	5.7	5.9	17.7	2,182
Learjet 70	\$11.3	2013	N/A	6	369	4.9	5.1	17.7	1,920
Learjet 75 Liberty	\$13.8	2013	2021	8	415	4.9	5.1	19.8	1,899



Aircraft	Price (\$ millions)	Production		Cabin					Range (nm)
		Year started	Year ended	Pax (typical)	Volume (cu ft)	Height (ft)	Width (ft)	Length (ft)	
<b>CESSNA (TEXTRON AVIATION)</b>									
Citation Bravo	\$6.2	1997	2006	7	292	4.7	4.8	15.8	1,610
Citation CJ1	\$4.2	2000	2005	5	201	4.8	4.8	11.0	887
Citation CJ1+	\$5.2	2005	2011	5	201	4.8	4.8	11.0	1,022
Citation CJ2	\$5.7	2000	2006	6	248	4.8	4.8	13.6	1,331
Citation CJ2+	\$6.5	2005	2015	6	248	4.8	4.8	13.6	1,452
Citation CJ3	\$7.3	2004	2015	6	286	4.8	4.8	15.7	1,748
Citation CJ3+	\$8.3	2014	In Production	6	286	4.8	4.8	15.7	2,040
Citation CJ4	\$9.2	2010	In Production	7	293	4.8	4.8	17.3	2,022
Citation Encore	\$8.1	2000	2006	7	314	4.8	4.8	17.3	1,695
Citation Encore+	\$9.2	2007	2009	7	314	4.8	4.8	17.3	1,712
Citation Excel	\$10.3	1998	2004	7	422	5.7	5.5	18.5	1,786
Citation Latitude	\$16.7	2015	In Production	9	587	6.0	6.4	21.1	2,787
Citation Longitude	\$27.0	2019	In Production	8	N/A	6.0	6.0	25.0	3,422
Citation M2	\$4.7	2013	In Production	6	201	4.8	4.8	11.0	1,550
Citation Mustang	\$3.5	2006	2017	4	163	4.5	4.6	9.8	800
Citation Sovereign	\$17.8	2004	2013	9	571	5.7	5.5	25.3	2,920
Citation Sovereign+	\$17.9	2013	2021	9	585	5.7	5.5	25.3	3,095
Citation VII	\$11.4	1992	2000	7	422	5.7	5.5	18.4	1,742
Citation X	\$23.1	1996	2012	8	538	5.7	5.5	23.9	3,140
Citation X+	\$23.4	2014	2018	8	593	5.7	5.5	25.2	3,460
Citation XLS	\$11.3	2004	2009	8	422	5.7	5.5	18.5	1,871
Citation XLS+	\$13.0	2008	In Production	8	422	5.7	5.5	18.5	1,896
<b>CIRRUS</b>									
SF50 Vision	\$2.3	2016	2018	4	170	4.1	5.1	11.5	1,200
SF50 G2+ Vision	\$2.3	2019	In Production	4	170	4.1	5.1	11.5	1,200
<b>DASSAULT</b>									
Falcon 7X	\$53.8	2007	In Production	12	1,506	6.2	7.7	39.1	5,754
Falcon 8X	\$57.5	2015	In Production	12	1,695	6.2	7.7	42.7	6,450
Falcon 50EX	\$21.4	1997	2007	9	569	5.9	6.1	23.5	3,366
Falcon 900B	\$26.2	1986	2000	12	1,270	6.2	7.7	33.2	4,000
Falcon 900C	\$31.6	1998	2005	12	1,270	6.2	7.7	33.2	4,000
Falcon 900DX	\$38.0	2005	2010	12	1,270	6.2	7.7	33.2	4,050
Falcon 900EX EASy	\$41.4	2003	2010	12	1,270	6.2	7.7	33.2	4,630
Falcon 900LX	\$43.8	2010	In Production	12	1,270	6.2	7.7	33.2	4,750
Falcon 2000	\$24.6	1995	2007	10	1,028	6.2	7.7	31.2	3,213
Falcon 2000DX	\$29.5	2008	2010	10	1,028	6.2	7.7	31.2	3,378
Falcon 2000EX EASy	\$30.2	2004	2009	10	1,028	6.2	7.7	31.2	3,878
Falcon 2000LX	\$32.9	2007	2013	8	1,028	6.2	7.7	31.2	4,079
Falcon 2000LXS	\$34.1	2013	In Production	8	1,028	6.2	7.7	31.2	4,046
Falcon 2000S	\$28.9	2013	In Production	10	1,028	6.2	7.7	31.2	3,539
<b>ECLIPSE AEROSPACE</b>									
Eclipse 500	N/A	2006	2008	3	109	4.2	4.7	7.6	574
Eclipse 550	\$2.9	2013	2017	3	109	4.2	4.7	7.6	1,125

## JETS continued



Aircraft	Price (\$ millions)	Production		Cabin					Range (nm)
		Year started	Year ended	Pax (typical)	Volume (cu ft)	Height (ft)	Width (ft)	Length (ft)	
<b>EMBRAER</b>									
Legacy 450	\$16.6	2015	In Production	7	705	6.0	6.8	24.0	2,844
Legacy 500	\$20.0	2014	In Production	8	705	6.0	6.8	27.5	3,095
Legacy 600	\$26.0	2002	2015	13	1,656	6.0	6.9	49.8	3,429
Legacy 650	\$31.6	2010	2017	13	1,656	6.0	6.9	49.8	3,919
Legacy 650E	\$25.9	2017	2019	13	1,656	6.0	6.9	49.8	3,919
Lineage 1000	\$53.0	2009	2013	19	3,914	6.6	8.8	84.3	4,554
Lineage 1000E	\$53.0	2013	2020	19	3,914	6.6	8.8	84.3	4,600
Phenom 100	\$4.1	2008	2013	5	212	4.9	5.1	11.0	1,045
Phenom 100E	\$4.3	2013	2017	5	212	4.9	5.1	11.0	1,178
Phenom 100EV	\$4.3	2016	In Production	5	212	4.9	5.1	11.0	1,178
Phenom 300	\$9.0	2009	2017	7	324	4.9	5.1	17.2	1,974
Phenom 300E	\$9.5	2017	In Production	7	324	4.9	5.1	17.2	1,811
Praetor 500	\$16.9	2018	In Production	7	705	6	6.9	24	3,340
Praetor 600	\$20.9	2018	In Production	8	705	6	6.9	27.6	4,018

<b>GULFSTREAM</b>									
GIV-SP	\$32.8	1992	2002	13	1,658	6.2	7.3	45.1	4,136
GV	\$43.1	1995	2002	13	1,812	6.2	7.3	50.1	6,500
G100	\$12.1	2001	2006	7	304	5.6	4.8	17.1	2,790
G150	\$15.7	2006	2016	7	521	5.8	5.8	17.7	3,018
G200	\$23.3	1999	2011	8	869	6.3	7.2	24.5	3,394
G280	\$24.5	2012	In Production	8	888	6.3	7.2	32.3	3,400
G300	\$25.5	2003	2004	13	1,658	6.2	7.3	45.1	3,774
G350	\$36.0	2005	2012	14	1,658	6.2	7.3	45.1	3,846
G400	\$32.5	2003	2004	13	1,658	6.2	7.3	45.1	4,136
G450	\$43.2	2005	2016	14	1,658	6.2	7.3	45.1	4,363
G500 (Old Model)	\$50.5	2003	2012	18	1,812	6.2	7.3	50.1	5,910
G500	\$43.5	2018	In Production	13	1,715	6.3	7.9	41.5	5,200
G550	\$61.5	2003	2021	18	1,812	6.2	7.3	50.1	6,820
G600	\$57.9	2019	In Production	19	1,884	6.2	7.5	45.2	6,500 (8 pax)
G650	\$64.5	2012	In Production	18	2,421	6.4	8.5	53.6	7,000
G650ER	\$66.5	2014	In Production	18	2,421	6.4	8.5	53.6	7,500
G700	\$75.0	2019	N/A	19	N/A	6.3	8.2	56.9	7,000

<b>HONDA AIRCRAFT</b>									
HA-420 HondaJet	\$4.5	2012	2018	5	N/A	4.8	5.0	12.1	1,223
HA-420 HondaJet Elite	\$5.3	2018	2021	5	N/A	4.8	5.0	12.1	1,437
HA-420 HondaJet Elite S	\$5.4	2021	In Production	5	N/A	4.8	5.0	17.8	422

<b>NEXTANT AEROSPACE</b>									
Nextant 400XT*	N/A	1986	2003	7	305	4.8	4.9	15.5	2,005
Nextant 400XTi*	\$5.2	2004	In Production	7	305	4.8	4.9	15.5	2,013



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## AIRCRAFT DIRECTORY

### JETS continued



Aircraft	Price (\$ millions)	Production		Cabin					Range (nm)
		Year started	Year ended	Pax (typical)	Volume (cu ft)	Height (ft)	Width (ft)	Length (ft)	
<b>PILATUS</b>									
PC-24	\$10.1	2017	In Production	8	501	5.1	5.6	23	2,000
<b>SYBERJET</b>									
SJ30	\$7.3	2006	2010	5	210	4.3	4.7	12.5	1,876

### TURBOPROPS



Aircraft	Price (\$ millions)	Production		Cabin					Range (nm)
		Year started	Year ended	Pax (typical)	Volume (cu ft)	Height (ft)	Width (ft)	Length (ft)	
<b>BEECHCRAFT (TEXTRON AVIATION)</b>									
King Air 250	\$6.3	2011	2020	6	303	4.8	4.5	16.7	1,051
King Air 260	N/A	2021	In Production	9	303	4.7	4.5	16.8	1,720
King Air 350	\$6.4	1990	2009	8	344	4.8	4.5	19.2	1,535
King Air 350ER	\$7.8	2008	2009	8	344	4.8	4.5	19.2	1,878
King Air 350i	\$7.4	2010	2020	8	344	4.8	4.5	19.2	1,535
King Air 350iER	\$8.4	2010	2020	8	344	4.8	4.5	19.5	2,238
King Air 360	N/A	2020	In Production	11	344	4.7	4.5	19.5	1,806
King Air 360ER	N/A	2020	In Production	15	344	4.7	4.5	19.5	2,692
King Air B200	\$5.3	1981	2008	6	303	4.8	4.5	16.7	1,164
King Air B200GT	\$5.9	2008	2013	6	303	4.8	4.5	16.7	1,164
King Air C90B	\$2.8	1992	2005	5	218	4.8	4.5	12.4	828
King Air C90GT	\$3.0	2006	2007	5	218	4.8	4.5	12.4	869
King Air C90GTi	\$3.4	2008	2010	5	218	4.8	4.5	12.4	869
King Air C90GTx	\$3.8	2010	2020	5	218	4.8	4.5	12.4	1,061
<b>CESSNA (TEXTRON AVIATION)</b>									
208 Caravan	\$2.0	1985	In Production	9	271	4.5	5.3	12.8	831
208B Grand Caravan	\$2.2	1990	2013	9	352	4.5	5.3	16.4	786
208B Grand Caravan EX	\$2.6	2013	In Production	9	352	4.5	5.3	16.8	738
<b>DAHER</b>									
TBM 700C2	\$2.7	2003	2006	5	143	4.1	4.0	10.0	1,024
TBM 850	\$3.4	2008	2013	5	143	4.1	4.0	10.0	1,171
TBM 900	\$3.9	2014	2015	5	143	4.1	4.0	10.0	1,730
TBM 910	\$3.9	2017	In Production	5	143	4.1	4.0	10.0	1,730



Pilatus PC-12 NGx

## TURBOPROPS continued



Aircraft	Price (\$ millions)	Production		Cabin					Range (nm)
		Year started	Year ended	Pax (typical)	Volume (cu ft)	Height (ft)	Width (ft)	Length (ft)	
<b>Daher (continued)</b>									
TBM 930	\$3.9	2016	2019	5	143	4.1	4.0	10.0	1,730
TBM 940	\$4.1	2019	In Production	5	143	4.1	4.0	10.0	1,730
Kodiak 100 Series II	\$2.2	2008	2021	5	248	4.5	4.8	15.5	1,132
Kodiak 100 Series III	N/A	2021	In Production	5	N/A	4.7	4.5	15.9	1,720

### EXTRA AIRCRAFT

Extra 500	\$1.7	2002	2015	5		4.1	4.6	13.6	1,588
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### NEXTANT AEROSPACE

Nextant G90XT*	\$2.6	N/A	N/A	5	218	4.8	4.5	12.4	1,240
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\*The XT and XTi variants are part of a factory remanufactured program.

### PIAGGIO

Avanti Evo	\$7.4	2005	In Production	6	393	5.8	6.1	17.5	1,410
Avanti P180	\$6.4	1990	2005	6	393	5.8	6.1	14.9	1,300
Avanti P180 II	\$7.2	2014	2015	6	393	5.8	6.1	17.5	1,410

## AIRCRAFT DIRECTORY



Aircraft	Price (\$ millions)	Production		Cabin					Range (nm)
		Year started	Year ended	Pax (typical)	Volume (cu ft)	Height (ft)	Width (ft)	Length (ft)	
<b>PILATUS</b>									
PC-12	\$3.4	1995	2008	7	356	4.8	5.0	16.9	1,604
PC-12 NG	\$4.9	2008	2019	7	356	4.8	5.0	16.9	1,638
PC-12 NGX	\$5.4	2019	In Production	7	356	4.8	5.0	16.9	1,803
<b>PIPER</b>									
M500	\$2.2	2015	In Production	5	164	3.9	4.2	12.3	1,000
M600	\$2.9	2016	In Production	5	165	3.9	4.2	12.3	1,812
Meridian PA 46TP	\$2.2	2001	2015	5	106	3.9	4.2	12.3	1,000
<b>VIKING AIR</b>									
DHC-6-400 Twin Otter	\$5.9	2010	In Production	19	581	4.9	5.3	18.5	485

## ROTORCRAFT



Aircraft	Price (\$ millions)	Production		Cabin					Range (nm)
		Year started	Year ended	Pax (typical)	Volume (cu ft)	Height (ft)	Width (ft)	Length (ft)	
<b>AIRBUS HELICOPTERS</b>									
AS332L1 Super Puma	\$21.7	1986	2011	12	479	5.1	5.9	22.3	406
AS332L2 Super Puma	\$14.8	1993	2007	9	479	5.1	5.9	25.8	392
AS350B2	\$2.4	1990	2014	4	61	4.3	5.4	6.6	312
AS350B3 (2B)	\$1.9	1997	2008	4	61	4.3	5.4	6.6	300
AS350B3 (2B1)	\$2.1	2008	2011	4	61	4.3	5.4	6.6	300
AS355N TwinStar	\$2.5	1993	2006	3	106	4.3	5.4	6.6	320
AS355NP TwinStar	\$3.9	2007	2014	4	61	4.3	5.4	6.6	315
AS365N2 Dauphin	\$6.7	1990	2001	6	186	4.6	6.3	7.2	420
AS365N3 Dauphin	\$8.6	1998	2010	6	186	4.6	6.5	7.2	354
AS365N3+ Dauphin	\$10.5	2011	In Production	6	186	4.6	6.5	7.2	341
BK117C1	\$4.1	1992	2003	8	147	4.2	4.9	6.7	221
EC130B4	\$2.4	2000	2012	5	65	4.2	6.1	7.2	280
EC135P1	\$3.4	1997	2004	5	100	4.2	4.7	5.9	254
EC135P2	\$4.5	2004	2006	5	100	4.2	4.7	5.9	254
EC135P2+	\$4.7	2006	2011	5	100	4.2	4.7	5.9	254
EC135P2e	\$5.2	2011	2014	5	100	4.2	4.7	5.9	278
EC135T1	\$3.5	1997	2004	5	100	4.2	4.7	5.9	262
EC135T2	\$3.7	2004	2006	5	100	4.2	4.7	5.9	262
EC135T2+	\$4.7	2006	2011	5	100	4.2	4.7	5.9	254
EC135T2e	\$5.2	2011	2014	5	100	4.2	4.7	5.9	256
EC145	\$8.7	2001	In Production	8	143	4.2	5.6	7.4	274
H120	\$2.0	1997	In Production	4	54	4.1	4.4	7.5	240

# ROTORCRAFT continued



Aircraft	Price (\$ millions)	Production		Cabin					Range (nm)
		Year started	Year ended	Pax (typical)	Volume (cu ft)	Height (ft)	Width (ft)	Length (ft)	
<b>Airbus Helicopters (continued)</b>									
H125	\$2.9	2011	In Production	4	61	4.3	5.4	6.6	300
H130	\$3.3	2012	In Production	5	65	4.2	6.1	7.2	268
H135 (P3)	\$5.5	2014	In Production	5	100	4.2	4.7	5.9	278
H135 (T3)	\$5.7	2014	In Production	5	100	4.2	4.7	5.9	256
H145	\$9.7	2013	In Production	8	143	4.2	5.6	7.4	260
H155	\$13.8	2003	In Production	6	225	4.4	6.7	8.4	373
H175	\$16.8	2012	In Production	10	434	4.6	6.8	12.5	390
H215C1	\$18.4	2016	In Production	12	N/A	5.1	5.9	19.6	406
H215L1	\$18.4	2016	In Production	12	479	5.1	5.9	22.3	406
H225	\$27.9	2005	In Production	12	595	4.8	5.9	25.8	354

## BELL TEXTRON

206B3	\$1.4	1977	2010	3	54	4.2	3.9	3.3	270
206L4	\$2.6	1993	2017	5	73	4.2	3.9	5.0	253
407	\$3.1	1996	2011	5	84	4.2	4.8	5.0	293
407GX	\$3.0	2013	2017	5	84	4.2	4.8	5.0	337
407GXi	N/A	2018	In Production	5	84	4.2	4.8	5.0	337
407GXP	\$3.5	2013	2018	5	84	4.2	4.8	5.0	337
412EP	\$11.2	1994	In Production	6	208	4.4	8.0	8.6	337
412EPi	\$11.0	2013	In Production	6	208	4.4	8.0	8.6	312
427	\$4.3	1999	2010	5	102	4.2	4.6	5.8	325
429	\$6.4	2009	In Production	5	130	4.1	5.0	9.8	276
430	\$8.0	1996	2008	5	158	4.8	4.8	8.3	276
505 Jet Ranger X	\$1.5	2016	In Production	4	61	4.4	4.8	7.2	242

## ENSTROM

280FX	\$0.48	1985	In Production	1	40	3.9	4.4	4.1	214
480	\$0.46	1994	2000	3	32	4.0	5.7	5.0	155
480B	\$1.2	2001	In Production	3	32	4.0	5.5	5.0	165
F-28F	\$0.47	1981	In Production	1	40	3.9	4.4	4.1	214

## LEONARDO

AW101	\$28.0	1994	In Production	10	970	6.2	8.2	21.3	466
AW109 Grand	\$6.4	2005	2010	5	178	4.2	5.3	7.7	360
AW109 GrandNew	\$5.5	2010	In Production	5	178	4.2	5.3	7.7	357
AW109 K2	\$3.8	1993	2003	5	125	4.3	4.7	5.4	75
AW109 Power	\$4.8	1997	2014	5	125	4.2	5.3	6.9	260
AW109 Trekker	\$5.0	2014	In Production	5	178	4.2	5.3	7.7	357
AW119 Ke	\$3.6	2007	2013	5	121	4.2	5.3	6.9	380
AW119 Koala	\$3.0	2000	2006	5	121	4.2	5.3	5.8	380
AW119 Kx	\$3.3	2013	In Production	5	121	4.2	5.3	6.9	380
AW139	\$11.0	2004	In Production	8	282	4.7	7.2	8.9	460
AW139 Enhanced	\$11.0	2016	In Production	8	282	4.7	7.2	8.9	460
AW169	\$8.0	2014	In Production	6	223	4.3	6.7	7.1	366
AW189	\$15.3	2015	In Production	8	396	4.7	8	11.41	600



Leonardo AW139



Aircraft	Price (\$ millions)	Production		Cabin					Range (nm)	
		Year started	Year ended	Pax (typical)	Volume (cu ft)	Height (ft)	Width (ft)	Length (ft)		
<b>MD HELICOPTERS</b>										
MD500E	\$1.9	1983	In Production	3	51	4.4	4.5	3.5	174	
MD500ER	\$1.9	1983	In Production	3	51	4.4	4.5	3.5	174	
MD520N	\$2.6	1992	In Production	3	51	4.4	4.5	3.5	138	
MD530F	\$2.5	1984	In Production	3	51	4.4	4.5	3.5	206	
MD600N	\$2.9	1997	In Production	5	92	4.4	4.5	6.0	235	
MD902 Explorer	\$7.2	1998	In Production	4	113	4.1	4.8	6.3	205	
<b>ROBINSON</b>										
R22 Beta II	\$0.30	1997	In Production	1	N/A	4.0	3.6	4.3	161	
R44 Cadet	\$0.34	2016	In Production	1	46	4.1	3.8	5.7	204	
R44 Raven I	\$0.42	2003	In Production	3	46	4.1	3.8	5.7	204	
R44 Raven II	\$0.53	2003	In Production	3	46	4.1	3.8	5.7	251	
R66 Turbine	\$1.0	2010	In Production	3	50	4.3	4.5	6.7	260	
<b>SIKORSKY</b>										
S-76C+	\$8.5	1996	2005	6	205	4.5	6.3	8.8	335	
S-76C++	\$11.6	2006	2013	6	205	4.5	6.3	8.8	335	
S-76D	\$15.0	2013	In Production	6	205	4.5	6.3	8.8	329	
S-92	\$27.0	2002	In Production	10	685	6.0	6.4	19.2	439	



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# FALCON 6X

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## CHANGE IS IN THE WIND

DASSAULT AVIATION READIES  
FALCON 6X FOR ENTRY INTO SERVICE

# DASSAULT AVIATION GOES BIG IN THE LONG-RANGE SEGMENT



Dassault Aviation's calling card has long been lean, agile aircraft that reflect fighter jet heritage, never lacking comfort, but still presenting a comparatively modest ramp presence. More the efficient sports sedan than the grand SUV of intercontinental jets.

The pilot-pleasing 7X, the first business jet with a digital flight control system, typified this ethos. Its handling and smooth ride inspired confidence in pilots and their passengers. The fly-by-wire 8X offered more passenger space, more range and the quietest cabin in the sky.

In the all-new 6X, scheduled to enter service in 2022, Dassault has taken the next step with

advanced flight control technology (test pilots already give its handling raves), while abandoning any shyness about putting a bigger airplane on the ramp.

Change is in the wind, and Dassault is adapting with renewed emphasis on the passenger experience. "Times and trends change," says Carlos Brana, Dassault's Executive Vice President, Civil Aviation, discussing the evolution of the large-cabin segment. "Passengers want space and the comforts of home, especially on long flights. They very much want to stroll up and down the aisle, to freely visit and mingle with passengers in other sections of the aircraft—and not be hunched over because of low ceiling height."

## A TRUE WIDEBODY CABIN

The 6X introduces a new standard in long range cabins. "It is wider and taller than current business jets," says Brana. With a width of eight feet six inches (2.58 meters) and height of six feet six inches (1.98 meters), it has the largest cross section of any business jet flying. It will be eclipsed in cabin size only by the Falcon 10X ultra-long-range jet now in development.

The interior design, from Dassault Aviation's in-house Design Studio, launches a new aesthetic—all flowing, uninterrupted lines that enhance the feeling of spaciousness. "Homes used to have dedicated dining rooms set apart from kitchens," Brana notes. "Today, home buyers want big open expanses for families to congregate, dine, and relax. It's a bit the same for business jets."



Reflecting the design team's achievement, the 6X cabin has received several prestigious design awards, including the 2021 Red Dot prize for premium cabin design, the International Yacht & Aviation Award, and recognition as the "Best of the Best" in aviation in 2021 by the Robb Report.

The cabin is divided into three living areas, in part so that passengers on long flights can choose a spot for rest, work or dining. The 6X can carry 16 in comfort, but typical passenger loads will be far smaller, allowing teams or families to really spread out and relax.

Operators can customize each section according to their tastes, and also optimize certain areas for the type of mission they will fly. Those who routinely travel long distances can choose an extended entryway for more galley storage space and equipment. Opposite a longer galley, operators can opt for a crew rest area allowing a resting pilot privacy and the space to lie flat and get some quality off-duty time.

At the other end of the cabin, operators can opt for private lounge or stateroom configurations so that passengers can also rest peacefully and have the privacy to change either into more comfortable flight attire or business clothes to look sharp upon arrival.

Times have also changed, notes Brana, with regard to expectations of a healthier environment on board. "Passengers want better air filtration, lower pressure altitudes, more natural light, and ultra-quiet cabins."

In the 6X, cabin air is refreshed continuously and run through hospital-grade HEPA filters for the healthiest possible experience. Cabin altitude pressurization is maintained at a low 3,900 feet (1,189 m), when cruising at 41,000 feet (12,497 m), greatly reducing fatigue.

Thirty extra-large windows in the 6X offer nearly 5,000 square inches — some 35 square feet — of viewing/window space, the largest in the aircraft's class. A unique skylight in the entryway adds natural light to a part of the cabin that is usually difficult to illuminate well. And even allows a bit of stargazing at night high above any haze or city lights.

The abundant ambient light is complemented by a new LED lighting system that adds another dimension to passenger comfort. "We are able to adapt cabin lighting to work with circadian rhythms and help passengers adjust to multiple time zones," Brana says. "But jet lag is more than disrupted circadian rhythms. We've combined improved natural and cabin lighting with fresh air flow, low cabin altitude and a serene, quiet cabin to overcome travel fatigue almost completely."

**Winner of the 2021 Red Dot prize for premium cabin design, and "Best of the Best" in aviation by the Robb Report.**



# LEADING EDGE ADVANCES

## THE QUIETEST CABIN

Dassault plans a cabin as quiet as the 8X, which leads the industry in the sounds of silence. At an average of 49dB, the 8X in flight is as quiet as a living room in the suburbs. To achieve equivalent sound reduction in the 6X, Dassault will acoustically map the cabin of a test aircraft equipped with a full interior. With this process, Dassault is able to identify noise “hotspots” and apply the correct materials and dampeners to eliminate them.”

## ONBOARD COMMUNICATION AND ENTERTAINMENT

Dassault recognizes that passengers are interacting with technology in new ways. While they can still enjoy streaming content on bulkhead or side ledge monitors, it’s more likely they’ll want entertainment and news on their personal devices. Passengers will be able

to manage all this content, including a vast library of news and entertainment programming through the FalconCabin app. For communications they’ll have worldwide high-speed broadband connectivity thanks to an optional Ka-band connection, once again through their own devices. Service subscriptions are easily managed by the flight department through another app called FalconConnect.

As expensive as aircraft in the Falcon 6X class are to operate, flight departments and owners do care about efficiencies, and FalconConnect lets a flight department monitor and manage communications service to satisfy passenger needs, while minimizing costs.

## THE FRENCH TOUCH

All business jet interiors today exude luxury, but Dassault has a more distinctive style, which it proudly refers to as the “French touch.” “It’s a unique combination of premium styling and elegance with high-tech innovation, a blending of the most advanced digital

design and finest old-world craftsmanship,” Brana says. “When the world thinks about French products, they probably first think of Hermes scarves and Dom Perignon champagne. Probably no one outside of the aerospace industry thinks of the Rafale fighter or CATIA,” Dassault Systèmes’ 3D industrial design software relied on by industries worldwide. “We have this soft and hard side to the French touch that creates something unique — powerful and sensuous; tough and gentle. In the cabin, this translates to functionality and a sensuality our competitors might shy away from.”

## TECHNOLOGY AND SAFETY INNOVATIONS

The 6X benefits from the tribal knowledge Dassault’s engineering organization has gained through development of preceding Falcons and military aircraft alike. That includes flight deck technology transfer from Dassault’s advanced Rafale fighter jet, with its





**The 6X represents the latest advance in digital flight control technology.**

finely tuned Digital Flight Control System. DFCS improves handling, safety, and ride in turbulent conditions.

The 6X represents Dassault's latest advance in digital flight control technology, managing primary and, for the first time, secondary flight control surfaces such as flaps and flaperons, as well as nose wheel steering for better tracking in gusty conditions and on wet runways.

The 6X is the first business aircraft to incorporate flaperons, active high-speed deflection control surfaces that can act as both flaps (increasing lift) and ailerons (roll control). Integrated into the DFCS, flaperons are especially beneficial during approaches with a steep descent profile

(for example, on the steep glidepath into London City airport), increasing drag while maintaining a high-lift coefficient.

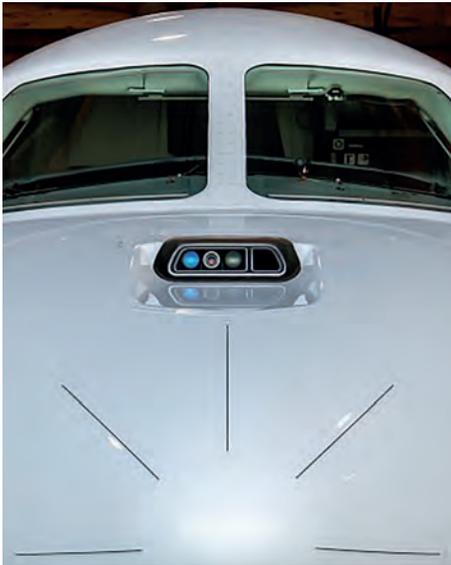
As an added benefit, "digital flight controls save weight and improve reliability," Brana adds. But not all digital flight control technology is equal. "The 'magic' in DFCS has much to do with experience in programming flight laws," Brana explains. And no company in business aviation has more experience in developing digital flight control laws and related hardware than Dassault, which has developed fly-by-wire technology in its fighters over more than four decades. It is the only business jet manufacturer

that designs and manufactures its own Digital Flight Control System, one that provides more functionality and safety than any other.

The 6X's spacious, ultra-widebody flight deck offers more headroom than the flight deck in any other business aircraft, and 30 percent more window space than previous models, providing greater situational awareness in the air and on the ground. The broader flight deck allows entry and egress without climbing across the center console, and there's more storage space for the crew's gear. The pilot seats recline to 130 degrees, allowing pilots to get into a more comfortable position on long-range flights.



# FALCONEYE



The FalconEye Combined Vision System brings a new dimension of technology and safety to the 6X. It is the first Head-Up Display (HUD) that combines images from a synthetic vision system (SVS), derived from database-driven terrain mapping, with images from a thermal and low-light enhanced vision system (EVS). Joined into a single view, FalconEye provides an unprecedented level of situational awareness to flight crews in challenging weather conditions and all phases of flight.

Developed in partnership with Elbit Systems, the heart of FalconEye's EVS system is a fourth-generation camera that integrates six sensors across a large bandwidth of visible and infrared spectrums. One advantage of the new sensors is the ability to pick up "cool" LED airport lighting.

The 30-by-40-degree field of view on the

FalconEye HUD that displays the imagery is one of the widest on any HUD, ensuring full viewing coverage with HD-quality 1280-by-1024-pixel resolution.

FalconEye permits approaches to 100-foot minimums, providing a substantial operational benefit.

Also on the flight deck: EASy III, the third-generation of Dassault's Enhanced Avionics System (EASy), powered by Honeywell's Primus Epic platform. Among new features are an integrated controller-pilot data link communication (CPDLC) system and RDR 4000 IntuVue 3D color weather radar that provides predictive lightning and hail detection as well as 60-nautical-mile-range Doppler turbulence detection. Hazardous weather and the vertical definition of thunderstorms can be seen at distances up to 320 nm.



## DEFINING NEW PERFORMANCE BENCHMARKS



With its high lift slats and flaps and new and brawny Pratt & Whitney Canada PurePower PW812D engines, the 6X continues the Falcon tradition of strong short field/high and hot runway performance. Approach speeds can be as low as 109 knots, allowing operations at short fields under 4,000 feet (1,220 meters).

The 6X also demonstrates the mission flexibility for which Falcons are prized. Thanks to a high maximum landing weight, operators can make a short hop (a positioning flight, for example), pick up passengers and then fly a long intercontinental mission—all with a quick turn and no need to take on fuel. The 6X could fly the short leg from Washington D.C. to New York and then on to London or Geneva.

The 13,000- to 14,000-pound thrust P&W Canada PurePower PW812D turbofan shares the proven, rigorously tested common core technology used in Pratt & Whitney's PurePower® family of geared turbofan commercial engines, Brana notes. They are employed in 16 engine applications with more than 585,000 in-service hours.



The new PW812D delivers a double-digit increase in fuel efficiency, with improvements in fuel burn, environmental emissions, engine noise, and operating costs, setting a new "green" standard for emissions with the advanced TALON™ X combustor.

The improved efficiency also results in quieter operation and low vibration levels, "providing more comfort to passengers," and reducing the cost of ownership, according to Brana: "We estimate a 40 percent reduction in maintenance costs versus other engines in this class." The 6X will also be able to fly with a 50/50 mix of sustainable aviation fuel.

The new-generation Falcon 6X wing incorporates advanced structural architecture and a curved trailing edge with an increased buffet margin and increased lift/drag ratio that reduces the impact of turbulence. The wing allows for a wide speed envelope bounded by low-speed approaches to short-fields and a top speed of Mach .90. The 6X will have the longest range in its class, flying 5,100 nm (9,445 km) at high-speed cruise of Mach .85, or its 5,500-nm

(10,186 km) maximum at Mach .80. It can fly from Moscow to New York, Paris to Beijing, London to Los Angeles, São Paulo to Chicago, or Shanghai to Melbourne at high-speed cruise. Or Beijing to San Francisco, Los Angeles to Geneva, Moscow to Singapore, or São Paulo to London at long-range cruise.

**With its high-lift slats and flaps and new and brawny Pratt & Whitney Canada PurePower PW812D engines, the 6X continues the Falcon tradition of strong short field/high and hot runway performance.**

## THE NEW LEADER HEADS SKYWARD

Flight testing began in March and now three aircraft are flying in the test campaign, which is expected to wrap up next year.

“A lot of important testing was accomplished before the 6X even began flying,” explains Brana. “This is our HALT and HASS testing for Highly Accelerated Life Testing and Highly Accelerated Stress Screen.” The tests have proven “very effective for ensuring reliability and durability of components and systems and put us ahead of the curve when we began flying.”

Flight tests have also gone “quite smoothly,” with the jets showing “a high level of maturity relative to this point in a typical test program,” says Brana. By early summer, more than 200 test hours had been flown.

“We’ve opened up almost the entire flight envelope, including stalls and other tests, and various weights and CG positions,” Brana says. “Pilots are reporting that they are delighted with the aircraft’s handling characteristics.”

Falcon 6X s/n 003 is fitted with the Falcon 6X’s award-winning interior, including in-flight entertainment and communications systems, and is being used for cabin design validation.

“With a/c 3, we have begun testing the cabin environment and systems,” Brana reports. “We will map the entire cabin for temperature distribution and for sound, so that we can fine-tune the environmental system and the soundproofing. We’ll also evaluate all the galley, cabin, and lav systems—lighting, water, waste, plus the entertainment systems and communications.”

S/n 004 has been equipped with a full cabin interior—and will join the test fleet shortly, embarking later in the test program on a two-month global endurance flight campaign to ensure all systems are fully mature upon entry into service.

Meanwhile, production of additional Falcon 6Xs is in full swing, with s/n 010 having gone on the final assembly line in early July. Parts are already flowing to the worldwide customer service organization, as Dassault readies itself to introduce an all-new Falcon to the market.

Dassault, which has invested heavily to expand its global service organization, is training technicians now to care for the new aircraft, in part by assigning senior techs from around the Dassault MRO network to participate in maintenance activities on the test fleet.

In recent years the factory service network has added TAG Maintenance Services and ExecuJet MRO Services to expand service coverage in Europe, the Middle East and Asia. It has strengthened spares support, AOG service and many other aspects of its vast service organization. As a result, the company now routinely ranks number one in independent industry surveys.

“Part of this is strategic and part of it is the unique spirit of the worldwide Falcon family, encompassing both our operator community and all of our employees. They go beyond. In fact, our service motto is ‘Whatever it takes.’ And we truly live this,” says Brana.

Speaking of family, the heirs of Marcel Dassault, the founder, still are majority owners of the company and are intensely committed to the long-term health of the enterprise. Because of its unique ownership structure within the aviation world, Dassault believes it is better able to make long-term investment decisions.

The contemporaneous development of two new aircraft—the 6X and 10X—bears that out.

The family’s other interests sometimes figure into the unique experience of becoming a Falcon owner. Customers visiting the factory in Bordeaux Mérignac may find themselves in a vineyard, for example, sipping on an excellent St Emilion from Chateau Dassault.

As high tech as Dassault Aviation may be, it is also famous for the personal touch.



**The company now routinely ranks number one in independent customer service surveys.**

